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ARCHITECT

THE MAGAZINE OF THE AMERICAN INSTITUTE OF ARCHITECTS

December 2014 www.architectmagazine.com

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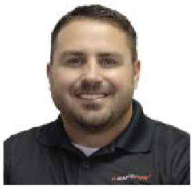

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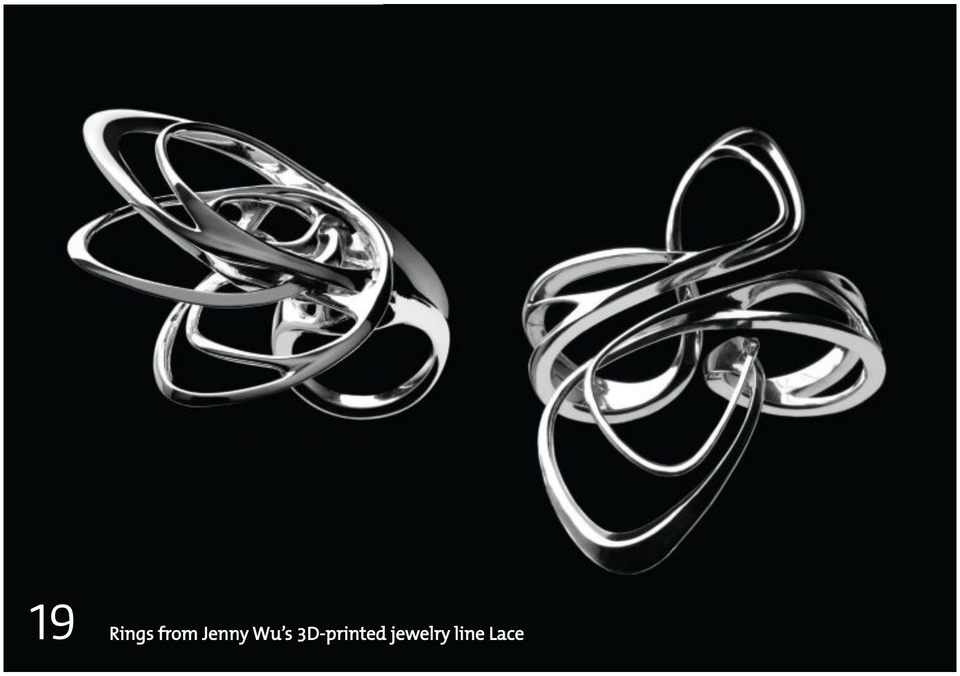
ON THE COVER

The Henderson-Hopkins School, designed by Rogers Partners Architects+Urban Designers, is an Honorable Mention in the Grow category of this year's Annual Design Review. Photo by Albert Vecerka/Esto.

MIKE SINCLAIR

12.14



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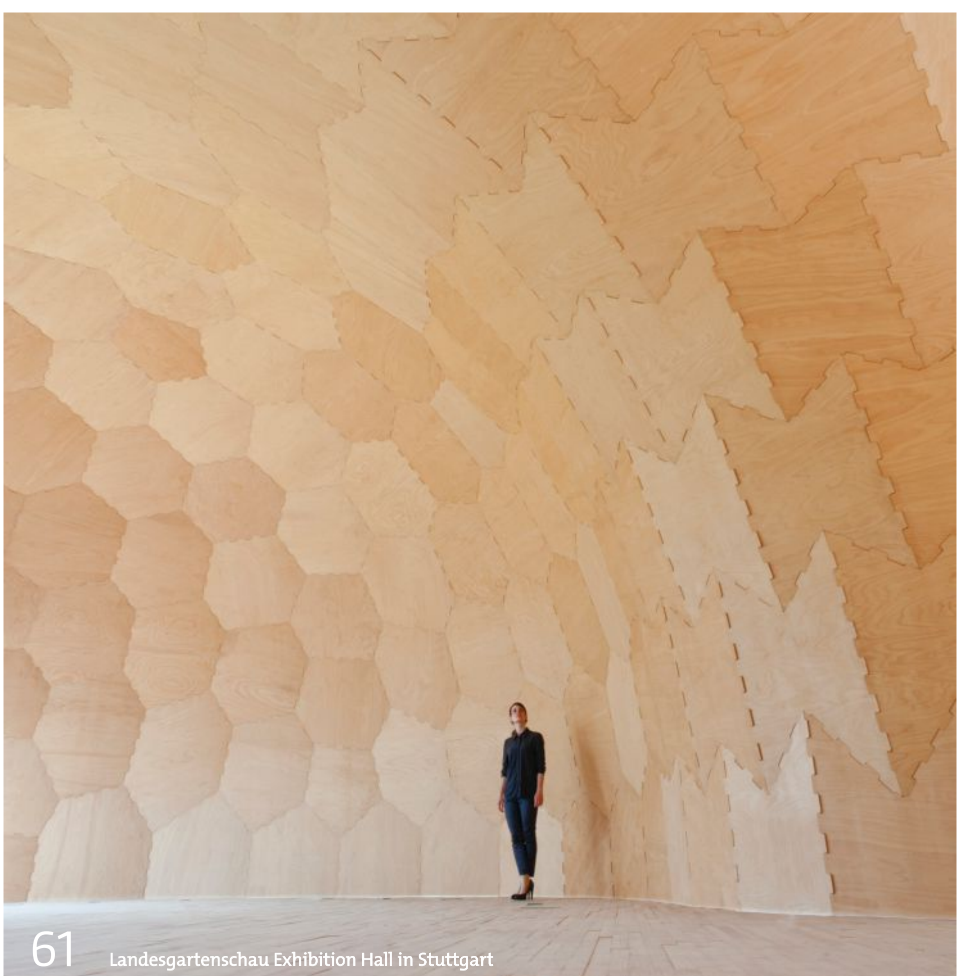

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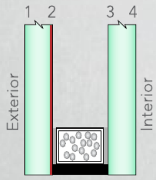

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DIALOGUE

DECIDING ON SOMETHING THAT WILL PLEASE 100,000 OR MORE ARCHITECTS AND DESIGNERS IS NO SMALL TASK.

DEAR SANTA,

ARE YOU LOOKING FOR INNOVATIVE WAYS TO SPREAD THE CHEER THIS HOLIDAY SEASON? LOOK NO FURTHER, O BEARDED ONE.

WINTERTIME IS A GOOD TIME in our house. The seasonal preparations begin in excited fits, far ahead of convention or necessity. My partner, for instance, usually starts playing Vince Guaraldi's *A Charlie Brown Christmas* soundtrack sometime in August.

In the office, we embark upon planning for the coming year with greater exactitude: making budget requests, drafting editorial calendars, and so forth. For 2015, we've also been cooking up something special for you. Be sure to check out the January issue. Hopefully you'll be pleased. But truth be told, we're a little apprehensive. Pleasing 100,000 or more architects and designers is no small task. When it arrives, let us know what you think.

I consider myself a pretty good gift giver, and, conversely, I've never been shy about sharing my own wish lists with loved ones. (I'm still hoping for a first edition of Johann Bernhard Fischer von Erlach's *Entwurff Einer Historischen Architectur*.) So given that we're sending something exciting your way, indulge me in a recitation of unwrappables that are guaranteed to make my 2015 extra-happy.

01. A Congress that works. At the beginning of 2014, contributor Nate Berg outlined the AIA's legislative priorities for the year (*bit.ly/AIALegislativePriorities*). For surveyed members of both the AIA and the Associated General Contractors of America, topping the list was a Congress that bickers less and legislates more. So now that the midterms have left the Republican Party with majorities in both houses, maybe we'll start seeing some action—on tax reform, infrastructure, and other vital issues for the profession.

02. Net neutrality. Yes, it matters. Just think: Many architecture firms use cloud-based servers (see page 56), and file sizes can be gargantuan. What happens if the telecom industry gets its way and can create tiered pricing for data services? We'll be keeping an eye on this in 2015.

03. Guinea pigs. No, not the animal kind, but just as happy-making. Back around convention-time, the National Council of Architectural Registration Boards (NCARB) rocked the architecture world by endorsing a path to licensure upon graduation from an accredited school, potentially reducing the duration of internships by many years (*bit.ly/NCARBRFP*). From Jan. 15 to June 1, the council will open an RFP for schools interested in piloting the idea. Let's hope there are lots of eager candidates.

04. A new title. While we're on the subject, I'm counting on good things from NCARB's Future Title Task Force (*bit.ly/NCARBFutureTitleTaskForce*), which is tasked with envisioning a term more fitting than "intern" for architecture graduates. In the AIA's Intern Titling Survey (*bit.ly/AIAInternTitlingSurvey*), the largest group of respondents, 25 percent, favored "associate architect" as an alternative. Hmmm.

05. BIM interoperability. It's not just for computer nerds anymore. As contributor Gideon Fink Shapiro explained back in April (*bit.ly/BIMstandards*), the establishment of universal standards for BIM software could be an AEC industry game changer, saving major time and money for architects and creating far greater value for clients.

06. Aunt Kathy's homemade caramels. A holiday gift tradition of tooth-numbing deliciousness and tragically decreasing regularity. Those readers who are not Katharine Cramer DeWitt of Cincinnati can ignore this one.

ELI KAPLAN

CONTRIBUTORS

PAST PROGRESSIVES

For the past six years, the Past Progressives department has anchored the back page of ARCHITECT, bringing a little historical perspective to our other coverage every month. Starting with the story in the January 2009 issue, which looked back at 1994 citation winner Wabasha Street Bridge in St. Paul, Minn., designed and submitted to the Progressive Architecture Awards by James Carpenter Design Associates, the duo of Thomas Fisher and John Morris Dixon have been trading off their examinations of P/A Award–winning unbuilt projects from past years, looking at how the architects' visions were turned into, or sometimes not turned into, completed buildings.

With 61 years of award winners, and counting, Fisher and Dixon have massive archives from which to select a compelling story each month, and invariably the duo find a project that is decades old yet addresses a current problem. And the two writers certainly possess enough experience with the topic to make the Past Progressives series a must-read: Dixon was at the helm of *Progressive Architecture (P/A)* magazine for more than two decades, and Fisher served as editorial director before moving on to academia. Fittingly, we end the series's regular print run this month with a project from 1992, a year in which Dixon was editor-in-chief of *P/A* and Fisher was executive editor.

THOMAS FISHER, ASSOC. AIA

Thomas Fisher, Assoc. AIA, is a professor in the School of Architecture and dean of the College of Design at the University of Minnesota. A graduate of Cornell University in architecture and Case Western Reserve University in intellectual history, he was recognized in 2005 as the fifth most published writer about architecture in the U.S. He has written more than 50 book chapters or introductions and more than 350 articles in professional journals and major publications. His books include *In the Scheme of Things: Alternative Thinking on the Practice of Architecture* (2006), *Salmela | Architect* (2005), *Lake|Flato: Buildings & Landscapes* (2005), *Architectural Design and Ethics: Tools for Survival* (2008), *Ethics for Architects: 50 Dilemmas of Professional Practice* (2010), *The Invisible Element of Place: The Architecture of David Salmela* (2011), and *Designing to Avoid Disaster: The Nature of Fracture-Critical Design* (2012). He has also lectured widely at a number of universities, professional meetings, and public venues.

JOHN MORRIS DIXON, FAIA

An architecture graduate of MIT, John Morris Dixon, FAIA, left the drafting board in 1960 for architectural journalism. Following staff positions at *Progressive Architecture* and *Architectural Forum*, he served as editor-in-chief of *P/A* from 1972 to 1996. During his career, he has observed 29 P/A Awards juries in action. With his staff colleagues, he strove to ensure that entries were legitimate, juries diverse, and judging unbiased, and he is pleased that this awards program has flourished for more than 60 years, now sustained by the third magazine to sponsor it. A fellow of the AIA, Dixon has served on numerous design competition juries and architect selection committees. He has chaired the AIA's national Committee on Design, on which he remains active, and is involved in preservation of modern architecture as a board member of Docomomo New York/Tri-State. He continues to write and edit for a variety of publications, in print and online.

➔ Turn to page 152 for Fisher's story on Mehrdad Yazdani and Ellerbe Becket's 1992 winning design for the Vermont/Santa Monica metro station in Los Angeles. And make sure to tune in to *architectmagazine.com* every month for a new story in the continuing, robust Past Progressives line.

FRONT

NUMEN/FOR USE

SUSPENDED ANIMATION

Something alien is growing inside Paris's Palais de Tokyo contemporary art center: a suspended 3D membrane of transparent tape and plastic. The brainchild of Central European art collective Numen/For Use, "Tape Paris" shudders and throbs as dark forms move beneath its skin. There's no cause for alarm. Honestly. It's just museumgoers climbing around inside. "Tape Paris" is on view through Jan. 11 as part of the exhibition "Inside."

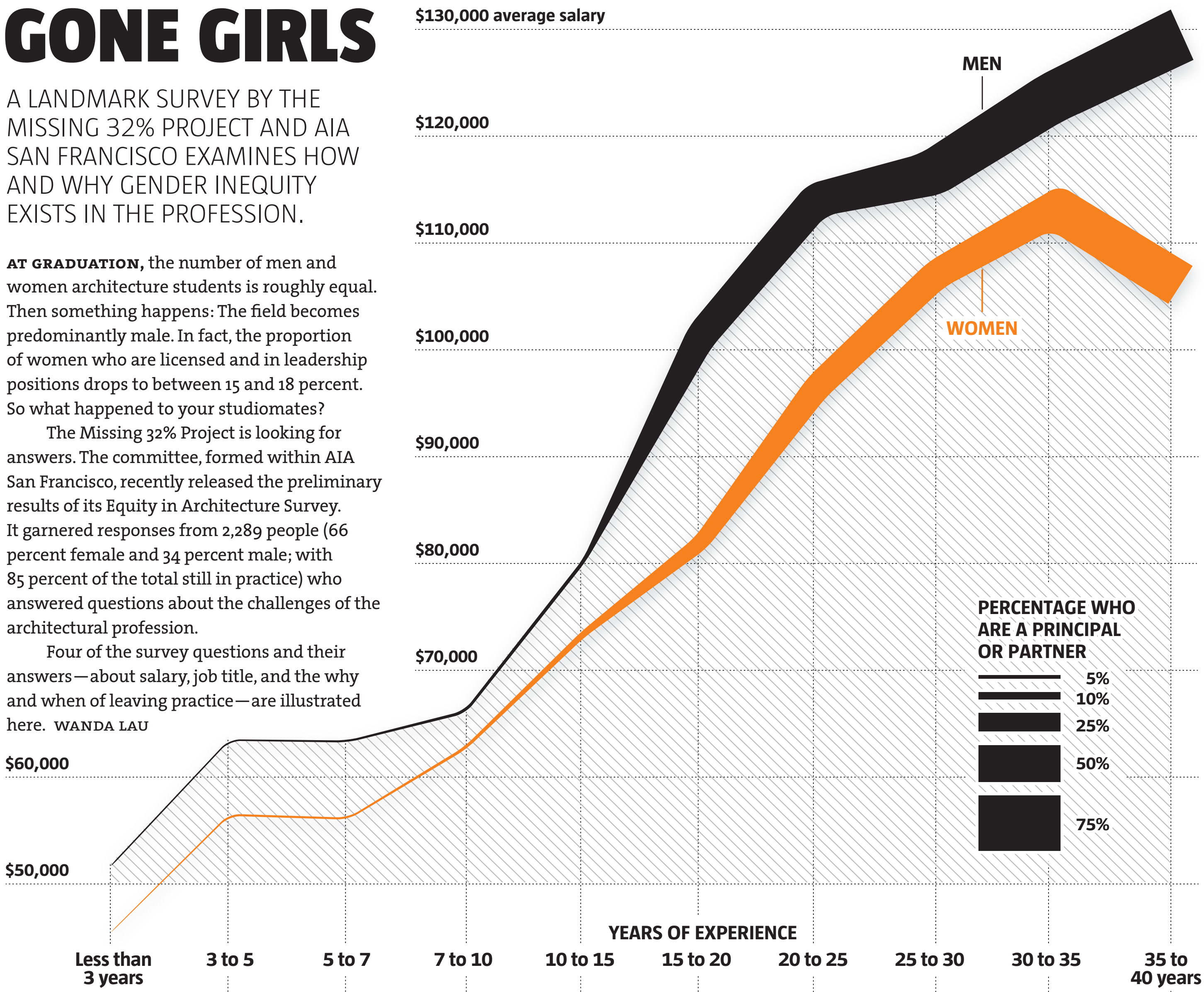
GONE GIRLS

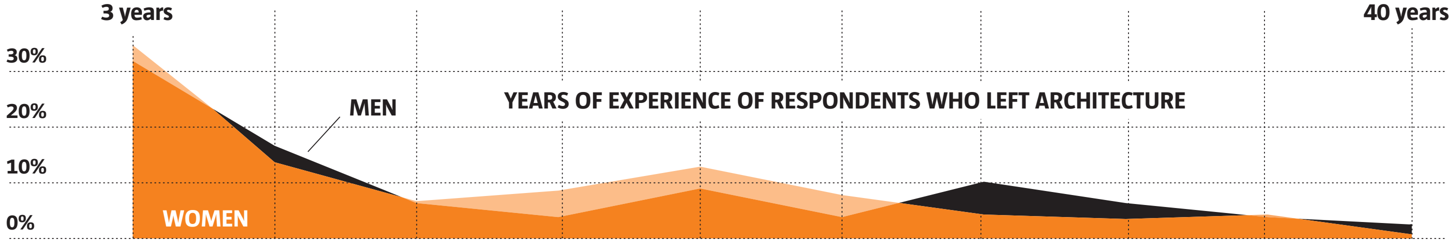
A LANDMARK SURVEY BY THE MISSING 32% PROJECT AND AIA SAN FRANCISCO EXAMINES HOW AND WHY GENDER INEQUITY EXISTS IN THE PROFESSION.

AT GRADUATION, the number of men and women architecture students is roughly equal. Then something happens: The field becomes predominantly male. In fact, the proportion of women who are licensed and in leadership positions drops to between 15 and 18 percent. So what happened to your studiomates?

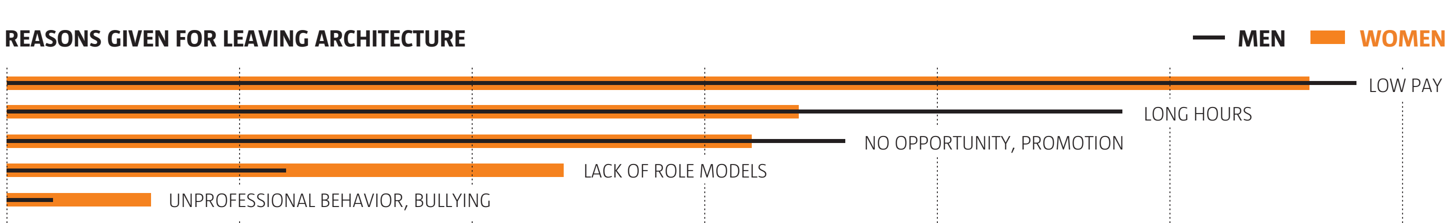
The Missing 32% Project is looking for answers. The committee, formed within AIA San Francisco, recently released the preliminary results of its Equity in Architecture Survey. It garnered responses from 2,289 people (66 percent female and 34 percent male; with 85 percent of the total still in practice) who answered questions about the challenges of the architectural profession.

Four of the survey questions and their answers—about salary, job title, and the why and when of leaving practice—are illustrated here. WANDA LAU





REASONS GIVEN FOR LEAVING ARCHITECTURE



For more data, as well as coverage of the Missing 32% Project's corresponding Equity by Design symposium, visit *bit.ly/Missing32Results.* For an even deeper dive into the survey results, visit *themissing32percent.com.*

NICOLAS RAPP

ARCHITECT THE AIA MAGAZINE DECEMBER 2014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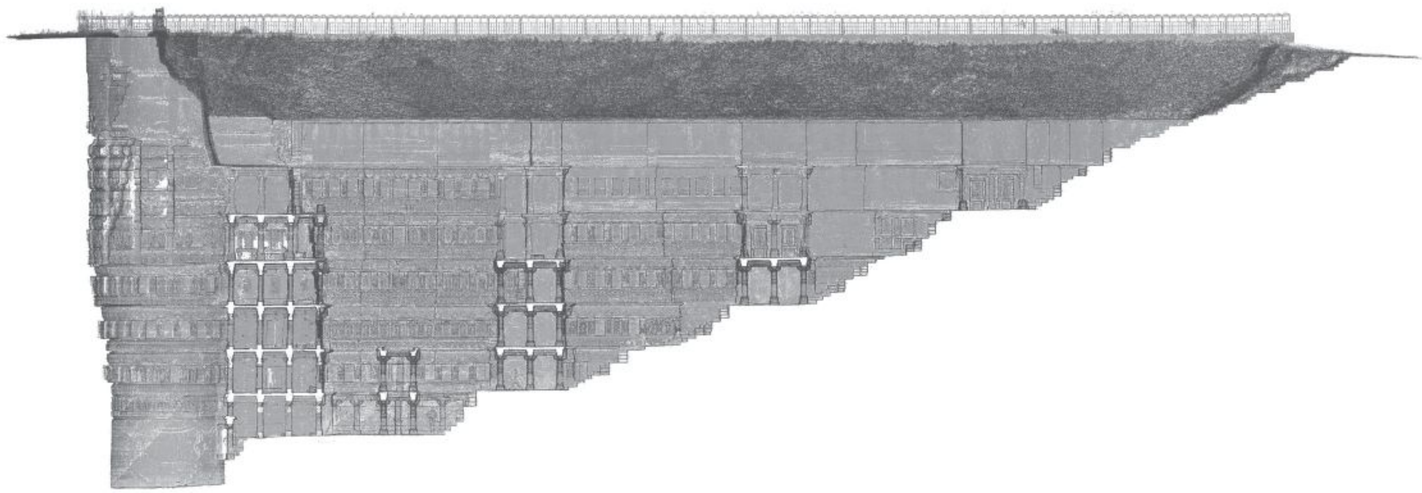
A STEP BACK IN TIME

STEPWELLS, STORIED SCULPTURAL INFRASTRUCTURE WORKS, EXIST IN UNKNOWN NUMBERS ON THE INDIAN SUBCONTINENT AND ARE IN DIRE NEED OF PRESERVATION.



A LACK OF ready access to water has long sparked ingenuity among civil engineers. (Consider the Roman Empire's aqueducts and the pumps that fed the elevated Alhambra citadel in Spain.) One solution, the stepwell, dates to the 3rd century B.C. and now risks being swallowed up by time. Unique to the Indian subcontinent, where the climate oscillates from arid to monsoon, stepwells descend deep into the earth to a cistern at the water table.

Built by both Hindu and Muslim groups, the civic wells were open to men and women of all faiths. "They were the most democratic structures in India," says Victoria Lautman, a Chicago-based journalist who has spent months in India, visiting sites and researching the topic.

Stairs and sometimes shaded arcades surround the well. Ornate details tell of their dual use as temples, memorials, and travel shelters, while their inverted pyramid form acts as a buttress. Thought to tally in the thousands at their peak of use in the 18th century, they have since been pushed into disrepair by new technology and ebbing water tables. Only a few hundred remain, and even fewer are navigable.

In June, one important stepwell, Rani-ki-Vav (shown) in India's Gujarat state, was named a UNESCO World Heritage Site after extensive modeling and digitization through a project of the Scottish government. The seven-story, 11th-century well is noted for its size—64 meters wide, 20 meters long, and 27 meters deep—and its well-preserved features (it partially collapsed and filled with silt early on), Lautman says. Some stepwells are being revived in Delhi as water tables rise in light of local restrictions on borewell drilling. Still, she says, "the [wells] to worry about are the ones … that are falling apart and no one will ever see."

HALLIE BUSTA

For two weeks in 2011, members of the heritage project Scottish Ten, which includes digital archiving firm CyArk, worked with the Archaeological Survey of India to scan the Rani-ki-Vav stepwell in India. Built between 1022 and 1063 A.D., it was rediscovered in the 1950s, and can be viewed online at *cyark.org*.

TOP: HISTORIC SCOTLAND, THE SCOTTISH TEN, CDVD, DIGITAL DESIGN STUDIO AT THE GLASGOW SCHOOL OF ART AND CYARK; BOTTOM: STEPH CARLISLE

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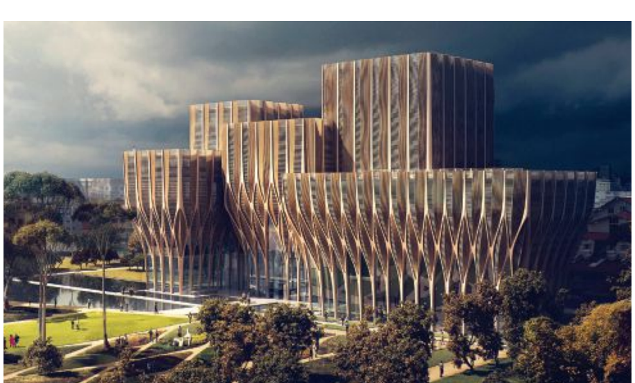
On The Boards: King Abdullah Financial District Metro Station, Riyadh, Saudi Arabia (top, estimated completion 2017); The Sleuk Rith Institute, Phnom Penh, Cambodia (below, will begin construction in 2015)
Notable Work: Jockey Club Innovation Tower, Hong Kong (right, completed 2014)

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



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UP AND RUNNING:
PUBLIC RELATIONS STRATEGIES FOR YOUR PRACTICE

A CRUCIAL PART of running an architecture firm is attracting clients. This requires marketing. Whether connecting virtually through online platforms or in-person through word-of-mouth or old fashioned networking, a firm needs to actively promote itself. Here are a few marketing tips that can help firms to get their name out—and get the contract. NATE BERG

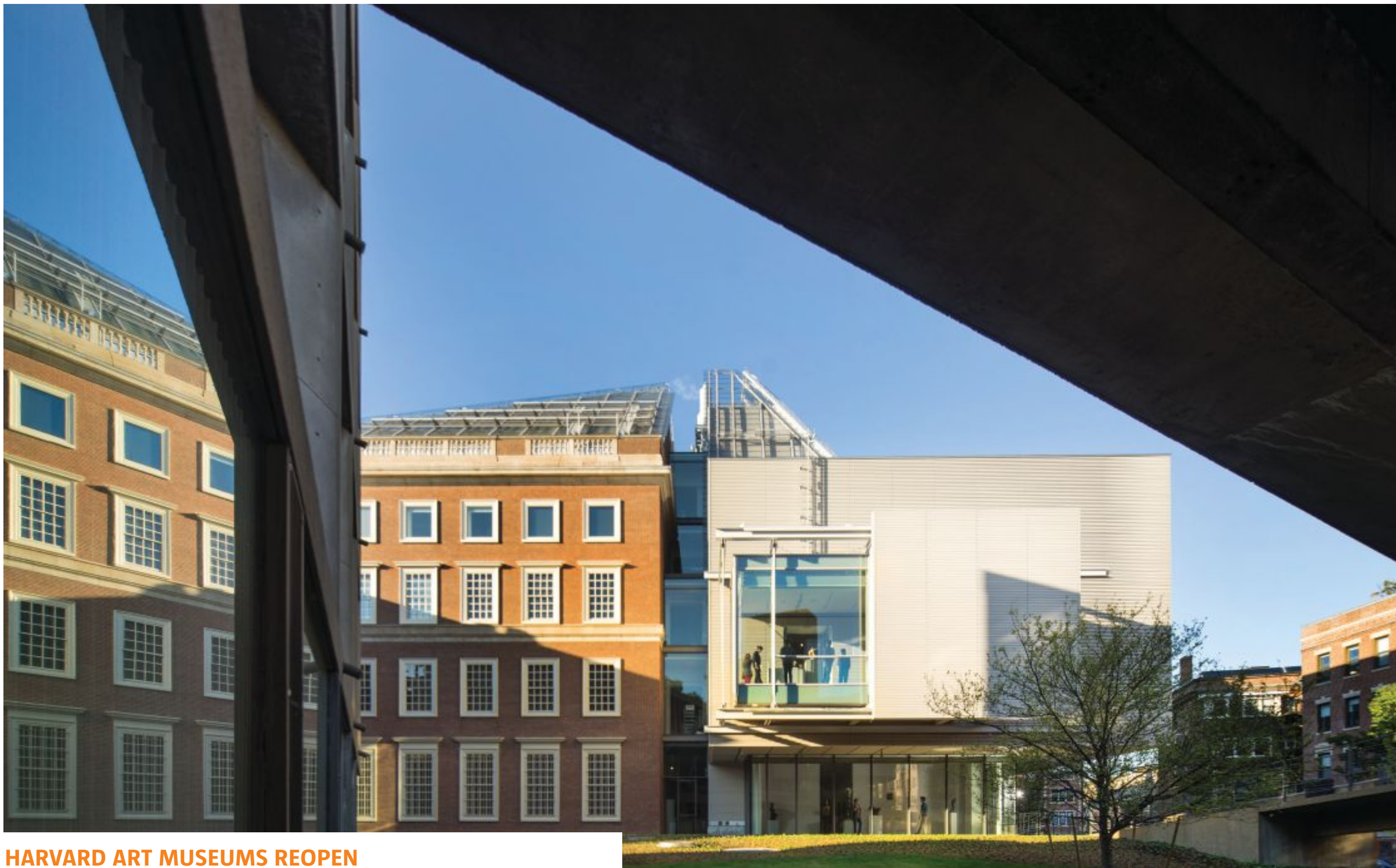
TIP 1: Establish a reputation in the community by engaging with people face-to-face. "Get out, speak a little more, be active with a local AIA chapter, go to events," says Michelle DiLello, vice president of New York public relations firm Susan Grant Lewin Associates. Schmoozing with the competition might not seem like a great way to snag new clients, but it will increase your exposure. Or your peers might be seeking collaborators or suggest your firm when asked for referrals.

TIP 2: Increase your visibility. ARCHITECT's online database of firms and projects is a good starting point. Also consider social media platforms, blogs, and email newsletters. "Look for places where you can tell your stories. Create your own media," says Cooper Smith Koch, principal of Dallas-based Cooper Smith Agency. Boston's Hacin + Associates embraced the idea by launching a publication: *H+ Magazine*. "The people you are marketing to are not thinking about architecture in the same way that you are," says president David Hacin, FAIA. "Think about your audience and contextualize your work in a way that is going to resonate."

TIP 3: Engage with the media. Print magazines, websites, and blogs can lend credibility to new firms, so don't be shy about politely approaching journalists. "Ensure those people are on your mailing lists so they're getting updates," DiLello says. It may be tempting to gear your marketing efforts towards top-tier printed publications, but firms shouldn't forsake attention from websites and blogs, Koch argues. Coverage online "has a longer shelf life," he says. And it is more easily searched and shared.

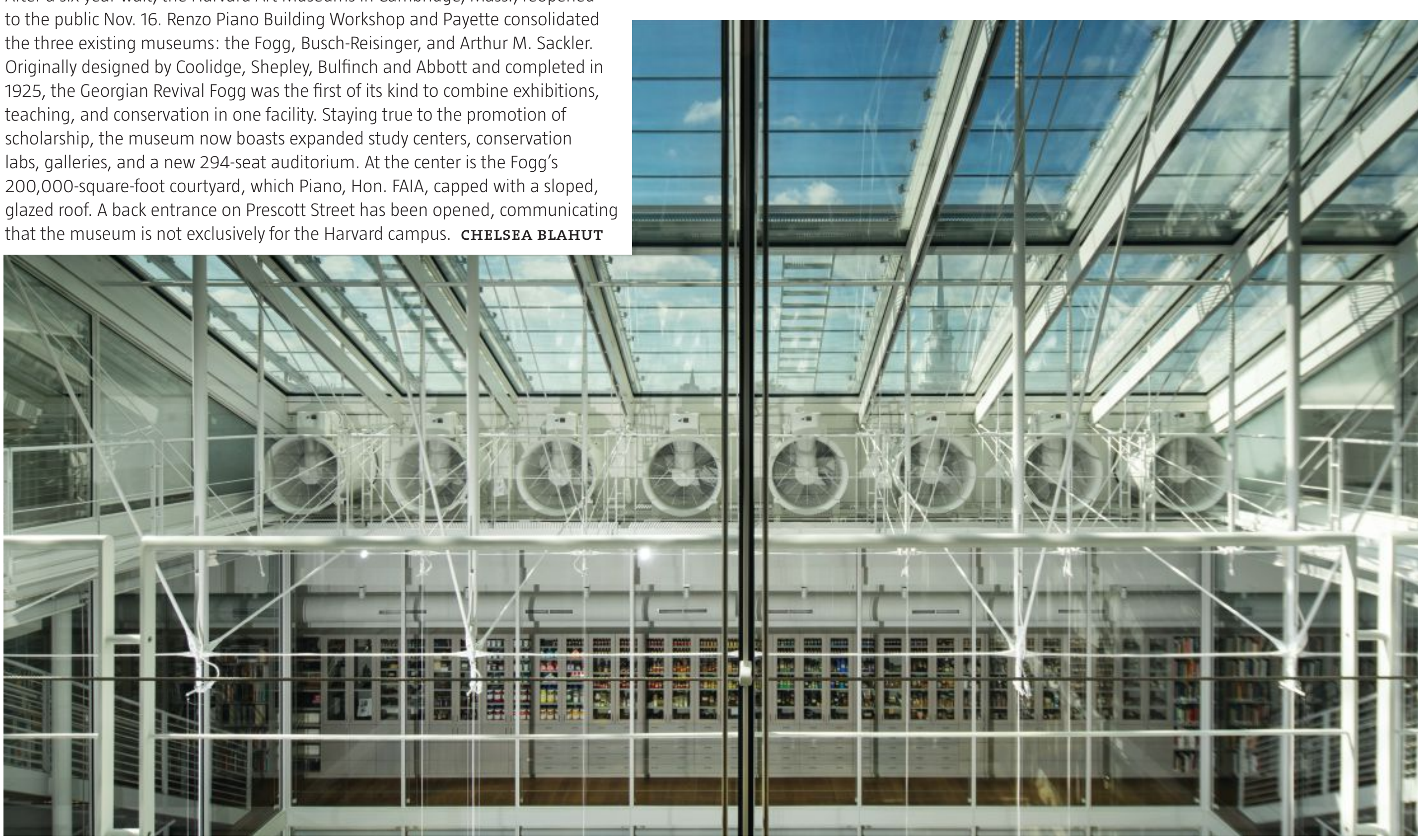
TIP 4: Show off your completed projects to attract new business. Photography is the single most important thing. "Everyone wants to see what's being talked about," Koch says. "If you don't have a good photograph, you don't have a good story. Period." Firms need to hire a professional photographer to help make their projects look as great as they are, he adds. "If you're going to invest in anything, invest in really good, high-quality photography." Whether it brings in new clients or just a little bit more attention to your young firm, the investment will pay off.

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



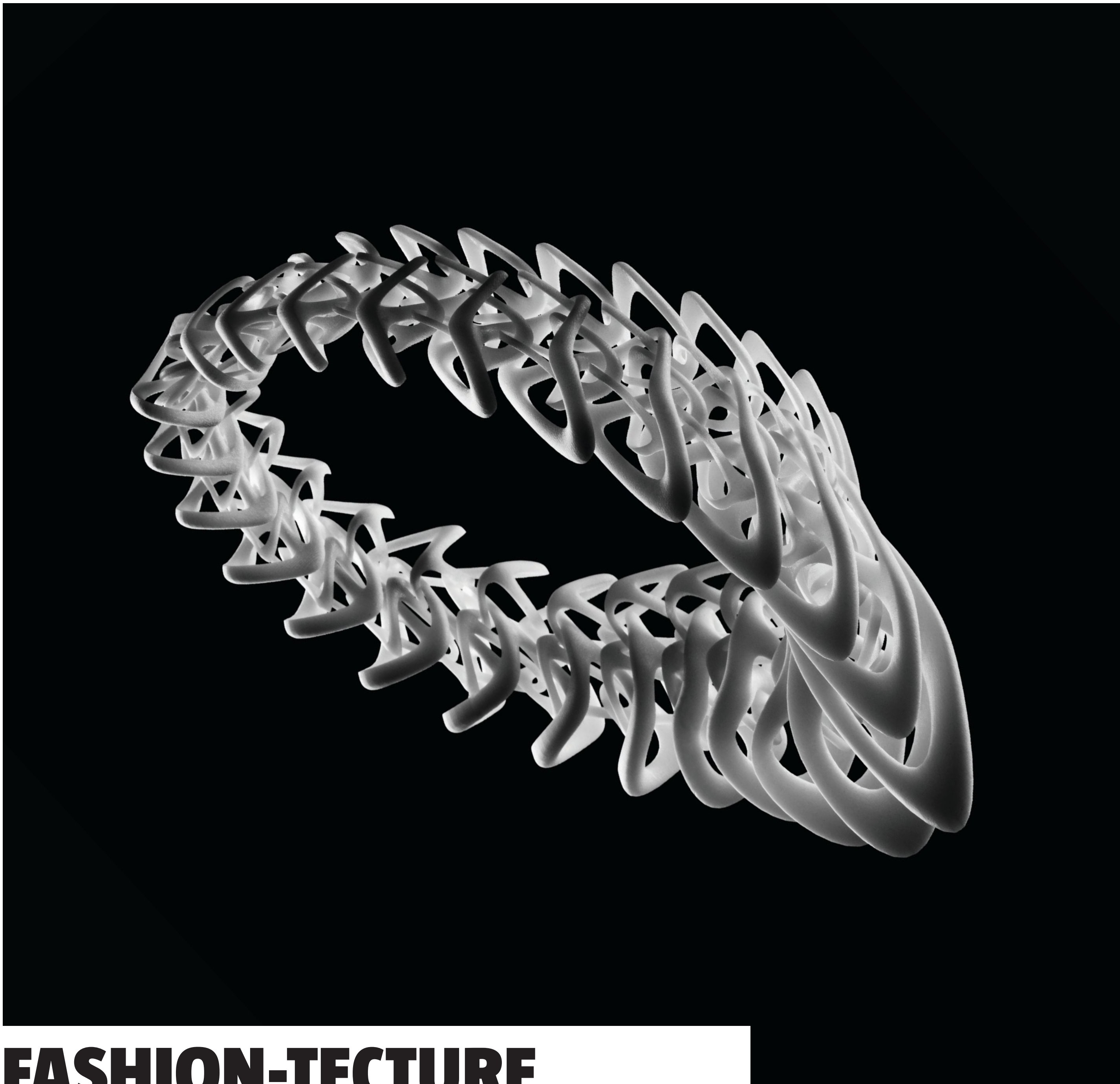
HARVARD ART MUSEUMS REOPEN

After a six-year wait, the Harvard Art Museums in Cambridge, Mass., reopened to the public Nov. 16. Renzo Piano Building Workshop and Payette consolidated the three existing museums: the Fogg, Busch-Reisinger, and Arthur M. Sackler. Originally designed by Coolidge, Shepley, Bulfinch and Abbott and completed in 1925, the Georgian Revival Fogg was the first of its kind to combine exhibitions, teaching, and conservation in one facility. Staying true to the promotion of scholarship, the museum now boasts expanded study centers, conservation labs, galleries, and a new 294-seat auditorium. At the center is the Fogg's 200,000-square-foot courtyard, which Piano, Hon. FAIA, capped with a sloped, glazed roof. A back entrance on Prescott Street has been opened, communicating that the museum is not exclusively for the Harvard campus. CHELSEA BLAHUT



NIC LEHOUX

Watch a video walk-through of the new Harvard Art Museums at *architectmagazine.com/videos*.



FASHION-TECTURE

THIS COLLECTION OF 3D-PRINTED AND CAST JEWELRY BY LOS ANGELES–BASED DESIGNER JENNY WU MAKES DIGITAL FABRICATION FABULOUS.

DESIGNER JENNY WU caught more than a few eyes when she wore jewelry she designed and fabricated to Art Basel Miami Beach last year. A partner at the Los Angeles–based Oyler Wu Collaborative, Wu was inspired to create Lace, a collection of 3D-printed and cast necklaces (Tangens, shown), earrings, and rings that launched this fall. The interwoven pieces are inspired by the firm's architectural work but offer softer lines and organic forms that consider the human body as a site, she says. Modeled in Autodesk Maya, the pieces are iteratively prototyped to understand how the materials—which include 3D-printed selective-laser sintered polished nylon and silver cast from a 3D-printed wax mold—will behave in use. But fashion and architecture differ in testing, says Wu, who is teaching a wearable-design seminar at SCI-Arc. "You can do mock-ups, but [until the building is done], you don't get to physically experience it," she says. With jewelry, "there's an instant gratification." Prices start at $40; *jennywulace.com*. **HALLIE BUSTA**

MIKE BASHER

October 2014

Architecture Billings Index
53.7
↓ 1.5 pts

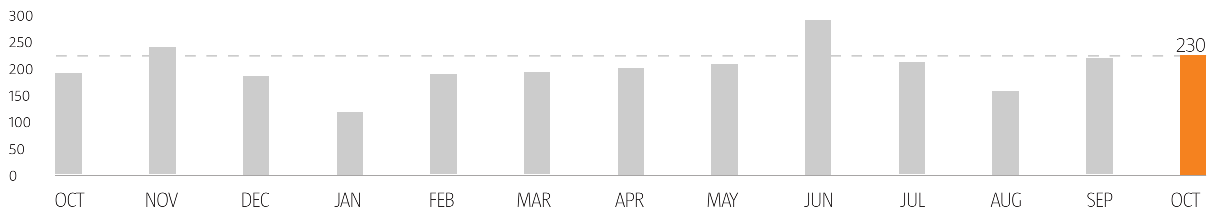
Institutional
54.4
= no change

Mixed Practice
56.9
↑ 2.1 pts

Commercial
52.3
↑ 0.8 pt

Multifamily Residential
54.7
↓ 0.4 pt

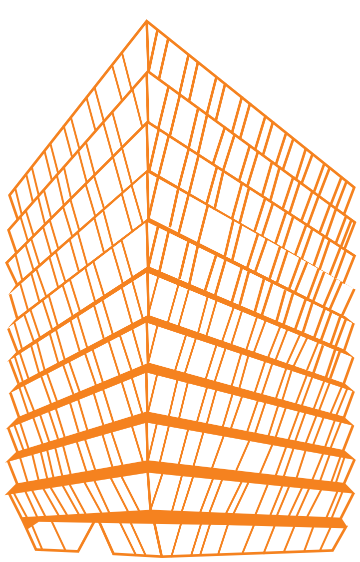
ADP NATIONAL JOB GROWTH IN THOUSANDS



1,715

DESIGN ENTRIES FOR THE GUGGENHEIM HELSINKI

Now, you too can play juror in the design competition for the new Guggenheim museum in Helsinki. The Solomon R. Guggenheim Foundation has posted all 1,715 submissions for the new building at designguggenheimhelsinki.org/stageonegallery. These schemes are from the preliminary, open-call portion of the design competition, which was launched this past June and was run by London's Malcolm Reading Consultants. The six official shortlisted ideas will be unveiled on Dec. 2 (about the time you are reading this), and from those a winner will be announced in June 2015. The Guggenheim Helsinki is slated for the city's Eteläsatama, or South Harbor, neighborhood. SARA JOHNSON



ROLLING ON THE (RHINE) RIVER

Designs for two office buildings by the team of MVRDV and morePlatz, both firms based in Rotterdam, beat out six other entries in an international competition to transform downtown Mainz, Germany, and its industrial harbor, Zollhafen, into a more versatile urban center. Together dubbed "Hafenspitze," the winning structures comprise a 12,000-square-meter, block-long, five-story building with a roof garden and an 11-story high-rise structure (at left) designed to be a visual landmark along the city's Rhine River waterfront. The buildings are intended to be the first phase of a broader redevelopment. "MVRDV will create an architectural highlight in the Zollhafen quarter. The profile of the city will be given a contemporary twist along Neustadt's future promenade by the Rhine, forming an antithesis to the medieval heart of the old town," said Michael Ebling, the mayor of Mainz. Both buildings will feature a tapered plinth to accommodate views of the city center and harbor, while differentiating themselves in their materiality and volumes. The high-rise will have windows on all four sides with dark-colored, slate-shingle cladding. The five-story building will be clad in a skin of folded, prefabricated concrete panels to emulate the three-dimensional look of stacked stone. Construction is expected to begin in the fall of 2015. CHELSEA BLAHUT

October Jobs Report

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

8,000	+	5,500	−	1,900	+	2,900	=	**14,500**
Residential Construction		Heavy and Civil Engineering		Nonresidential Construction		Architectural and Engineering Services		Total Construction Jobs Added

STEP UP ↑

Hashim Sarkis
Dean
MIT School of Architecture + Planning

Adèle Naudé Santos, FAIA's successor has been found in Sarkis, who is currently the Aga Khan Professor of Landscape Architecture and Urbanism in Muslim Societies at the Harvard Graduate School of Design. A full professor at Harvard since 2002, Sarkis will pack up and move down Massachusetts Avenue to be the new MIT architecture dean effective in January.

Steven White, AIA
Principal and director
Fentress Architects' Washington, D.C., office

Chris Morrison, FAIA
Managing director
Perkins+Will's Washington, D.C., office.

Andrew Rozzi
Designer
Studio3877, Washington, D.C.

Monica Obniski
Demmer curator of 20th and 21st Century Design
The Milwaukee Art Museum

Obniski will start in January and will assist in the museum's renovation and reinstallation of its permanent collection.

"The State of the Art of Architecture"
2015 Chicago Architecture Biennial

This is the name the Second City's architecture biennal has chosen for itself. The event also has selected a first commission, a collection of photos of the city by architecture photographer Iwan Baan.

STEP DOWN ↓

Robert A.M. Stern, FAIA
Dean
Yale School of Architecture

Hashim Sarkis isn't the only architecture professor who has decided to leave his post in the Ivy League. On Nov. 7, the Yale Daily News reported that Robert A.M. Stern is planning to retire at the conclusion of his current term as head of the architecture school, which ends in spring 2016.

Michael F. Ross, FAIA
Vice president and principal
HGA Architects and Engineers

Ross retired on Nov. 7 after 12 years with the Minneapolis-based firm.

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The Greenbuild LivingHome in partnership with LivingHomes, Make It Right, and the Cradle To Cradle Products Innovation Institute was permanently placed for occupancy in the Lower 9th Ward in New Orleans after the Greenbuild International Conference & Expo.

*Final LEED certification will occur after reassembly on Make It Right site in New Orleans.

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PHOTO: CARL BOWER

AIAVOICES

SUSTAINABILITY'S FUTURE | CAMPUS AND COMMUNITY AS ONE

Peter Walker, the new dean of the Falk School of Sustainability at Chatham University in Pittsburgh, is a researcher and educator who has spent the last 25 years working in the field on humanitarian crises. Walker, who holds a bachelor of science in environmental sciences and a doctorate in soil science from Sheffield University, has specific goals for the next generation of sustainability leaders centered on the construction of Falk, billed as the U.S.'s first completely sustainable campus. "You don't learn everything by sitting in a classroom," he says. "You also learn a great deal by doing."

OUR CAMPUS IS AN EXAMPLE OF WHAT YOU CAN DO WHEN YOU question assumptions about living and working. Being part of a university, it's an example of creating a laboratory from scratch, where we can try ideas, test them, and refine them. Our first residents will arrive in the fall of 2015.

We'll be doing all of our own water treatment on the site via natural systems, generating all of our own energy through PV arrays, geothermal wells, and a farm that currently produces all the vegetables we eat on campus. A truly sustainable campus is not just about the buildings, but about how we use these buildings and how we incorporate the community into the campus. We are in a rapidly growing economic area, and so there are a lot of opportunities to bring people in—whether for workshops, night classes, or to create startup farms on campus with school-supported training.

For a degree like sustainability, which is in its first round of development—maybe five or 10 years—what you're looking for is a strong mix of academic experience and practical skills. We don't want this to be simply vocational. We want it to be a rigorous exploration.

Looking at the market, the sustainability sector is one of the fastest-growing in the U.S. Ten years ago, virtually no businesses had a sustainability officer. Now, a wide range of companies have sustainability officers—banks, engineering firms, school districts, and so forth. Conservation, efficiencies, optimizations—these are concepts that inform our MBA/Master of Sustainability dual degree. The reason we created it is because most MBA degrees are relatively generic. We're saying that, yes, you need basic business skills, but you also have to have an understanding that increasing margins and cutting expenditures is not the only way to profit.

If you're truly going to think about things sustainably, you have to look at scale. Sure, you can deal with individual buildings and their performance or materials. But if you step up the scale and think about infrastructure around that building, such as the fact that it may sit in a valley or the weather patterns that affect that valley, you start to see how a building affects—and is affected by—a much larger area than its immediate footprint.

You also have to step up the time scale. Let's say you want to build sustainable systems. My questions are: For how long? Will it be sustainable in 50 years? 100 years? In other words, it's not just a generational concern with short-term goals and quick wins to simply do something that will benefit one's children. It's an intergenerational challenge. *—As told to William Richards*

AIANOW

By William Richards
Art Direction by Jelena Schulz

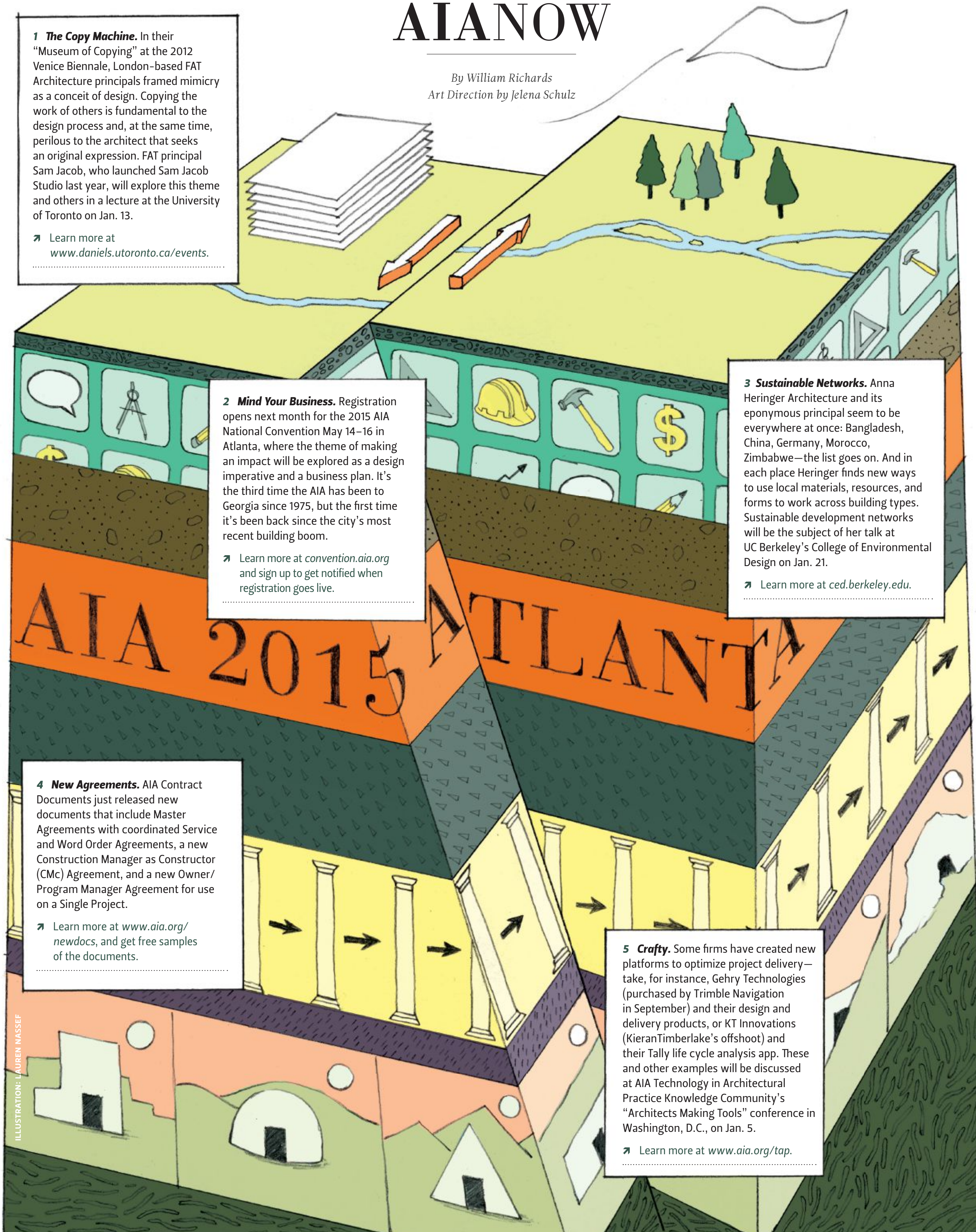

ILLUSTRATION: LAUREN NASSEF

1 ***The Copy Machine.*** In their "Museum of Copying" at the 2012 Venice Biennale, London-based FAT Architecture principals framed mimicry as a conceit of design. Copying the work of others is fundamental to the design process and, at the same time, perilous to the architect that seeks an original expression. FAT principal Sam Jacob, who launched Sam Jacob Studio last year, will explore this theme and others in a lecture at the University of Toronto on Jan. 13.

↗ Learn more at *www.daniels.utoronto.ca/events.*

2 ***Mind Your Business.*** Registration opens next month for the 2015 AIA National Convention May 14–16 in Atlanta, where the theme of making an impact will be explored as a design imperative and a business plan. It's the third time the AIA has been to Georgia since 1975, but the first time it's been back since the city's most recent building boom.

↗ Learn more at *convention.aia.org* and sign up to get notified when registration goes live.

3 ***Sustainable Networks.*** Anna Heringer Architecture and its eponymous principal seem to be everywhere at once: Bangladesh, China, Germany, Morocco, Zimbabwe—the list goes on. And in each place Heringer finds new ways to use local materials, resources, and forms to work across building types. Sustainable development networks will be the subject of her talk at UC Berkeley's College of Environmental Design on Jan. 21.

↗ Learn more at *ced.berkeley.edu.*

4 ***New Agreements.*** AIA Contract Documents just released new documents that include Master Agreements with coordinated Service and Word Order Agreements, a new Construction Manager as Constructor (CMc) Agreement, and a new Owner/Program Manager Agreement for use on a Single Project.

↗ Learn more at *www.aia.org/newdocs*, and get free samples of the documents.

5 ***Crafty.*** Some firms have created new platforms to optimize project delivery—take, for instance, Gehry Technologies (purchased by Trimble Navigation in September) and their design and delivery products, or KT Innovations (KieranTimberlake's offshoot) and their Tally life cycle analysis app. These and other examples will be discussed at AIA Technology in Architectural Practice Knowledge Community's "Architects Making Tools" conference in Washington, D.C., on Jan. 5.

↗ Learn more at *www.aia.org/tap.*

Future Proofing the Past

Predicting and preparing for future impacts may be the greenest approach to preservation we've seen.

BY KIM A. O'CONNELL

THE HISTORIC SEASIDE TOWN OF MANTOLOKING, LOCATED ON THE scenic Barnegat Peninsula, has long been a gem of coastal New Jersey. A province of charming shingle-style cottages, the town boasts two districts that have been named eligible for the National Register of Historic Places, which include homes designed by Stanford White of McKim, Mead, and White.

When Hurricane Sandy tore through the town in October 2012, however, more than 90 percent of Mantoloking's buildings were damaged or destroyed.

Could this kind of wholesale devastation have been predicted or prevented? And could historic buildings and their immediate contexts have been protected? These are the central questions surrounding a relatively new way of thinking about preservation and sustainability called "future proofing." The term is similar to the hot-button concept of resiliency in that it is an attempt to understand the threats and changes that are facing our existing building stock, not just now but well into the future, and to minimize their negative impacts.

For historic buildings, future proofing means preparing for those changes in a way that protects a building's historic character while extending its lifespan and conserving resources. So far, however, there has been no widely accepted rubric for applying concepts of future proofing or resilience to historic preservation and heritage conservation. Brian Rich, AIA, principal at Seattle's Richhaven Sustainable Preservation Architecture, is hoping to change that. He is among a growing number of architects working on resilience issues, but with a particular emphasis on historic resources.

"Sustainability is still a valuable term and concept, though waning in popularity," Rich says. "I believe it is coming to be understood as a very important aspect of resiliency and future proofing. I selected the term 'future proofing' because I wanted to make the point that there is potentially a wider definition of resiliency which can be understood, and that it varies depending on the subject under discussion."

Rich is developing a set of principles that would bring the concepts of future proofing and resiliency into recognized preservation standards. These include preventing decay, incorporating flexibility and adaptability, fortifying buildings against climate change and shortages of materials and energy, increasing durability and redundancy, using local materials, and rejecting planned obsolescence. None of this is really new, but Rich hopes to codify the concepts so that they are considered equally alongside established rubrics such as the Secretary of the Interior's Standards for Rehabilitation.

What this means in practice is that future proofing may require a more flexible approach to dealing with historic materials, context, and character. In one scenario, a historic building might need to be moved to a new site to be truly resilient, taking it out of its historic context. In another, a historic site might have to be shored up with more durable materials that are different from the original fabric.

"The Secretary of the Interior's standards are likely not able to keep up with the evolving understanding of heritage conservation," Rich says. "The key issue here is that because of the thousands of jurisdictions that have adopted the [Interior] Secretary's standards, most have only adopted the [department's] Rehabilitation standards and have done so not by referencing them, but rather by writing them into the codes that are passed by local legislative bodies. This makes it nearly impossible to change them all." Rich is hoping to encourage historic landmark commissions to adopt the principles of future proofing, or to have them be the basis of a new cultural heritage document like the 1964 Venice Charter, an influential guideline governing the protection of cultural monuments worldwide.

Broader Applications

Finding a balance between future proofing and preservation is something the National Trust for Historic Preservation is grappling with at the Farnsworth House, the iconic house that Ludwig Mies van der Rohe designed for the Chicago nephrologist Edith Farnsworth, which was completed in 1951 and purchased by the Trust in 2003. The house is notoriously prone to flooding, particularly in 2008 when Hurricane Ike tore through the Midwest, causing extensive damage and costly repairs to the structure, its systems, and its furnishings.

"We preservationists will have to expand our comfort zone—in particular the concept of site integrity," says Ashley R. Wilson, AIA, Graham Gund Architect for the National Trust for Historic Preservation and a member of the AIA Historic Resources Committee (HRC) Advisory Group. "If a site constantly floods, it becomes impossible to maintain the historic resource. It loses its historic fabric rapidly, and it's less and less available to the public."

Preservationists have faced similarly tough decisions before. In 1968, the Abu Simbel temples in Egypt—part of a UNESCO World Heritage Site—were relocated to avoid being submerged during the creation of Lake Nasser. Closer to home, North Carolina's Cape Hatteras Lighthouse, a national historic landmark, was moved farther inland, to Buxton, N.C., in 1999 to avoid succumbing to the eroding shoreline. Each decision involved weighing future access to the sites against the classic preservation goals of maintaining the original historic context and site.

"We are currently developing solutions, but each of them uncomfortably bumps up against integrity of fabric and location

ILLUSTRATION: MICHAEL GLENWOOD


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issues," Wilson says. "Something has to change to protect the building. And, as we all know, some preservationists and change don't mix well. Our approach is to vet potential solutions publicly and thoughtfully to create a national dialogue and a precedent for future projects." At press time, members of the National Trust's Farnsworth House Flood Mitigation Project are continuing to collect comments at their website (farnsworthproject.org) related to three proposed solutions: Elevate the house permanently, relocate the house to higher ground, or employ a hydraulic system to elevate the house only in times of flooding.

One Part Prophecy, Two Parts Planning

In addition to influencing practice, Rich believes that architecture schools should emphasize the technical issues surrounding building and design—something that certainly exists now, but not to the extent that is necessary to truly future proof cities. "There ought to be a respected subdiscipline of architecture which carefully teaches the ins and outs of how a building is put together," Rich says. "This course of study should focus on the nature of building materials, their origins, strengths, weaknesses, modes of failure and deterioration, and their repair." The idea is to teach students to consider repair rather than demolition.

This emphasis on repair would help avoid scenarios in which high-quality building materials are undermined by bad design or, in the case of historic preservation, unsustainable interventions. "Some projects employ highly durable materials such as stone and brick and stainless steel, and then have gaps filled with sealant or thin sheet metal to protect the materials behind," Rich says. "Materials on a building must be consistently high quality or be designed for easy disassembly and replacement."

The questions of durability, sustainability, and history are all being pondered in Mantoloking. Once a symbol of nature's devastating power, the New Jersey town is now a buzzing construction zone, with bigger, stronger houses being built up on stilts, ready to withstand the rising sea levels that climate change analysts predict. Yet with so many historic houses washed away or subsequently torn down, the very meaning of historic preservation in that area has changed, as Preservation New Jersey recognized when it included Mantoloking and other towns damaged by Sandy on its annual endangered historic places list. In this town and others, reconstructing historic character may have to take precedence over preserving original fabric.

Going forward, the biggest issue with future proofing, says Karl Stumpf, AIA, a senior vice president at RTKL and member of the HRC Advisory Group, lies in the difficulty of trying to accurately predict the future in a rapidly changing world. "When considering protection beyond minimum code, what level of event are you trying to protect against? A tropical storm or a Category 5 hurricane?" he asks rhetorically. "The level of protection is really a choice you have to make with each building."

Stumpf agrees, however, with the notion that preservation and future proofing (or resiliency, which has ever-broader acceptance and support these days) have the same core goals. "In the broadest context, with historic preservation the number one goal is to preserve a resource and, from the practical point of view, maintain that structure for the long term," he says. "Resilience is going toward the same core goal of historic preservation—to protect that asset." AIA

AIACOLLABORATION

PREPARING FOR THE INEVITABLE

A NEW AIA PILOT PROGRAM LOOKS TO ASSIST COMMUNITIES FACING RESILIENCY ISSUES

TO PREPARE FOR ELEVATED SEA LEVELS THAT ARE PROJECTED TO flood their historic downtown over the next 50 years, officials from Bath, Maine, met with the AIA's new Design and Resiliency Team (DART) to discuss strategic responses for this potentially grim future.

The DART pilot program was created to assist smaller city governments in addressing resiliency issues via strategy sessions with both national and local interdisciplinary experts. In partnership with the New England Municipal Sustainability Network, it is aimed at communities in New England that displayed a commitment to conflict resolution and a need to address their problems in a timely fashion.

"We want to highlight the importance of developing strategies for small jurisdictions," says Joel Mills, director of the AIA's Center for Communities by Design and lead on the DART program. "Smaller cities without as many resources create even more urgency to have effective plans in place. They can't afford to wait; they can't respond in an instant. They need to be planning earlier."

All major businesses and industrial areas in Bath are located on the banks of the Kennebec River, which provides the city with its primary source of revenue but will eventually threaten its very existence. After an intensive research project with the Maine Coastal Program and Maine Geological Survey, it was determined that much of the downtown area would be vulnerable to flooding if levels were to rise by two or more feet. It was also estimated that such an increase will occur by the year 2064.

Because of Bath's size and limited resources, the city sought outside assistance to plan for the now-expected surge. After being rejected in an attempt to secure federal funding, Bath representatives suggested a partnership with the AIA, which named Bath DART's pilot project, which will minimize future damage to new and existing structures better equipped to handle flooding.

The plans that were subsequently developed for Bath may be too specific to replicate elsewhere, since the city's problems are unique to its geographical situation. But other cities in the area will suffer from issues related to rising sea levels, and the ultimate purpose of the DART program is to demonstrate how urban design can assist vulnerable populations in need.

"Our goals are to promote the value of design in conversations about resiliency," says Mills, "and promote the value of architects as resources to figure out these strategies." —*Steve Cimino* AIA

For more information on DART, an initiative of the AIA's Sustainable Design Assessment Teams program, visit *www.aia.org/liv_sdat*.

AIAPERSPECTIVE

NEW VOICES | A YEAR OF PROGRESS AND THE CHALLENGES AHEAD

PHOTO: WILLIAM STEWART

IN THESE PAST 12 MONTHS, THE AIA HAS MOVED SURPRISINGLY quickly towards becoming a more nimble, innovative, and relevant professional community than it was a decade ago. The Institute's Repositioning Initiative has transformed the ways in which we represent architects, as well as the ways in which other initiatives, programs, and projects align with a new way of thinking and behaving.

Nowhere is our professional challenge greater, nor more urgent, than the ways in which we support emerging architects.

This past year, we emboldened the AIA Foundation, an organization that, as our public outreach arm, is intent on emphasizing good design as the key to elevating public perception about architects and architecture. We chartered a new component, AIA Shanghai, whose members reflect the Institute's growing international design presence. We also collaborated with strategic partners to advance critical issues where architects can have great influence, such as resilience and how design affects health.

In addition, in 2014, the AIA Board of Directors voted to refresh its governance structure to reflect a new vision of leadership. The particulars of this shift have been covered extensively already, but I will make this point: The new, bicameral structure will open the AIA to new and varied representative voices that chronicle our changing demographics as well as the growing practice diversity of our profession. The ability of a 157-year-old organization to renew itself speaks to the power of leadership and the creativity that is our core skill.

There is more work to be done and, indeed, many of the Institute's efforts are just building momentum. Nowhere is our professional challenge greater, nor more urgent, than the ways in which we support emerging architects. They represent our best hope. Indeed, our vibrancy as a profession tomorrow depends on the men and women who are just starting their architecture journeys today—and how we mentor them and care for them. It's a subject in which all of us should be deeply invested—as the AIA; as local and state components; and as architecture firms. They remind us that design thinking is an instrument for social equity and a necessary strategy to balance human needs with stewardship of natural resources. In this, we must never allow ourselves to believe that design thinking is merely a subjective or aesthetic exercise—a trend, a fashion, or something to be commoditized. To our emerging professionals, design thinking is a medium to bear witness to the force of life that seeks a better world. AIA

Helene Combs Dreiling, FAIA
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The dance pavilion was the last structure at Taliesin West designed by Frank Lloyd Wright. It was constructed circa 1956 to 1957. Now known as the Music Pavilion, the building remains in active use.

JOHN AMARANTIDES/COURTESY THE FRANK LLOYD WRIGHT FOUNDATION ARCHIVES (THE MUSEUM OF MODERN ART | AVERY ARCHITECTURAL & FINE ARTS LIBRARY, COLUMBIA UNIVERSITY, NEW YORK)

PRESERVATION

SEEKING THE WRIGHT PATH

AS OFFICIAL PLANS TO SAVE TALIESIN WEST ARE FORMALIZED, THE REMAINING LEGACY FELLOWS STRUGGLE TO MAINTAIN THE AGING ARIZONA SANCTUARY IN THE SPIRIT OF THEIR FORMER MASTER.

A maintenance worker removes deteriorated sealant from the acrylic panels that top the controversial canvas roofs over the historic core of Taliesin West, the 10-acre compound designed by Frank Lloyd Wright.

Text by **Logan Ward**
Photos by **Mark Peterman**

ARNOLD ROY, A SPRY 83-YEAR-OLD with a thick gray goatee, leans over a plywood drafting table. "They want to go back to canvas," he says. "That's the dumbest thing I've ever heard." To underscore his point, he opens a flat file and removes a stack of detail drawings showing how the roof of Taliesin West has evolved over six-plus decades.

Roy is one of the few people left who remembers when Frank Lloyd Wright's winter home and studio in Scottsdale, Ariz., was under canvas, before it was sealed up and mechanically cooled for use during the scorching 100-degree-plus summers.

"Is it possible to summer at Taliesin West without air conditioning?" I ask.

"Sure," Roy says. "Take a bed sheet, soak it in water, and sleep in it."

After years of deferred maintenance and questionable architectural accretions, Taliesin West stands at a crossroads. The Frank Lloyd Wright Foundation (FLWF), which owns and operates the 491-acre property, is staging a comeback for the National Historic Landmark, starting with the development of a preservation master plan. But the plan is proving complicated and controversial. And it's taking a long time.

Meanwhile, Taliesin West continues to age. Initially in awe of the site, I soon begin noticing chipping paint, water-damaged soffits, and smeared brown sealant spanning the joints of the acrylic panels covering the canvas roofing—a solution added, along with a layer of batt insulation, in 1998 to make the structures more airtight. I also learn that the compound's earliest buildings need new plumbing and wiring, and replacements for 12 dangerously outdated transformers. Given that many consider Taliesin West to be Wright's opus, the whole place looks surprisingly rundown.

The question of whether to restore the canvas roofs is only one aspect of the forthcoming preservation master plan that worries Roy and the remaining Legacy Fellows, the last living Frank Lloyd Wright apprentices, six of whom reside year-round at Taliesin West.

Until recently, the Fellows were Taliesin West's primary stewards. For better or worse,

they've largely ignored the outside world, focusing on maintaining Wright's successor architectural practice—until it folded in 2003—and training future architects. Between commissions and classes, little time was left for long-term maintenance planning. If a roof sprang a leak, a fellow would grab a ladder and fix it. Self-reliance is the Taliesin way.

Taliesin West, Roy says, was Wright's laboratory. For years, Roy served as its unofficial preservationist, a job he took seriously. He was a teenager when he first set foot on the property in 1952—Feb. 9, to be exact—to train under the master for seven years. He has never left.

He remembers how Wright loved the luminescence of the canvas but hated replacing it every two years; how Wright unsuccessfully attempted to find a more robust substitute; and how Olgivanna Lloyd Wright, who began spending more time in Arizona after her husband's death, eventually directed the Fellows to install air-conditioning. Change was and still is a constant.

"If you say we're going back to canvas, then you're saying we're going back to a desert winter camp," Roy says. "That's not consistent with the Fellowship and foundation."

His unease is clear. How do you preserve Taliesin West without overstepping the work of those who represent the last living link to its creator? How do you return to a time before air-conditioning and still accommodate the year-round residents, the foundation members, and the 100,000 tourists that come each year?

"**WRIGHT IMMEDIATELY FELL** in love with the desert," says Taliesin West preservation director Fred Prozzillo as we wander onto the prow, a V-shaped promenade raised above the desert thorns that frames the compound to the south. A clean-cut 47-year-old dressed in plaid shorts, Ray-Bans, and suede desert boots, Prozzillo studied at the Frank Lloyd Wright (FLW) School of Architecture from 1997 to 2000 and practiced architecture in Phoenix before joining the Taliesin West team in 2012. Wright, he says, found something blunt and honest in the desert's angled rocks and hardy plants—a perfect counterpoint to the soft, verdant Taliesin estate in Spring Green, Wis., where Wright spent his summers.

The desert "seems to cry out for a space-loving architecture of its own," wrote Wright, buzzing with inspiration, in his autobiography (Longmans, Green and Co., 1932). He marveled at the "economy in the patterns of construction," the fluted columns supporting the saguaro cacti, the "perfect lattice or the reed and welded tubular construction in the stalk of the cholla," and the "nature-masonry we see rising from the great mesa floors."

The circumstances that brought Wright to the desert made him particularly vulnerable to its power. Arriving in Phoenix in 1928 to design San Marcos in the Desert, a monumental resort to be built in the South Mountain foothills for veterinarian-turned-land developer Alexander Chandler, the architect was desperate for a fresh start after a hellish string of personal setbacks, which included mass murder, fires, adultery, and divorce. "Phoenix seems to be the name for me too," he wrote in a letter to his son. "It looks as tho [sic] I was well started now for the last lap of my life and work."

Rather than renting expensive live–work quarters, the 60-year-old and his cadre of draftsmen cleared a remote patch of land and built Ocatilla desert camp, fashioning door hinges with rubber belting and rigging canvas flaps with ship cord. Invigorated by his handmade compound, Wright nevertheless viewed Ocatilla as a temporary structure, a life-size model. "You are 'ephemera,'" Wright wrote of Ocatilla. "Nevertheless you will drop a seed or two yourself in course of time."

Taliesin West was one of those seeds. After the 1929 stock market crash killed Chandler's resort plans, Wright abandoned Ocatilla. Money was still tight a decade later when he returned to Arizona and purchased the land for his desert outpost, so he and his two dozen apprentices erected a temporary work camp and slept in pyramid-shaped sheepherder tents.

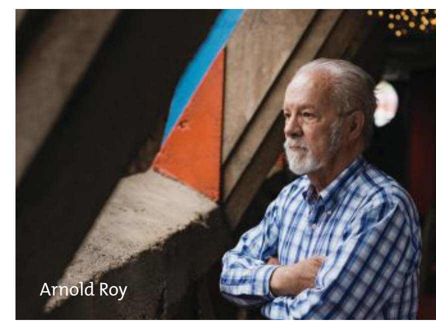
As with Ocatilla, Wright designed structures out of wooden fins with translucent roof panels made from canvas-wrapped 2x4-frames stair-stepped in between. This time around, Wright built his winter camp on a firmer foundation, Prozzillo says. He gestures to one of Taliesin West's distinct, angled masonry walls, which exemplify Wright's organic design ideal: "It looks like the desert floor has been tilted up."

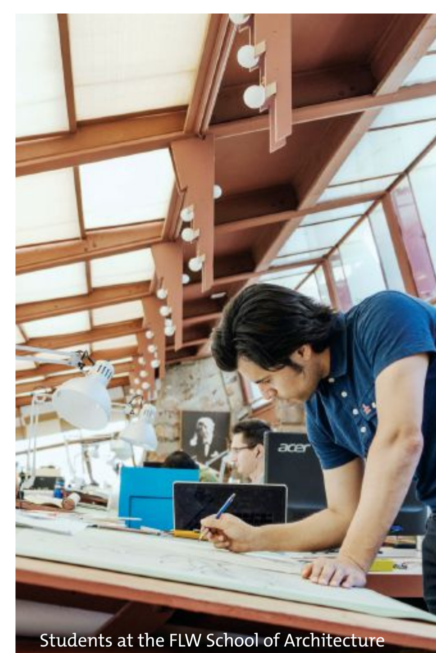
Prozzillo points out other examples of Wright's abstracted interpretation of nature—slanted rooflines that echo the surrounding mountains; brightly painted, carved wood forms jutting like spiky wildflowers. "Wright wanted others to experience this amazing place as he experienced it," he says.

WRIGHT HAD ABOUT 80 apprentices when he died in 1959. Like the property, they've aged. Three died in the past two years, and one more is in a nursing home, leaving a total of 13 active—relatively speaking—Legacy Fellows.

Anticipating the inevitable change, the FLWF's board of trustees began charting a public course for Taliesin West a decade ago. (Founded by Wright in 1940, the foundation owns the Wright archives, lucrative licensing rights to all things Wright-ian, and the Taliesin estate, whose operations and preservation are managed by a


Bust of Frank Lloyd Wright


Arnold Roy



Students at the FLW School of Architecture


Fred Prozzillo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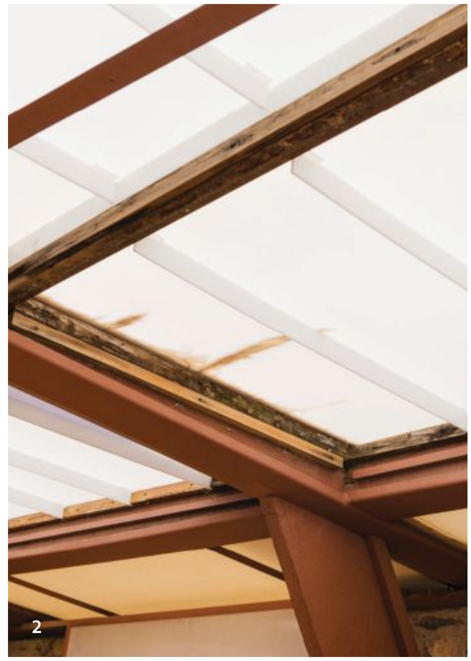
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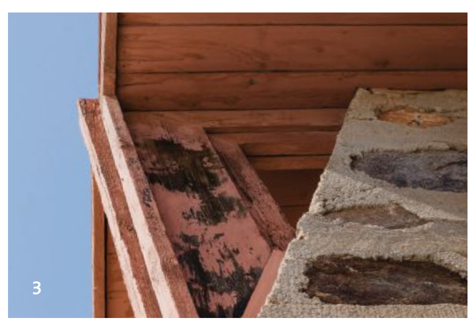
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separate foundation. The FLWF also operates the FLW School of Architecture, which divides its academic year between the Taliesins.)

In 2011, the board hired a new foundation CEO and president, Sean Malone, to tackle Taliesin West's challenges—which, controversially, includes the potential loss of its architecture school's accreditation in 2017 due to new rules adopted by the Chicago-based Higher Learning Commission.

The FLWF has three main objectives: the preservation and stewardship of Taliesin West; architectural education; and public engagement. "Preservation is our deepest public obligation," says Malone, who is especially keen on the property's historic core, the 10-acre compound Wright designed that includes Wright's private office, a drafting studio, dining hall, residences, and the Cabaret Theater. "The place itself is ... the heart and spinal cord for all our public programs and higher education."

In the fall of 2012, Malone oversaw the creation of the Taliesin West Preservation Oversight Committee and commissioned Chicago-based T. Gunny Harboe, FAIA, of Harboe Architects to develop a preservation master plan. After nearly a year of site visits, interviews with Legacy Fellows, workshops, and poring over foundation archives—which includes some 22,000 drawings, 40,000 photographs, and 100,000 letters—Harboe is still hammering out the details. He can't consult original architectural drawings because, frankly, they don't exist. For the most part, Wright designed Taliesin West in his head and built it by barking directions and pointing his cane. So Harboe only has sketches on butcher paper.

The master plan is due for review by the foundation trustees early next year. But one point has been made clear. In September, the trustees signed off on Harboe's "Taliesin West: Preservation Philosophy & Approach," a 22-page document that identifies 1938 to 1959 as the period of historic significance. The return to canvas may not be a done deal, but by zeroing in on the Wright years the trustees are sending a strong message.

Roy disagrees with the decision. "No one asked me," he says, "but if they did, I'd say the period of significance is today. And tomorrow. And tomorrow. It's always changing. Mr. Wright was always making changes."

And, as Roy noted, Taliesin West was Wright's design laboratory. Every winter, when Wright and his caravan of Fellows returned, he'd see the place with fresh eyes, adding and removing walls here and there, experimenting with building materials, and sending "the boys," as Wright wrote in his autobiography, into the mountains to collect a boulder for the garden.

Subject to the extreme weather of the Arizona desert, Taliesin West shows signs of aging, including: **1.** Water-damaged soffits under roof eaves; **2.** Sagging acrylic roof panels that lead to water infiltration and deteriorated blocking; **3.** Chipped and fading paint; and **4.** Crumbling masonry. The compound exemplifies Wright's "desert masonry" construction, which used sand and broad flat stones from the desert mixed with Portland cement that were then packed rammed-earth-style into crude wall forms with the stones wired to the forms' inside faces.

As a result, the preservationist's mainstay of dating and identifying original materials has been nearly impossible.

Harboe calls Taliesin West his most challenging preservation project to date—no small feat for a career that spans 26 years and includes other Wright projects such as Unity Temple and the Robie House, as well as several buildings by Ludwig Mies van der Rohe, such as S.R. Crown Hall. "Taliesin West isn't your typical house museum," he says. "It's a living, breathing site." How do you honor the spirit of the place, which sprang from Wright's desert visions and lives on through the communalist and migratory nature of Legacy Fellows and architecture students?

WITHOUT A PRESERVATION master plan to guide major decisions, Prozzillo is in a holding pattern. Leaks, peeling paint, and mini-geysers sprouting from old galvanized plumbing direct his current maintenance schedule. He knows that the master plan will not be a silver bullet, but merely a wayfinding map for the future. And the foundation will still have to raise restoration funds. It has taken the Martin House Restoration Corp. 18 years and $40 million to restore Wright's Darwin D. Martin House, in Buffalo, N.Y.—and the work isn't done. Will donors fork over millions of dollars to restore what began as a seasonal winter camp?

"The word 'camp' implies that it's ephemeral," Malone says. "We do not want Taliesin West to be ephemeral. This is one of the truly great architectural creations ever. Our obligation is to preserve it for the next 100 or 500 years." He pauses before asking the question on everyone's minds. "How do you nurture that ephemeral feeling without having an ephemeral reality?"

NEXT PROGRESSIVES

CLIENT CONNECTIONS

AT DSPACE STUDIO IN CHICAGO, FOUNDER KEVIN TOUKOUMIDIS FINDS THAT CHALLENGES BREED OPPORTUNITIES, AND THAT A CLIENT'S QUIRK CAN BE A PROJECT'S DRIVING INFLUENCE.

Kevin Toukoumidis and dSPACE Studio innovate whenever possible, mainly with projects in and around his adopted hometown of Chicago. Here, he takes a break at the Wave, a dynamic bench in the city's Southport Corridor neighborhood that doubles as almost anything else.

Introduction by **Danielle Rago**
Portrait by **Ari Gabel**

FOR CHICAGO-BASED design firm dSPACE Studio, architecture is not only about the synthesis of art, science, and technology, but also about human connections. After earning his M.Arch. from Syracuse University, dSPACE founder and principal Kevin Toukoumidis, AIA, traveled the country, working in different cities before choosing to open his practice in Chicago in 2007, having fallen in love with all the city had to offer. Recently, Toukoumidis spoke to us about his burgeoning practice, now up to eight people, and his love of a challenge.

Approaching a project: When I started this firm, one thing that was important to me was not to lose track of my passion for combining architecture, interior architecture, and landscape architecture. Our process looks at a holistic approach whenever possible. We're multifaceted, and we care about all of these different elements, phases, and aspects of a project, approaching every project with the idea of innovating and doing it better. Architecture is all about creating an experience, and if you can create an experience that people feel excited about, or even just get them to notice the architecture, it's just as important as creating architecture that is absolutely functional. We try to bring an element of fun and innovation. We want to enrich lives.

Concern for the human element: With the Wave, a seasonal three-dimensional art object that is a bench, lounge, table, and playground on Chicago's Southport Corridor neighborhood,

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We have been honored to support the Next Progressives in 2014, and we look forward to continuing the relationship in 2015. By sharing our collective experiences, working together to improve technologies and building materials, and generating new ideas, our future together—and the future of the industry—will continue to thrive.

Doug Clausen
President/CEO
VT Industries, Inc.

we were thinking about what a parklet could be, beyond tables, chairs, and coffee. So during the design phase, we looked through three lenses: architecture, landscape, and urbanism. It had to be a permanent piece of sculpture that was multifaceted and multifunctional, so we created this extremely comfortable, functional, and flexible space for lounging, relaxing, and reading that can be used 24/7. Whether it's the bar crowd on a Friday night or kids playing on a Sunday afternoon, it addresses the needs of many different age groups and uses.

We have a lot of clients that have very specific needs, and we tailor our design projects to work with how they live. For example, we have a client who was fond of fireman's poles when he was a kid, and right away we decided we had to put one in his house. And now that's how the family and kids get downstairs—they jump down the pole.

Custom design: We excel when we have clients who want to innovate with us. A lot of our clients hire us because they are looking for that and appreciate our process, because we're really into the details, not just the big picture. When one piece touches another piece, how does it work, how does it feel, how does it look? Some of the things we love are the unexpected features, like the fireman's pole or the Wave parklet, which is completely unexpected in the middle of the city. All of these features are part of the innovation and creativity that make a project one-of-a-kind. We want people to walk by and have that sense of awe or inspiration when they use that space.

Working with historic buildings: A lot of our work in an urban environment is taking the old and adding something new onto it. In the Wicker Park Escape Pod project in Chicago, we added a steel-and-glass addition to an amazing brick Italianate two-story house. The result is an amazing contrast between this beautiful brick 1880s house and a contemporary addition, one with an aircraft hangar door and a roof deck with a hot tub.

Climate control: For us, the most important thing is making the building thermally efficient. We're always considering how the sun enters the building. We're in a climate, here in Chicago, where we want the sunlight in the winter months. And we have these hot, humid summers, so it's really important to shield the interior from that harsh sunlight. We focus more on windows, insulation, and the thermal envelope than on anything else. If you can build a house that handles the weather and keeps the occupant comfortable, while minimizing the cost of fueling that house, then you've done a great job as an architect.

On deck: One project that we're working on is the contemporary glass-and-steel Sand Box beach house that is propped up on columns over a protected sand dune on Lake Michigan. It's going to be two floors and will have an amazing roof deck with a swimming pool. It's a 1,800-square-foot vacation house for a client that has a very large family that is used to having 6,000 square feet. So every space has been utilized, and we've had to be really creative. Anytime we get a challenge, it's actually something we look at as an opportunity.


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EVAN THOMAS

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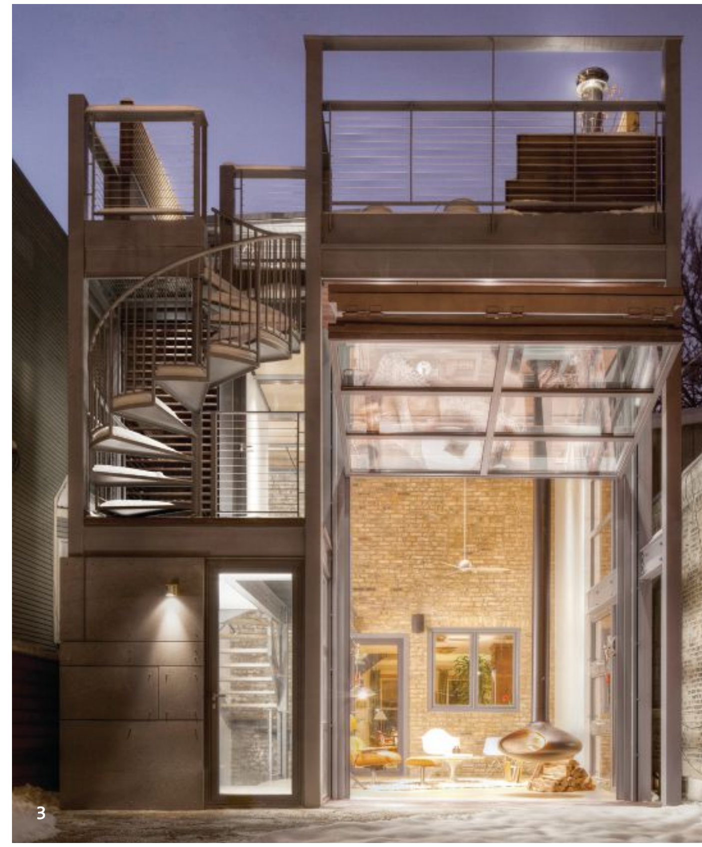

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2-4: EVAN THOMAS; 5: DSPACE STUDIO; 6: ARI GABEL

1: The Rustic Modern Vacation Home was a victim of the Great Recession, with its construction halted during the downturn. Toukoumidis and company are hoping to find a client who will allow them to finish the house, which blends barn styling with a more contemporary aesthetic, and uses its linear form to maximize southern sun exposure. **2, 4:** In the Atrium House, a 2014 AIA Chicago Small Project Awards winner, stairs bend to become shelves and seating. The firm worked with the clients on a complete renovation of this 1978 house, and named it after the two-story central atrium, which clients felt was severely underused in the original design. **3:** In Wicker Park Escape Pod, a 2013 AIA Chicago Small Project Awards winner, the firm added a glass-and-steel volume to an existing Italianate house. **5:** The Sand Box house, located on the shore of Lake Michigan an hour outside of Chicago, supports a rooftop deck with a pool, has piers that lift the house over the protected dunes, and has an operable steel drawbridge staircase to access the beach. **6.** The Wave is a three-dimensional art project that won a 2014 AIA Chicago Small Project Award.

BEST PRACTICES

DESIGNING IN A CLOUD

A ROUNDUP OF TOOLS AND SERVICES THAT ARCHITECTS ARE USING TO BREAK FREE FROM COMPANY SERVERS AND PHYSICAL BOUNDARIES.

Text by **Brian Libby**
Photo by **Florian Müller**

ARCHITECTURE FIRMS TODAY are starting to use the cloud for more than just file sharing and storage. Whether it's schematic design or project management with BIM, outsourced tasks such as rendering, or energy performance analysis, the days of relying primarily on company servers are quickly disappearing. To compete for and deliver the best projects, architects are taking to the virtual skies.

Modeling

For firms with staff members scattered across multiple offices, or partnerships involving multiple practices, it's natural to put a 3D model in the cloud. "We had to go there because of how we operate," says Nick Cameron, AIA, vice president of CannonDesign, which was founded in Niagara Falls, N.Y., and now has offices in cities around the globe. "If you're working on a dispersed team, having a centralized model in the cloud is number one. This idea of shipping models back and forth isn't fast enough for how we need to react to clients. A cloud-based system allows us to collaborate in real time in any of our offices." CannonDesign relies on its own privately hosted cloud in an off-site data center, Cameron says, but semi-private clouds hosted by companies such as Amazon can achieve a similar result.

NICK CAMERON, AIA
VICE PRESIDENT, CANNONDESIGN

KEN SANDERS, FAIA
MANAGING DIRECTOR, GENSLER

AMY LEEDHAM, ASSOC. AIA
DESIGNER, EHDD

Project and Content Management
Although BIM software is itself a tool for uniting the efforts of architects, builders, engineers, and other subcontractors with one model, "if you're a structural steel fabricator, you're not working in Revit," says Dennis Shelden, chief technology officer of Los Angeles–based Gehry Technologies, the offshoot of Frank Gehry, FAIA's firm that was recently acquired by Trimble. "Somebody still has to translate it out. It's still a very disconnected process from the design view to the fabricator or engineering view."

Trimble Connect software (Trimble, free for single-user accounts and varied pricing for organizations), formerly known as GTeam and designed by Gehry Technologies, allows building team members to connect and collaborate via one software platform by combining file management, BIM model viewing, and messaging. "The info's all there to allow different parties to work on the same set of information expressed in different products," Shelden says.

Software like Unifi (Inviewlabs, $10 to $19 per month) can also help architects better access their data libraries. "It was a really easy return on investment case," says Lauren Collier, Assoc. AIA, design technology section manager of Toledo, Ohio–based SSOE Group, of her firm's use of Unifi. "I could prove a search efficiency pretty much at a per-user cost. You don't use Unifi every day. You use it when you need to load in and harvest items. Before, it could take three minutes to search for an item. Now it takes five seconds."

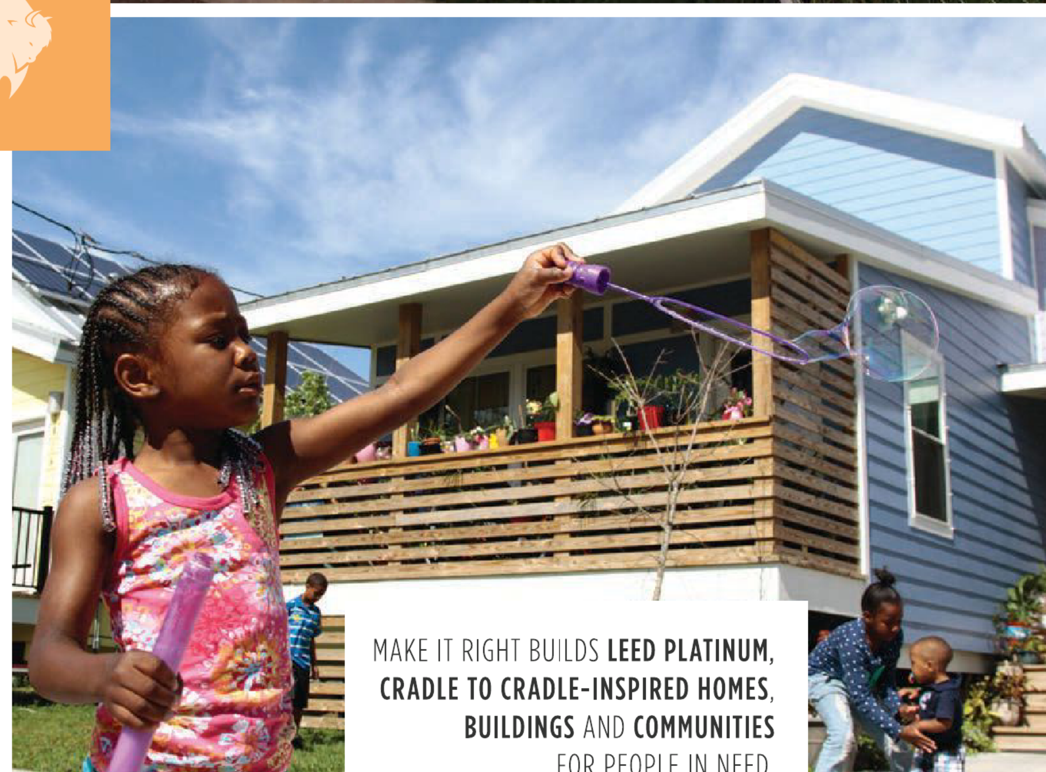
Rendering
Cloud computing also allows time-consuming tasks previously performed in-house, such as generating renderings, to be outsourced in a way that expedites delivery. San Francisco–based Gensler, for example, uses Nvidia Iray paired with Migenius's RealityServer (pricing varies) to send designs to a cluster of GPUs (graphics processing units) off-site that can be received back within minutes instead of hours. "It produces incredible results in an incredibly short time," says Gensler managing director Ken Sanders, FAIA. "We can do not just photorealistic renderings but these complex daylighting analyses where you're simulating light with very high fidelity. You can turn those around in seconds or minutes rather than taking all night to compute."

CannonDesign's Cameron also recommends Rendercore (offered at $0.20 to $0.35 per core hour of usage), a third-party provider that can deliver renderings as a Revit plugin. "We need that efficiency to share those models," he says. "Offloading some of these intensive processes is the future."

Performance Analysis
The cloud also allows for an array of energy and building performance analysis tools that can be accessed from any location. For example, Trevor Taylor, design technology manager at Portland, Ore.–based ZGF Architects, makes use of Autodesk's Flow Design ($35 per month or $210 per year) "to study how the predominating winds might influence site design. Flow Design has been most useful for form-finding exercises during early design, in a model that might come from Revit or from SketchUp." Autodesk A360, the software developer's cloud-based collaboration platform, hosts the model.

Amy Leedham, Assoc. AIA, a designer at San Francisco–based firm EHDD, uses Sefaira to estimate a project's energy consumption as a Revit plugin. "We use it very early in the process—even before an engineer has been brought on—with conceptual design to help make big-picture decisions about massing, orientation, and glazing," she explains. "And the cloud was appealing because you could get results more quickly as you change parameters ... test your ideas, and shape it into what we wanted to be. It helps us reduce energy by a pretty significant percentage."

PETER ARKLE



DETAIL

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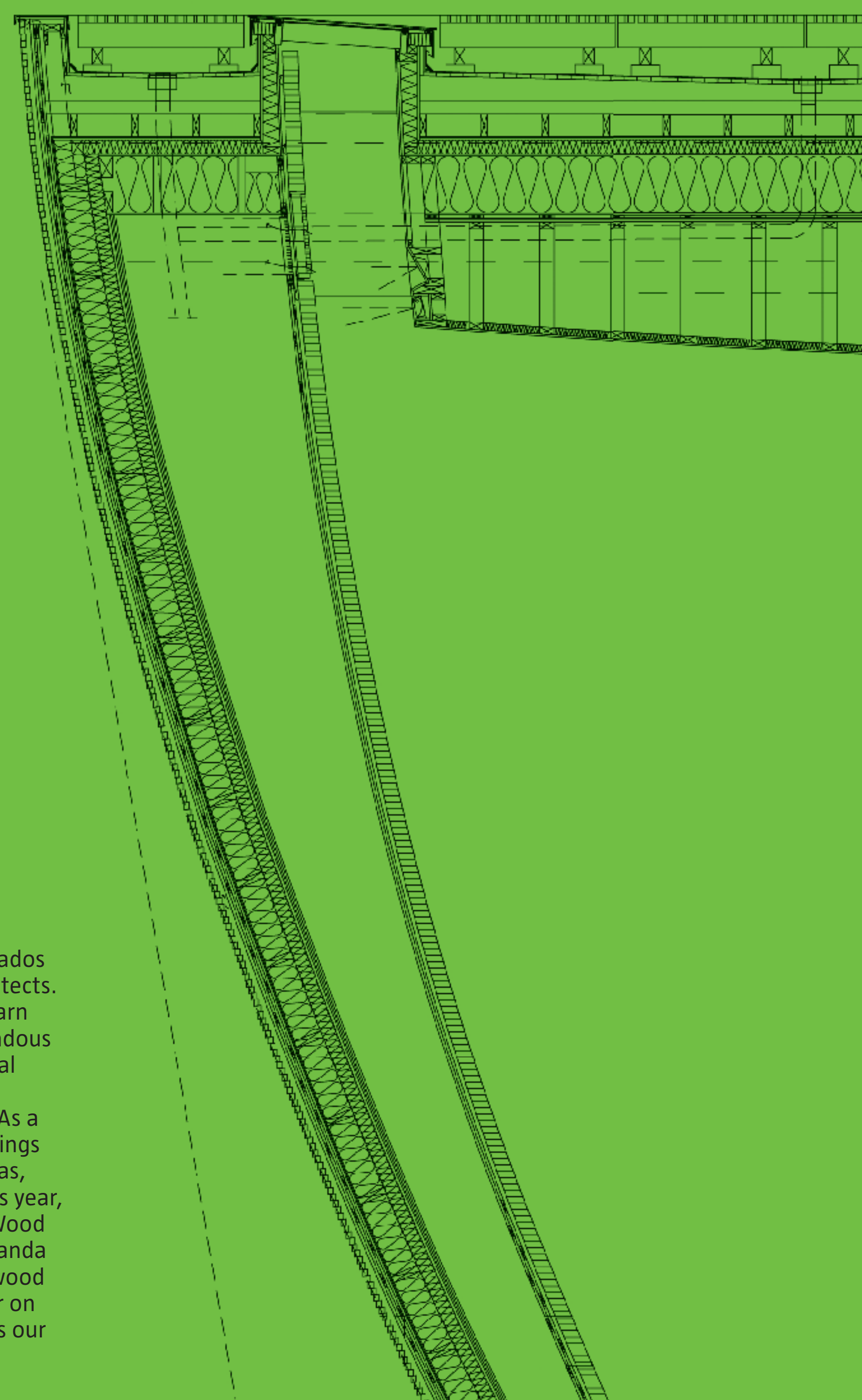


To understand how an engine works, car aficionados can simply lift the hood. It's not so easy for architects. One can't go around peeling back cladding to learn how buildings come together. Hence the tremendous value that we put on detail drawings, those visual instruction manuals that illustrate how building materials and components fit into architecture. As a matter of policy, ARCHITECT includes detail drawings with the project features whenever possible. (Alas, not every firm bothers to create them. Hint.) This year, thanks to generous underwriting from reThink Wood and the expertise of senior technology editor Wanda Lau, we've been able to highlight a compelling wood detail in each issue. All 12 stories come together on the following pages in this last issue of 2014. It's our holiday gift to you. NED CRAMER

Happening Above the Forum

THE GEODESIC GRID SHELL OVER THE UNIVERSITY OF EXETER'S FORUM SUPPORTS STUDENT LIFE AND LOOKS GREAT ON T-SHIRTS.

1. 17.75" × 3.5" spruce glulam beams
2. ⌀5" steel node
3. 0.75" × 1.73" oak slats (1.73" o.c.)
4. Black acoustically transparent fabric
5. ETFE rooflights, three-ply with frit

Modeled with Tekla and Autodesk software, the timber grid shell comprises standard-sized timber with custom-fabricated steel nodes and mounting plates. It was assembled on site like a complicated "piece of flat-pack furniture," lead designer Stafford Critchlow says.

Text by **Logan Ward**
Photo by **Hufton + Crow**

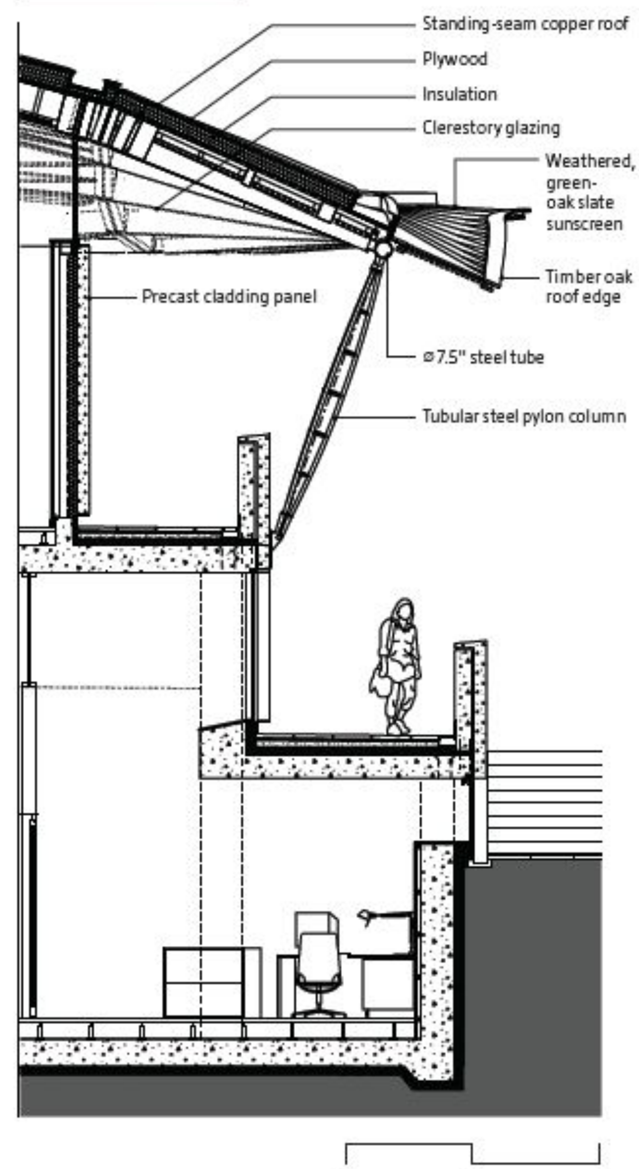
WITH ITS DESIGN for an undulating geodesic dome roof, London-based Wilkinson Eyre Architects turned an underutilized infill space into the social and academic heart of the University of Exeter's Streatham Campus. The 37,674-square-foot, free-form, timber grid shell—one of the largest in the United Kingdom—covers a 96,875-square-foot area called the Forum, which ties together the Great Hall Piazza, student guild, library, and other academic facilities with cafés, a shop, and a bank along a galleried high street. The soaring ceiling of oak-clad spruce timber shelters the Forum from South West England's wet climate and floods it with natural light, thanks to a mix of glass and ETFE (ethylene tetrafluoroethylene) panels.

Wilkinson Eyre director and project lead designer Stafford Critchlow and his team used wood for the roof to reference the tree-covered campus, which was once part of Reed Hall, a Victorian-era country house and botanical garden. A pure timber grid shell of woven wood would have taken too long to build. Working with engineering firm BuroHappold and subcontractor S H Structures, Wilkinson Eyre developed a hybrid grid of timber linked by custom-fabricated steel nodes and flitch plates.

The project's success is clear: The iconic ceiling now appears on T-shirts, wayfinding signs, and event posters. "They used the grid-shell structure as a graphic, a kind of totem," Critchlow says. "It's become this sub-brand within the university."

Timber Grid Shell Exploded Axonometric

Roof and Wall Section



A Timber Structure on a Tight Budget

THROUGH CREATIVE DETAILING AND DESIGN, HENNEBERY EDDY ARCHITECTS CRAFTED A FACILITY FOR THE CASCADES ACADEMY THAT COMPLEMENTS ITS FORESTED SITE.

Custom knife plate connections cap the top and bottom 6 inches of columns, adding to the structure's open feel.

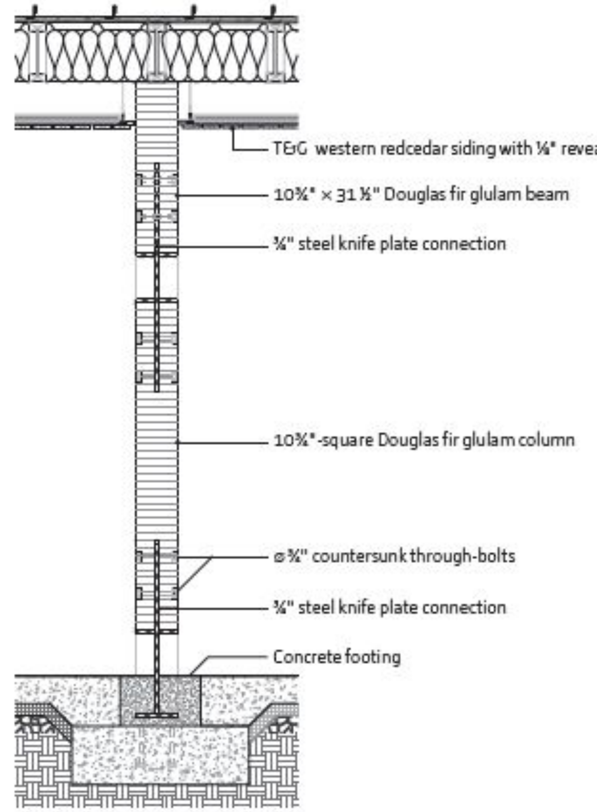
Text by **Logan Ward**
Photos by **Josh Partee**

MONEY WAS TIGHT for the Cascades Academy, in Bend, Ore., which needed a facility to accommodate a growing student population that had been stuck in rented classrooms since the private day school's founding in 2003. While the forested site overlooking the Deschutes River called for a timber structure, the nonprofit's budget was more in the realm of fiber-cement cladding or stucco on block.

In 2007, the school's board of directors hired Portland, Ore.–based Hennebery Eddy Architects to design a master plan for the 21-acre site, but the board pressed the pause button when the economy soured. In 2009, after plans resumed and Hennebery Eddy began design on a 38,500-square-foot facility, talk turned to slashing costs—and expectations. A couple of the school's board members spoke up, says Hennebery Eddy founding principal and project design leader Tim Eddy, AIA. "They wanted a building that belongs in the region."

Resolved to avoid the Pacific Northwest's overused chalet aesthetic, the firm crafted a "more finely detailed piece of contemporary architecture" that reflects the school's nature-focused mission and met the budget, Eddy says. Novel wood, glass, and steel connection details blur the line between the outdoors and indoors while strategic material and design choices made the project financially feasible.

Interior Beam and Column Section



Hemlock panels accent the entrance walls, and double-channel steel columns allow light and views of the landscape to slip through. "We sketched out a lot of concepts for the entry," design leader Tim Eddy says. "In the end, everyone was most comfortable with a surface treatment that remained in character with the rest of the building."

K2S Architects conducted several massing studies for the chapel before eschewing rectilinear forms in favor of an ovoid bowl geometry.

Around the Square

WITH HELP FROM A TEAM OF FORMER SHIPBUILDERS, K2S ARCHITECTS REALIZED AN UNORTHODOX WOODEN FORM FOR A CHAPEL IN HELSINKI.

Text by **Logan Ward**
Photos by **Marko Huttunen**

FINLAND HAS A RICH TRADITION of rural wooden churches, the most iconic of which grace the coastal plains like cubist sculptures, their steep gable roofs standing in defiance of the harsh northern climate. But for the Kamppi Chapel of Silence in downtown Helsinki, local firm K2S Architects turned tradition on its head, eschewing angles for curves in its ovoid bowl design.

The 2,900-square-foot chapel was built using a combination of carpentry techniques and CAD-CAM technology, including CNC milling by Helsinki-based Puupalvelu Jari Rajala. K2S collaborated with Finnish structural engineering firm Vahanen Group on the design. "We thought the chapel should have a strong independent identity to reflect the contrast between its spiritual function in a commercial city," says K2S partner Mikko Summanen.

Though the roughly 38-foot-tall form is more suited for concrete, K2S made it work with the traditional, warm, familiar wood by utilizing clever detailing, CAD, CNC milling, and a construction team that counted a former shipbuilding company—Late-Rakenteet in western Finland—among its crew.

Steel brackets attach more than two-dozen curved and tapered ribs—CNC-milled glulam columns, each approximately 36 feet tall—to the concrete foundation. Steel brackets also anchor the glulam roof beams, the longest of which spans 49 feet.

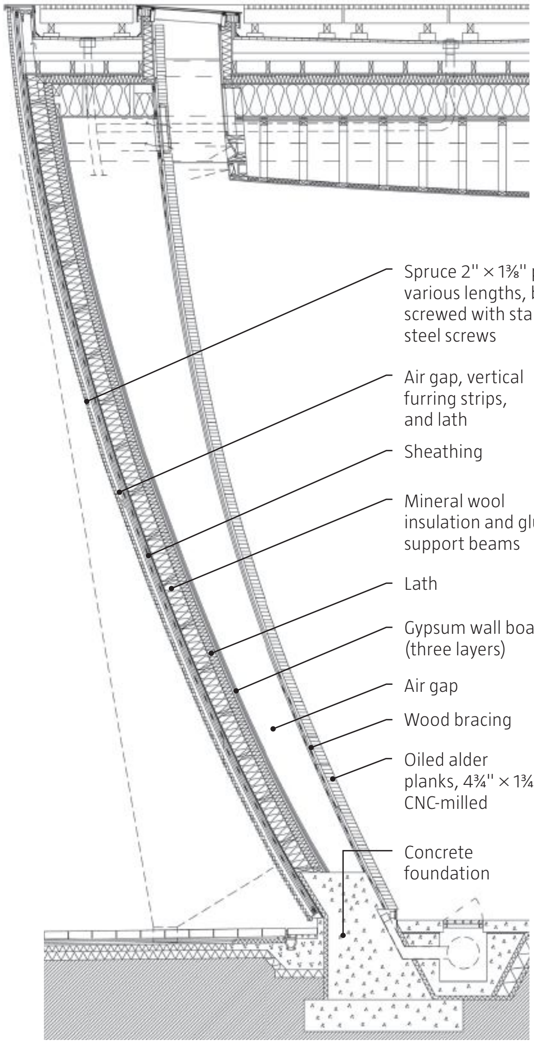
Once the structural frame was in place, local contractor Pakrak added mineral wool insulation, sheathing, and a vapor barrier to the wall. Vertical furring strips with custom-designed, CNC-milled notches guided each plank of curved, finger-jointed spruce cladding into place. The notches are slightly angled, like teeth in a saw, to compensate for the wall's pitch.

Curved, sawn-to-order finger-jointed spruce planks clad the façade. The exterior wood was treated with Teknos Biowax, a pigmented, transparent nanotech wax (not commercially available at the time of publication) developed by a Finnish company, which alleges that the wax particles penetrate the wood's cell structure deeper than conventional sealants and help repel water. After two years, the siding on the chapel has shown no change in appearance, the designers say. They anticipate a natural patina to form over time, but they expect to reapply the wax within 10 years.

All of the lumber used in the chapel—glulam structural beams, exterior finger-jointed spruce planks, and interior alder siding—was sourced and processed within 125 miles of the site in the bustling Narinkka Square. The chapel was completed in May 2012 after 14 months of construction.

Indirect light spills down the double-curved walls, which are fashioned from oiled alder planks glued together to form one large wooden bowl. The 4¾-inch-by-1¾-inch alder planks were CNC-milled into 7,500 distinct shapes. The entire structure floats on a concrete foundation, allowing for thermal movement.

Wall Section



The Right Angles

SANJAY PURI ARCHITECTS CREATED THE DIZZYING INTERIOR WOOD FINISH OF THE AURIGA RESTAURANT IN MUMBAI, INDIA, WITH NO SOFTWARE, BUT RATHER A PENCIL TIED TO A STICK.

Text by **Logan Ward**
Photo by **Vinesh Gandhi**

FOR YEARS, SANJAY PURI, principal of Sanjay Puri Architects in Mumbai, India, wondered why walls and ceilings were kept distinct. Puri experimented with his counter-orthogonal vision in the Auriga restaurant, in the city's Mahalaxmi neighborhood, where he created a mesmerizing, wood-clad room that "feels like the inside of a sculpture," he says. "The client wanted a warm ambience, [so] we decided to use wood."

Puri sourced strips of exterior-grade plywood discarded by a furniture company and several residential interior contractors to craft his inspiration. Installed on their edges in undulating angular planes, the wood strips clad the walls, ceiling, kitchen counter, and serving-bar counter, creating a fluid volume that redefines the way interior spaces are perceived.

No computer software was used to generate the interior's repetitive forms. Instead, Puri made preliminary sketches by hand to "explain the process" to the carpenters and then worked on site every other day to direct the builders. Together, they made mock-ups and marked points on the ceiling using a pencil tied to a long stick. "The design was created organically and spontaneously, the way one would start an abstract painting with one stroke and then continue adding to it over time," Puri says.

The biggest challenge was avoiding right-angled corners, he says. Through trial and error, he masked the space's orthogonal arrangement with a series of smaller facets. In spots where two corner walls meet the ceiling, up to seven facets converge to soften the angle.

1. 0.7" × 4.33" exterior-grade plywood scraps
2. Teak sub-frame
3. Faceted wood corner
4. Exterior aluminum fins
5. Glass curtainwall

Workers sanded and coated the 3,000-square-foot wood surface with a melamine-based polish. It took an 18-person carpentry crew three months to complete the work.

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Rethinking Wood as a Material of Choice

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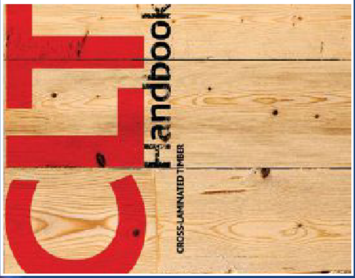
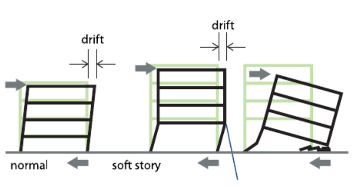
Cross Laminated Timber

American Wood Council, FPInnovations & reThink Wood



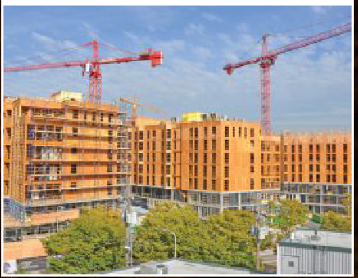
Seismic-Resistive Design of Wood Buildings

reThink Wood



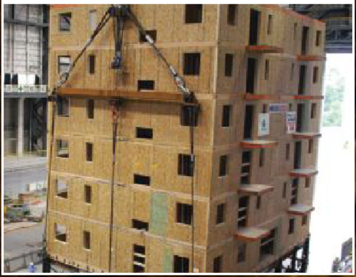
Design Is in the Details

American Wood Council, reThink Wood & WoodWorks



Multi-Story Wood Construction

reThink Wood & WoodWorks

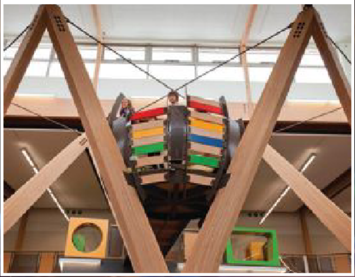


Tall Wood Takes a Stand

reThink Wood

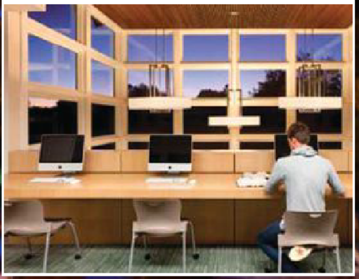
The Human Response to Wood

American Wood Council, reThink Wood & WoodWorks



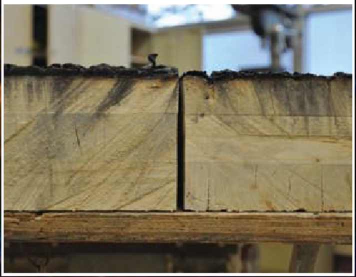
Wood Scores A+ for Schools & Student Housing

reThink Wood & WoodWorks



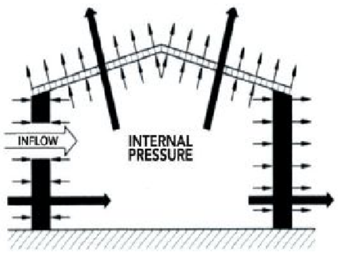
Fire Protection in Wood Buildings

American Wood Council & reThink Wood



Wind-Resistive Design of Wood Buildings

American Wood Council & reThink Wood



Exterior of Arena Stage, Mead Center for American Theatre, Washington, D.C. | Photo credit: Nic Lehoux courtesy of Bing Thom Architects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A Slanted Perspective

FOR THE NEXUS GP SUPER CLINIC IN WALLAN, VICTORIA, THE BILLARD LEECE PARTNERSHIP ANGLED LONG LENGTHS OF TIMBER TO MEET AUSTRALIA'S SUNSHADING REQUIREMENT.

The depth of the timber fins increases in areas of fenestration to provide additional shading. The designers added a perforated metal screen between the timber fins at window heads on the north façade, where the exposure is at its greatest.

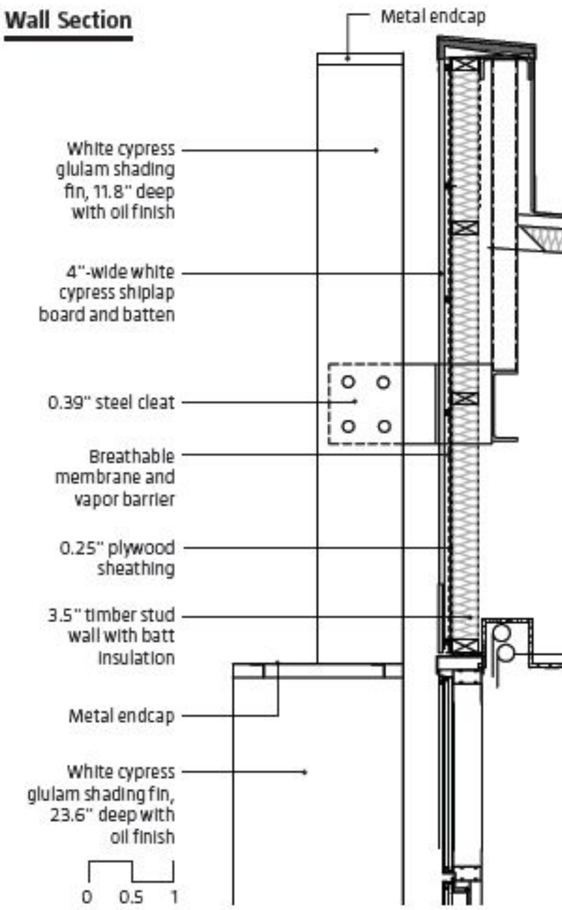
Text by **Logan Ward**
Photos by **Tony Miller**

BOLD, ORIGINAL, AND NON-INSTITUTIONAL were the objectives behind the Billard Leece Partnership's design of the 17,200-square-foot Nexus Health GP Super Clinic in Wallan township, Victoria, Australia. The wood cladding adds warmth to this wellness-focused, primary healthcare facility. Even more striking are the raked glulam timber fins, which shade the abundance of windows.

For the clinic's fins and cladding, the Melbourne-based firm selected white cypress, a native species favored for its durability and natural resistance to pests. However, the choice of glulam timbers for the shading system was less about sustainability and more about function. The state of Victoria is a sunny, high UV–index area. Australia's building codes mandate that 80 percent of a structure's north, south, and east façades are shaded at the height of solar exposure. The fins' profiles, supplied by Timber Imagineering, in Blackburn, Victoria, were determined in response to the movement of the sun and tweaked to maximize shading and minimize heat load. The consistency in the material composition and the size of glulam timber meant that each fin could comprise a single piece.

"At the end of the day," says project architect Daniel Rafter, "we were able to exceed the requirements by working with the achievable depths available in the glue-laminated products." The façade and shading system took four months to construct, and the clinic opened in December 2013.

Wall Section



Inboard of the fins, the clinic's roughly 6,000 square feet of façade is clad with pre-drilled boards that hang at a 25-degree angle from the vertical axis and attach with countersunk stainless steel screws.

Shading a Sun-Filled Courtyard

FOR THE GSA OFFICE BUILDING IN ALBUQUERQUE, N.M., PAGE HUNG WESTERN REDCEDAR SLATS TO SHADE THE COURTYARD AND BUILDING INTERIOR IN AN ELEGANT AND EFFICIENT MANNER.

Text by **Logan Ward**
Photo by **Patrick Coulie**

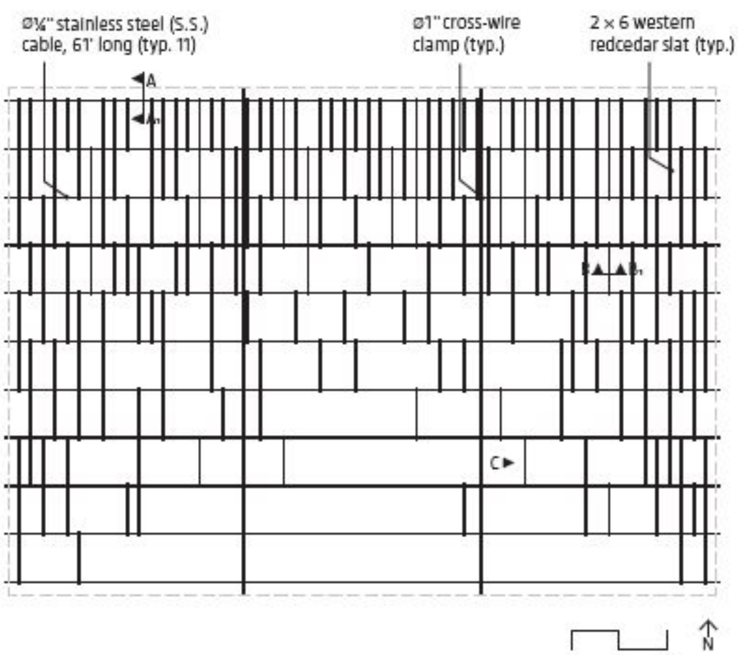
The slats provide shade only where necessary along the east, west, and north courtyard façades. Most of the catenary structure was design/build; Page assembled drawings but gave the contractor, Albuquerque's Enterprise Builders Corp., leeway in the shading system's installation.

FOR AN INTERIOR COURTYARD surrounded by the double-height, floor-to-ceiling glazing of the General Services Administration Office Building in Albuquerque, N.M., Page senior principal Larry Speck, FAIA, and his team designed a suspended system of transverse wooden slats that serves the building's site-specific shading needs, while allowing natural light inside.

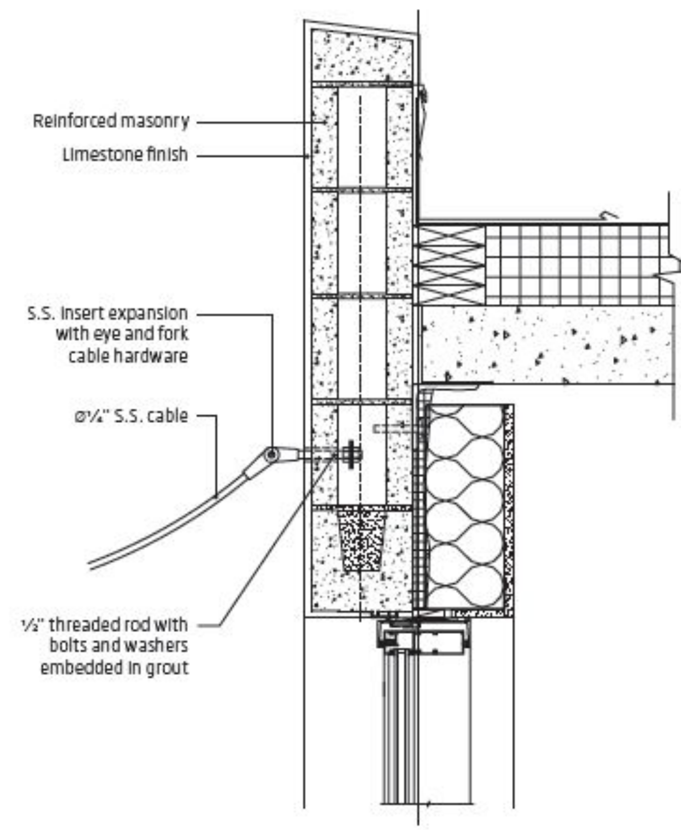
Speck variably spaced his 2x6 western redcedar slats, which come in lengths of 5, 10, and 15 feet. In order to place the boards in the most effective and economical layout, the designers superimposed sun-tracking data onto its 3D building models in Autodesk Revit. By looping simulations of the sun's movement throughout the day and year, the designers added slats accordingly and omitted them in locations where the building self-shades the courtyard. The resulting pattern is intended to look randomized for aesthetic reasons, but is in fact quite purposeful.

Shadows cast by the slats dance on surfaces inside and outside the courtyard. Speck takes pride in the design's simple elegance. "Doing an expensive, extraordinary thing is not that hard," he says. "Doing an extraordinary thing inexpensively—that's hard."

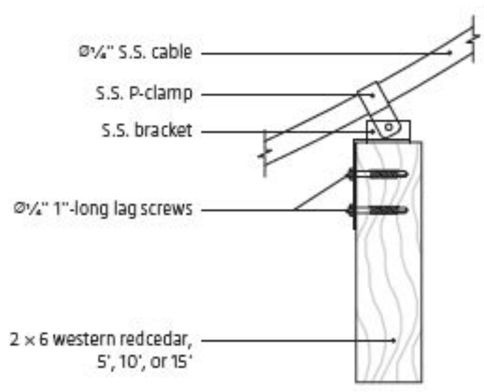
Shading System Plan



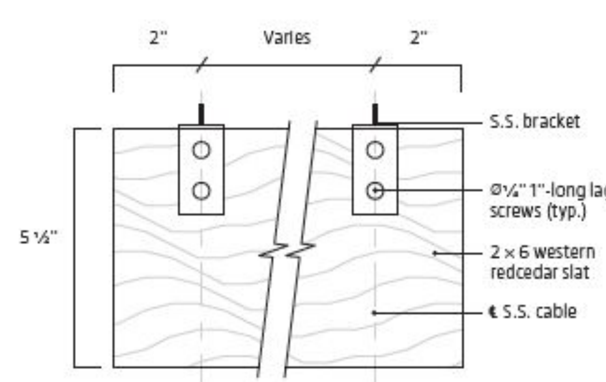
Section A–A₁: Parapet



Section B–B₁: Slat



Elevation C: Slat



Because the unconventional structural design looked astronomically expensive, the Ontario Ministry of Health and Long-Term Care required a cost analysis during the final design phase. The timber-tree concept proved less expensive than standard steel construction, prompting one hospital board member to call the design "beauty on a budget."

A Tree Grows in Ontario

FARROW PARTNERSHIP ARCHITECTS CREATED AN INDOOR FOREST BEFORE DIGITAL FABRICATION CAME OF AGE.

Text by **Logan Ward**
Photos by **Tom Arban**

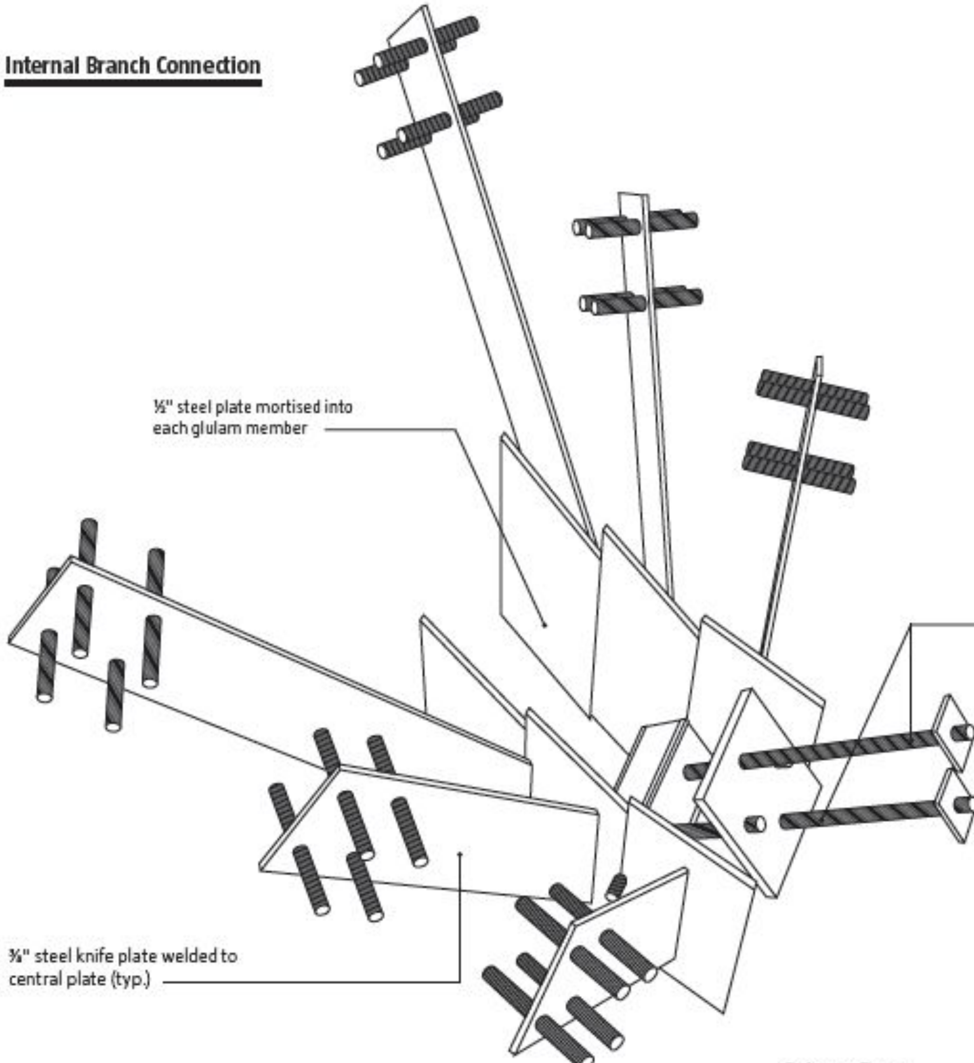
THE IDEA FOR THE GROVE of timber trees flourishing in the atrium of Credit Valley Hospital's Carlo Fidani Peel Regional Cancer Centre, in Mississauga, Ontario, grew out of visits by Toronto-based designer Tye Farrow, Intl. Assoc. AIA, to 30 cancer centers in North America and Europe. Patients said they wanted fewer hotel-like amenities and more reasons to feel hopeful.

"We decided to create an environment that appeared to be alive and growing," says Farrow, a senior partner at Farrow Partnership Architects. A Geoffrey James photograph of a tree in Prospect Park, in New York, provided early design inspiration. "Trees symbolize strength and comfort," Farrow says. He made a few sketches and foam core models for the 11,500-square-foot space before creating a triangular floor plan centered on four sprawling columns comprising Douglas fir glulam members.

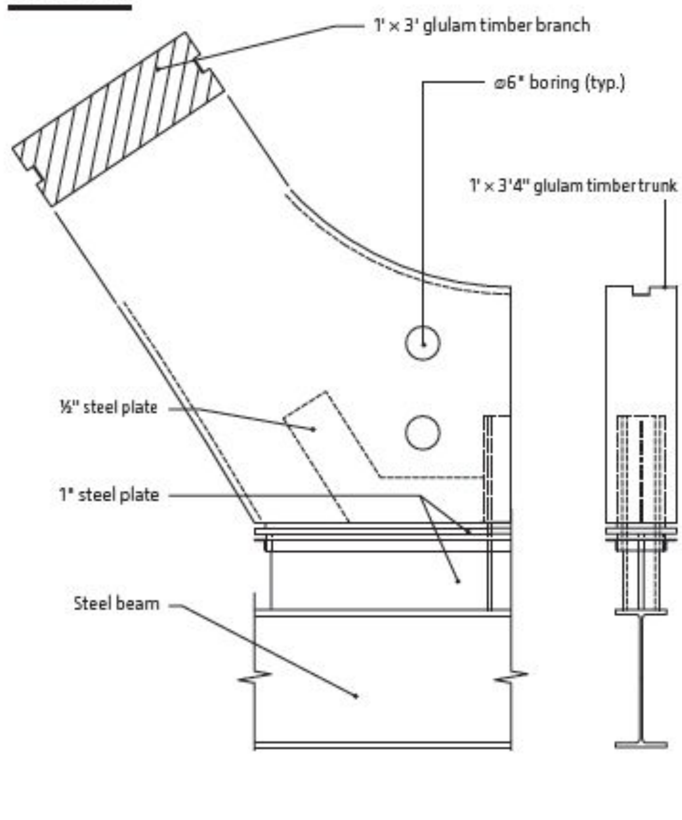
The massive engineered timbers curve 44 feet 6 inches up to the beams that support the atrium roof, and total more than 25,000 cubic feet of Douglas fir, the equivalent of 60,000 residential studs. Like trees, the structural columns sprout almost seamlessly into glulam branches that further support the roof frame.

Designed in 2003, the project precedes today's advanced 3D modeling

Internal Branch Connection



Column Base



software and fabrication technologies. Early in the design process, Farrow and his team began a steady dialogue with manufacturing and installation partner Timber Systems Limited, based in Markham, Ontario, to detail the complex geometry. The original drawings called for external steel connectors. But Timber Systems president Gary Williams felt that the metal would disrupt the aesthetic—"Trees," he notes, "don't have sideplates"—so his team spent hours devising a system of concealed connectors. Instead of two exposed plates flanking each glulam branch, they inserted a single, ⅜-inch steel plate into a slot mortised into the center of each member.

Though Timber Systems modeled and mapped hundreds of joints using Dietrich's 3D-CAD/CAM software for wood construction, it had no CNC cutting machines in 2004. Instead, workers mortised the slots and mitered the ends manually, using a bench-mounted chainsaw in the factory.

Farrow says the center had the most intricate wood structure in North America when it opened in 2004. Ten years later, Williams says there has been no need for any maintenance or refinishing of glulam components. In May, Farrow dropped by to judge for himself. "It looks as good as it did when it opened," the architect says. "Maybe even better, thanks to the patina it has picked up." Even now, Farrow still hears from patients and their families, who call the space "uplifting" and "natural."

1. ⌀6" borings
2. "Quality" appearance-grade Douglas fir glulam
3. 10" x 13½" secondary branch
4. 1' x 2'9" lower and upper branches
5. 1' x 3' Y-shaped branch
6. 1' x 3'4" glulam timber trunk

Made in Germany by Robots

THE UNIVERSITY OF STUTTGART EMPLOYS ROBOTS TO FABRICATE THE SHELL OF LANDESGARTENSCHAU EXHIBITION HALL, A PAVILION ON INNOVATIVE CONSTRUCTION METHODS.

Each plywood plate has a unique geometry and connects to its neighbors via perimeter finger joints. The plate dimensions were determined with consideration of the available fabrication workspace.

Text by **Blaine Brownell, AIA**
Photos by **ICD/ITKE/IIGS University of Stuttgart**

ROBOTS ARE GAINING traction when it comes to the highly precise construction of geometrically complex assemblies. Initially, architects employed them to fabricate small-scale, prototypical installations. But as the technology continues to develop, architects are using machines to create larger, permanent structures.

In April, the University of Stuttgart's Institute for Computational Design completed the construction of the Landesgartenschau Exhibition Hall, a 1,345-square-foot, 20-foot-tall pavilion created for the purpose of demonstrating innovative building methods. Its prefabricated lightweight timber shell, which has a surface area of 2,640 square feet, is the first structure to be made entirely of robot-fabricated plates, according to the project team.

The researchers selected beech plywood for its lightness, strength, local availability, and alignment with resource-sensitive forestry practices in Central Europe. After studying the microscopic plate joints in sand dollars, they devised a series of 50-millimeter-thick (2-inch-thick) plates with perimeter finger joints for panel-to-panel connections.

The unique shapes of the five-, six-, and seven-sided panels, which range between 1 and 2 meters in length, were generated through custom design tools in Rhino and based on biological principles, the planar approximation of freeform surfaces, the plywood's material properties, stock availability, the robotic fabrication technique, and workspace. "Due to the computational design process, all panels have different geometries," says research associate Oliver David Krieg. "Introducing different-sided polygons is a natural behavior of the design and simulation process." Sofistik was used conduct the structural analysis. "It is important to point out that the beech plywood is not used as some sort of interior cladding," Krieg says. "It is used as the primary load-bearing structure."

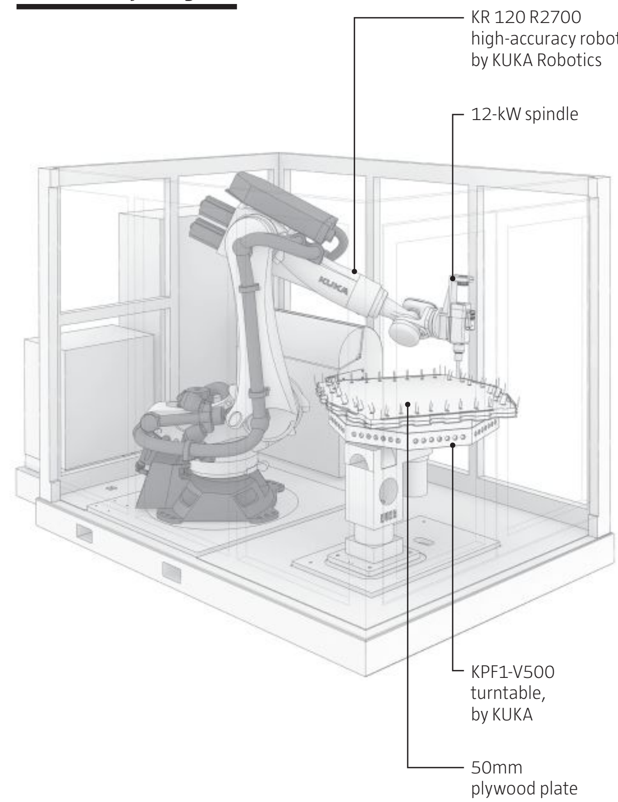
The computational design and robotic fabrication workflow was developed over the course of nine months. First, a CNC milling machine cut each panel from a stock piece of beech plywood to its approximate final shape. Two small holes were drilled into each panel for attachment and orientation on the turntable of a seven-axis industrial robot. The robot then refined the panel edges, finger joints, and screw pockets with a milling bit. Each of the 243 interior panels required about 1 minute of programming and 20 minutes of fabrication time.

The team also prefabricated the building insulation, waterproofing, and ventilated exterior rainscreen, which was made from untreated larch plywood. Prefabrication took a total of four weeks. "The panels were sorted for a fast and easy assembly process, starting on one side of the pavilion in the corner of the larger glass façade and advancing towards the other side," Krieg says. Because the beech plywood panels are exposed, the team took extra precautions in handling them during transport and assembly.

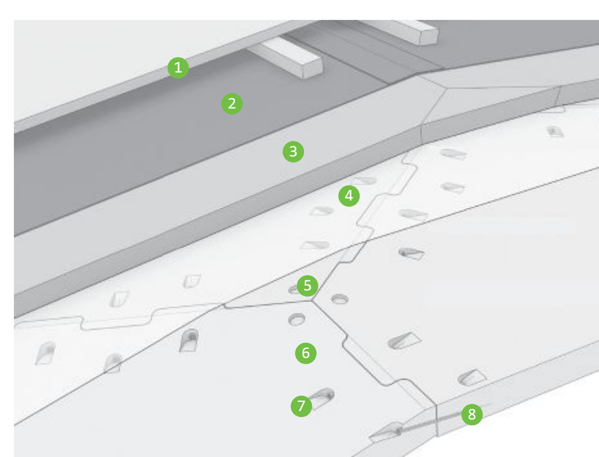
On-site construction also took four weeks. The panels were attached by hand using crossing screws. At the foundation, a steel angle connects the panels to a wood sill plate on the concrete slab.

Designed for a five-year lifespan, the exhibition hall demonstrates that robot-driven fabrication is a legitimate method for building construction, particularly when designers want to create formal complexity with heterogeneous components and optimize material resources. This effort also bridges the gap between product and building: As plywood is transformed into interlocking panels, the unique construction system becomes inseparable from the final product.

Robot Setup Diagram



Timber Shell Diagram



1. Three-ply larch cladding
2. EPDM
3. 35mm wood-fiber board
4. Vapor barrier
5. Robot assembly guide
6. 50mm beech plywood
7. Screw pockets
8. Crossing-screw connection

Crafting a Serpentine Roof from Wood

DIAMOND SCHMITT ARCHITECTS TURNS A FORGETTABLE LOW-RISE BUILDING INTO A FOCAL POINT FOR THOMPSON RIVERS UNIVERSITY'S LAW SCHOOL IN BRITISH COLUMBIA.

Clad in weather-resistant cedar, the undulating roof eave of the Old Main academic building at Thompson Rivers University cantilevers 5 to 13 feet past the façade.

Text by **Jenny Jones**
Photo by **Tom Arban**

THE BOXY, 1970S OLD MAIN academic building at the center of Thompson Rivers University's (TRU's) campus in Kamloops, British Columbia, lacked the space and *dignitas* needed to house a law school. That changed when Toronto-based firm Diamond Schmitt Architects (DSA) capped the building with a two-story, 45,000-square-foot addition and undulating timber roof that rivals the mountainous setting. The 400-foot-long roof transforms Old Main into a centerpiece for the 250-acre campus, which overlooks the confluence of the north and south branches of the 304-mile-long Thompson River.

Donald Schmitt, AIA, DSA principal, says that the 1945 painting *Mount Paul* by A.Y. Jackson, a member of the Group of Seven landscape artists, inspired the roof's rippled form. Visible from the building, Mount Paul and the neighboring Mount Peter are sacred to the First Nations, who account for 11 percent of TRU's student body. "The visual connection between the building shape and [the two mountains] was very important to creating that cultural connection with the aboriginal people," Schmitt says.

Timber was chosen for the roof because of British Columbia's strong logging industry and the First Nations' long use of wood in construction. The roof's glulam timber frame is supported by wood purlins made of trees that were killed by the invasive pine beetles in the province. "It's a very green and sustainable way to reuse something that is [otherwise] a waste material," Schmitt says.

The shell of the roof and building addition had to be completed during the summer, when fewer people use the building. To meet the tight deadline and $6.9 million project budget, the team designed the roof to be prefabricated from 92 panels, curved in profile and rectangular in plan.

The roof's geometry was achieved using Rhino and AutoCAD. Vancouver, British Columbia–based structural engineering firm Fast + Epp worked with architectural structures firm StructureCraft Builders, in Delta, British Columbia, to design and manufacture the prefabricated panels.

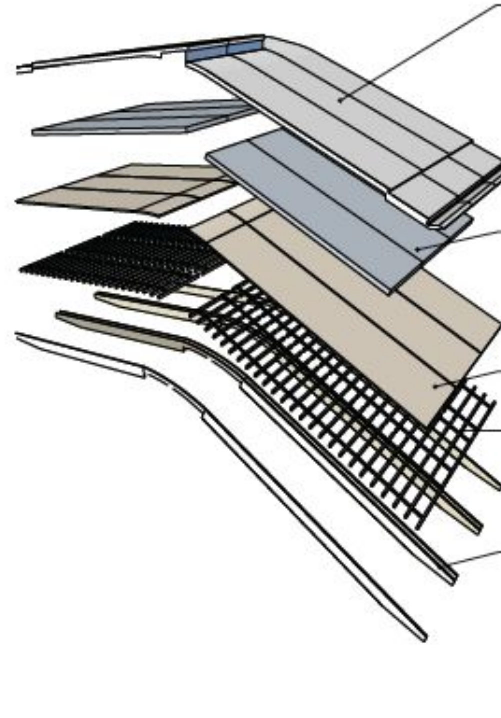
Approximately 60 percent of the panels share the same geometry. StructureCraft bent the glulam beams using a template to frame each panel and then infilled the frames using the straight wood purlins. Each 12-foot-wide-by-36-foot-long panel weighs about 4,000 pounds.

The panels were transported to the site in 42 tractor-trailer loads and then hoisted atop 5-inch-diameter structural steel columns along the building perimeter and down the roof's centerline. The panels, which locked into place like puzzle pieces, were bolted together to form the continuous serpentine form. The installation was completed in seven weeks.

An insulation layer covers the panels, which is then topped by a plywood roof deck and flexible EPDM (ethylene propylene diene monomer) membrane that contours to the roof's curves. Inside, the undulating ceiling is covered by medium-density fiberboard acoustic panels with a maple veneer. The custom-fitted panels have a fire-retardant treatment to meet the local fire safety code. Classes in the expanded building began in January 2014.

The renovation did more than allow the university to reuse an existing building, Schmitt says. "Suddenly this unpleasant box was turned into something that has a more iconic presence on the landscape and a more positive contribution to the campus."

Exploded Axonometric



77H in Washington, D.C., jointly designed by MV+A Architects, Washington, D.C., and The Preston Partnership, Atlanta, Ga.

WOOD: PROVEN SAFETY AND PERFORMANCE

77H IS A WOOD-FRAME, MIXED-USE MID-RISE PODIUM WRAP PROJECT THAT IS NORTH AMERICA'S FIRST MULTIFAMILY BUILDING TO INCLUDE AN URBAN-FORMAT WALMART STORE

77H is a 375,000 square foot residential in-fill mixed-use structure built on the 2.1 acre site of a former gravel parking lot near the United States Capitol. Besides 90,000 square feet of retail including a 75,000 square foot LEED® Silver for Retail-certified Walmart, 77H residents have access to a three-season rooftop pool, spacious lounge area, warehouse-style fitness center, and a variety of public transportation options, including a new streetcar system and bikeshare station.

Code Compliance

The project complies with Section 602.3 of the 2012 International Building Code for Type IIIA, four-story wood-frame construction on a one-story concrete podium with exposed cellar. It is also among the first projects to be fully compliant with D.C.'s new Inclusionary Zoning Regulations, a model for serving income-qualified families and individuals.

Why Wood?

The decision to specify wood was made for a couple of reasons. First, building with wood is safe. Today's fire-resistive materials and building practices, including a fire sprinkler system throughout all rooms and public areas, ensures that 77H meets or exceeds the safety performance expected from any code-compliant building system.

Wood has a high strength-to-weight ratio and exceptional ductility. That means great structural durability during high winds and seismic events.

Wood is also the best way to help maximize the owner's investment. Because the property is a tight in-fill site in an active urban location, the designers looked at other construction options, including metal framing. Wood offered the owner the most density for the lowest cost with full code compliance.

The design team ran a comparative analysis of wood vs. metal framing. Going with metal at the same density would have spiked construction costs by 20 percent.

Density

77H was able to achieve an affordable density of 303 units and 90,000 SF of retail, including a Walmart Supercenter, on just 2.1 acres. This translates to a density of 144.3 dwelling units per acre (du/ac), which made 77H economically viable.

Aesthetics & Sustainability

The top four floors are designed for class A apartment units, thoughtfully blending historic detail with rusticated bases, deep recessed windows, jack arch lintels, and stone cornices. The affordability of wood-frame construction allowed the developer to spend more on the brick façade.

Sustainability was also another important consideration. Wood is natural, renewable, biodegradable, non-toxic, recyclable, and reusable. Today, 77H is on track to receive Green Communities Certification through the Enterprise Green Communities Initiative and is LEED® Silver-certified by the U.S. Green Building Council.

Awards and Distinctions

Washington Business Journal's Community Impact Award

Finalist for the 2014 ULI Global Award for Excellence

MULTIFAMILY EXECUTIVE Project of the Year—Mid-Rise Podium or Wrap

AIA Maryland 2014 Excellence in Design Merit Award for Commercial Architecture

2014 Builder's Choice: Award of Merit—Multifamily

Lead Architect: MV+A, James Voelzke, AIA, LEED AP
Residential Architect: The Preston Partnership, Robert N. Preston, AIA, LEED AP
Developer: The JBG Companies, Chevy Chase, Md.
Owner: Clarion Partners, New York, N.Y.
General Contractor: Clark Builders Group, Arlington, Va.
Civil Engineer: Bohler Engineering, Warren, N.J.
Structural Engineer: SK&A Structural Engineers, Washington, D.C.
Mechanical Engineer: WSP Flack + Kurtz, Washington, D.C.
Landscape Architect: Parker Rodriguez, Alexandria, Va.

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A Neighborhood of Cocoons Woven Together

ISTANBUL-BASED ARCHITECTURE AND DESIGN STUDIO AUTOBAN CREATES A WOODEN VILLAGE TO ENCOURAGE WANDERING IN A VAST AIRPORT TERMINAL.

Text by **Shonquis Moreno**
Photo by **Kerem Sanliman**

BAKU, AZERBAIJAN, BURNS in a hot landscape—literally. In recent years, swaths of land in the country's capital have ignited in spontaneous fires due to shallow-lying natural gas and oil. Since the country gained its independence in 1991, the government has sought to elevate its design stature. In June 2012, the government commissioned the Istanbul-based architecture studio Autoban to design the 645,835-square-foot interior of Baku's new Heydar Aliyev International Airport, by Arup.

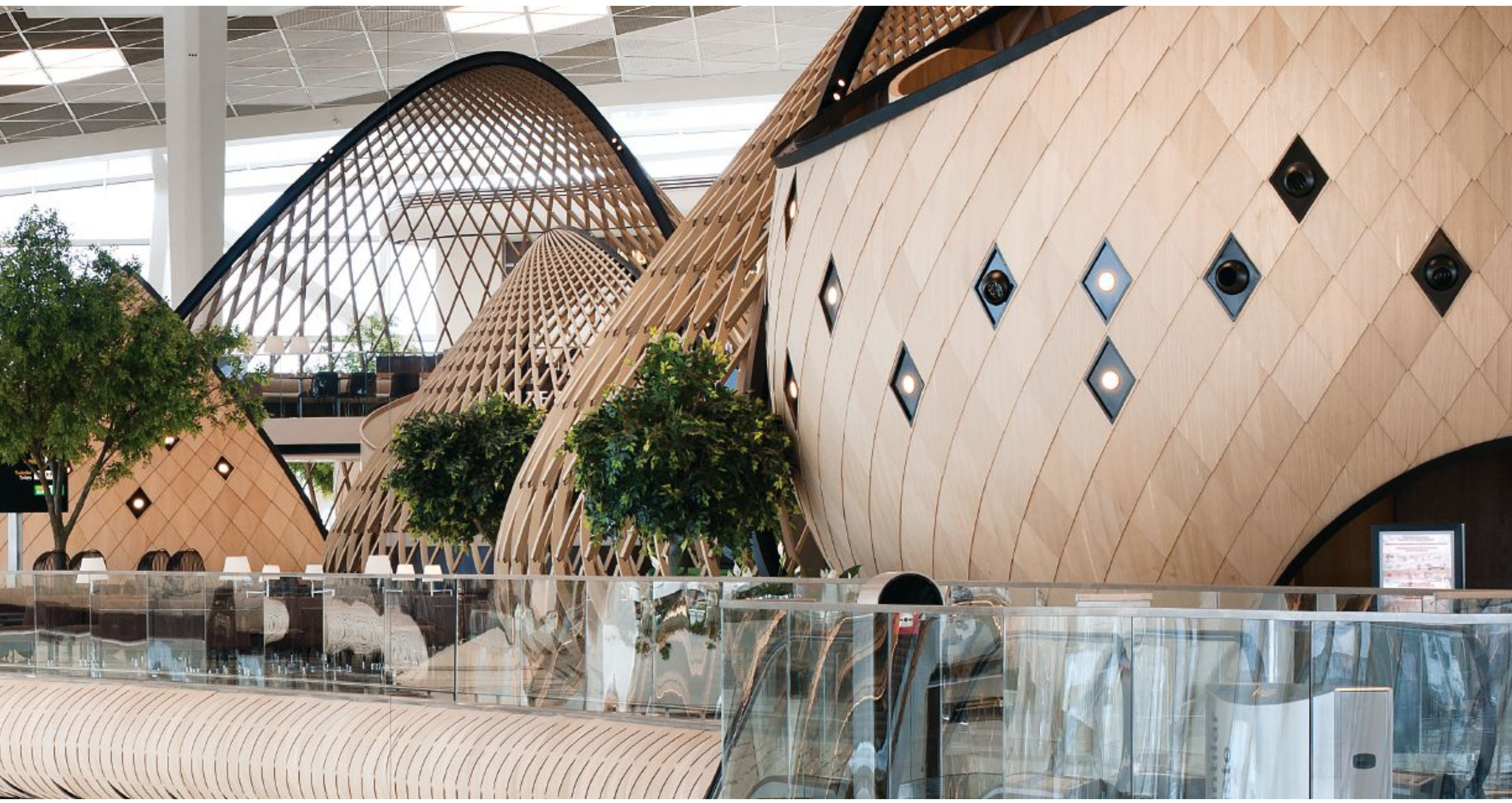
The centerpiece of Autoban's work is a series of 16 wooden cocoons, which house everything from a ticket kiosk to a coat check, and cafés to a children's playroom. With an aesthetic influenced by Arup's building design and the country's culture of hospitality, the cocoon's organic forms give a human scale to the spacious terminal and insert a village street-like organization that restores the micro-experience of wandering.

"We're interested in experiential design, in creating a balance between ornament and control," Autoban partner Sefer Çağlar says. He and partner Seyhan Özdemir culled and clarified patterns that appear throughout the terminal structure and finishes while celebrating them in profusion to make the space feel both comfortable and chic.

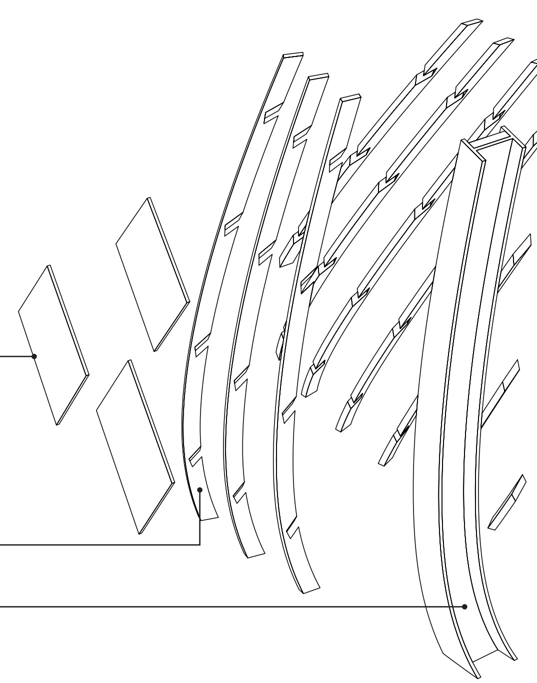
"To make the cocoons," Özdemir says, "we played with natural materials and worked with craftsmen, but we also used CNC milling and laser-cutting." Autoban used Rhinoceros and AutoCAD to design the cocoons and 3ds Max to place the cocoons into the overall interior design. They 3D printed one model of the open-framework cocoons in ABS M30i, a biocompatible, production-grade thermoplastic, at a 40:610 (0.065) scale, which the designers deemed best for evaluating the visual and functional aspects of the cocoons. Before construction began, Ankara, Turkey–based contractor Mapa built a full-size mock-up in Ankara.

CNC milling machines were used to produce the molds to curve and cut dovetail joints into each beam of the lattice structures. These were manufactured in Ankara under the supervision of the engineering faculty at the local Middle East Technical University and later assembled on site. Mapa laser-cut the diamond-shaped cladding panels. Layers of ayous wood with oak veneer on plywood were laminated and then formed over the CNC-milled wooden molds in a factory to achieve the desired curvature. The largest cocoon is clad with 2,050 panels in 40 different sizes.

The terminal maintains a strong, minimal graphical quality. Even light and shadow contribute to the overlain filigree of patterns and reinforce the sense of a geometric forest canopy. "Things here are usually overdesigned," Çağlar says. "This airport represents a new Baku."



Exploded Axonometric



Autoban designed five types of cocoons, ranging from 305 square feet to 3,700 square feet in area, 20 feet to 34 feet in height, and 20 feet and 39 feet in diameter. One cocoon type contains two stories. Each open cocoon took two weeks for Mapa to construct, while each enclosed cocoon took about three weeks to build.

ARCHITECT THE AIA MAGAZINE DECEMBER 2014

Taking the Higher Ground

AN ELEVATED WALKWAY BY MARK THOMAS ARCHITECTS TAKES VISITORS OVER AND THROUGH A STUNNING ARBORETUM IN CAPE TOWN, SOUTH AFRICA.

In October, the walkway's lateral range of motion—up to 3 inches in windy conditions—was reduced by 25 percent with bracing cables in response to visitor feedback that the amount of movement was disconcerting.

Text by **Emily Hooper**
Photos by **Adam Harrower**

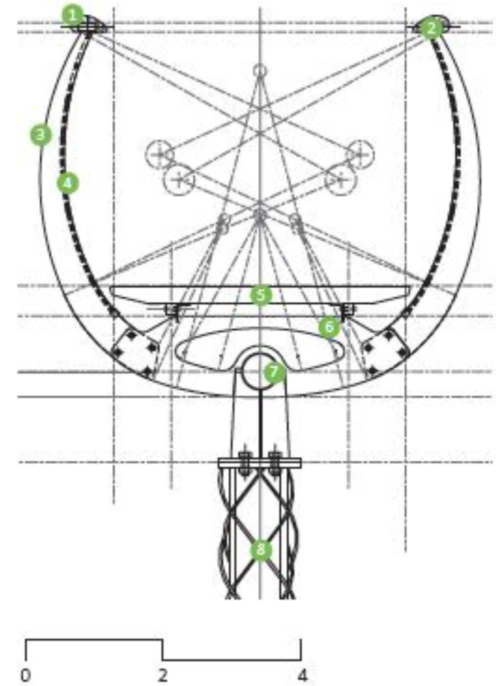
TO CELEBRATE THE CENTENNIAL anniversary of the Kirstenbosch National Botanical Garden in Cape Town, South Africa, the South African National Biodiversity Institute (SANBI) last year commissioned a 426-foot-long aerial walkway through the garden's arboretum. The Kirstenbosch Centenary Tree Canopy Walkway takes visitors 40 feet above a forest of approximately 450 indigenous species against the backdrop of Table Mountain.

The structure was designed by Mark Thomas, of local firm Mark Thomas Architects, in collaboration with local structural and civil engineering firm Henry Fagan & Partners and SANBI horticulturist Adam Harrower. "For this project, Mark and I worked together to integrate everything, so that many of the components serve both a structural and architectural purpose," says Henry Fagan, principal partner at his namesake firm. The project team conducted extensive site surveys to ensure none of the 400-plus trees in the walkway's path would be affected. "At one point, where a tree could not be avoided, a branch of a tree extends vertically through the walkway," Fagan says.

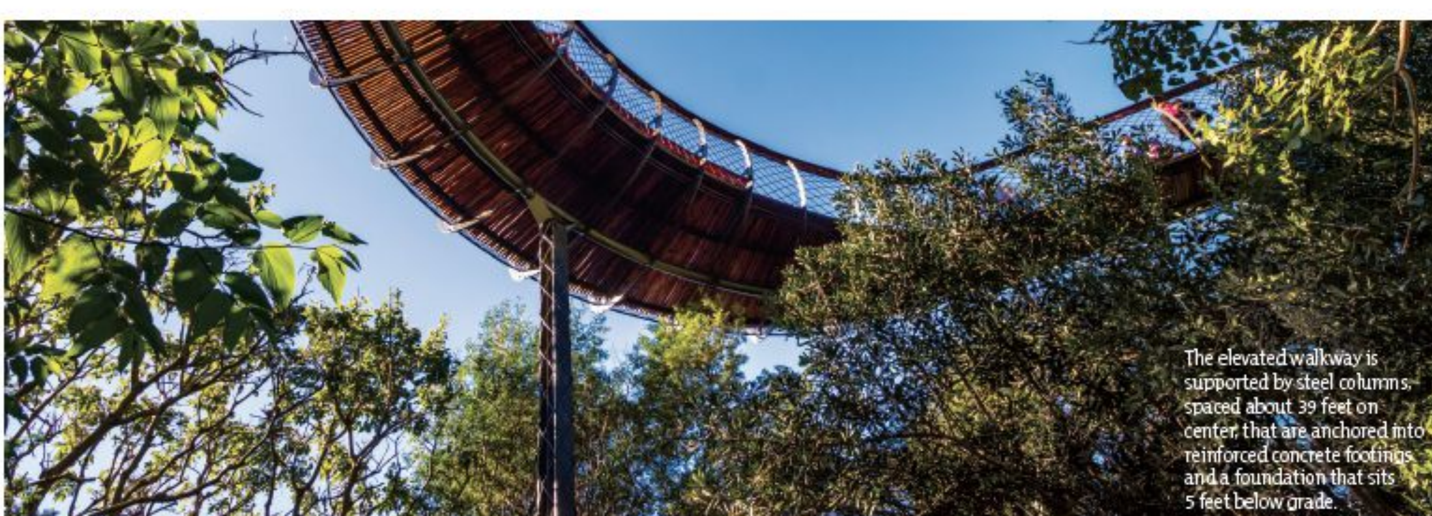
Coined by local residents as the Boomslang, an indigenous tree snake, the walkway comprises a series of trusses that vary in width between 4 feet 6 inches and 10 feet and are connected by continuous handrails and a 420-foot-long steel tube spine that acts as the bottom chord. The handrails are made from slender planks of Padauk hardwood from West Africa and laminated onsite to accommodate the sinuous design contours. "One of our biggest challenges was the development of the eccentric curves," Thomas says. "They appeared smooth at first on the computer model, but close up showed faceted straight lines." By using wood instead of steel, the team reduced the visibility of the faceting.

The walkway was completed this past May, almost 100 years to the day that the South African government established a botanical society to help build and promote Kirstenbosch.

Truss Section



1. Padauk wood handrail
2. 80mm × 40mm × 6mm galvanized mild steel (GMS) box section
3. 8mm GMS curved rib stanchion
4. Two-ply ⌀10mm GMS rod mesh
5. 25mm × 76mm treated-pine plank
6. 8mm GMS central transverse frame
7. 6mm GMS pipe spine ⌀165mm
8. 252mm × 252mm GMS H-section column welded to 8mm GMS mesh



The elevated walkway is supported by steel columns, spaced about 39 feet on center, that are anchored into reinforced concrete footings and a foundation that sits 5 feet below grade.

MoDus Architects won Damiani-Holz & Ko's invited design competition to create a new headquarters in Bressanone, Italy, with a concept that embodies the company's timber construction capabilities and showcases wood's potential as a building material inside and out.

Revamping the Box

IN ITALY, MODUS ARCHITECTS WRAPS A TIMBER CONSTRUCTION COMPANY'S HEADQUARTERS WITH—WHAT ELSE?—WOOD FINS.

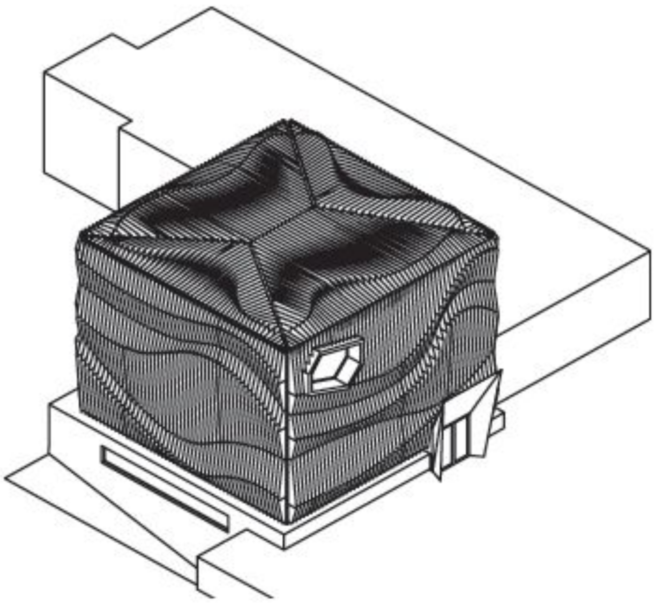
Text by **Jenny Jones**
Photos by **Günter Richard Wett & Leonhard Angerer**

IF EVER A CLIENT EXISTS that would want to flaunt the versatility of wood, it is Damiani-Holz & Ko (DH&K), a timber construction company in the light-industrial district of Bressanone, Italy. DH&K wanted a building that "represented what they do in an innovative way and that just stood out and said, 'Wood,'" says Sandy Attia, founding partner of local firm MoDus Architects.

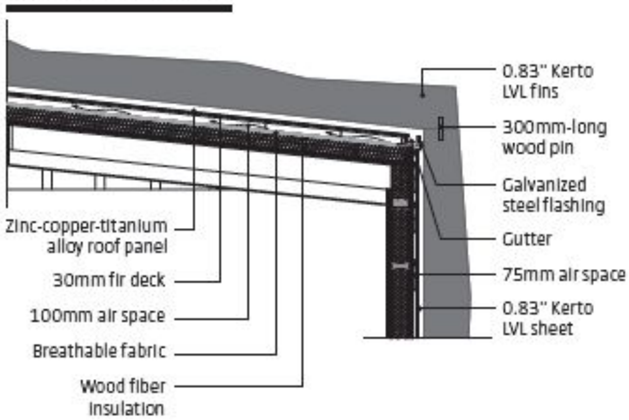
Housing a customer service area, office space, and a multipurpose room, the four-story, 12,885-square-foot building features wood framing, floors, ceilings, and stairs. But its most prominent element is its exterior, which comprises 424 geometric plywood fins that wrap the structure's walls and roof and mimic the towering pallets of boards and planks in DH&K's lumberyard. "These big, very monolithic blocks—almost like mini buildings of wood—were our inspiration," Attia says. Designed using Maxon Cinema 4D Studio, Autodesk 3ds Max, and other software, each uniquely shaped fin in the series contributes to the undulating pattern that becomes the building's seemingly continuous outer skin.

The fins also form a brise-soleil over most of the building's windows. Attia says that shading was important because DH&K's staff always had to draw the blinds in their former office building to limit solar glare and heat

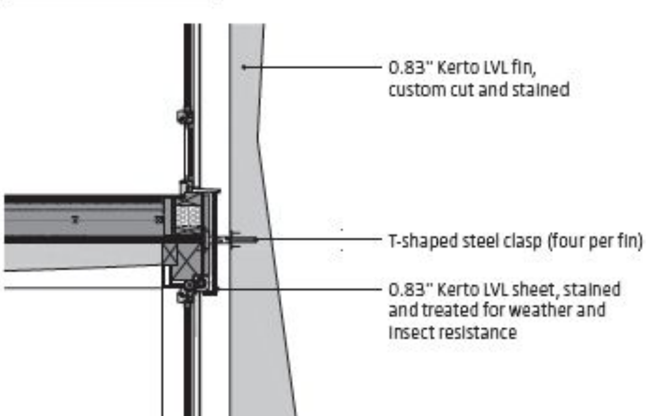
Building Axonometric



Roof and Wall Section



Wall and Fin Section



gain. "We understood that light was an issue," she says. "This brise-soleil was a useful façade solution."

The exterior skin has two layers, both made from Kerto, a laminated veneer lumber (LVL) product from Finland-based Metsä Wood (formerly Finnforest). The 6,060-square-foot base layer comprises 156 0.83-inch-thick sheets of Kerto, which are finished in a dark stain and treated for weather and fungal resistance. Perpendicular to these panels are the lighter-color curvilinear fins. Juxtaposed together, the different hues add depth of the cube-shaped building. "We were ... interested in working with the kind of duality between the lightness and heaviness of wood," Attia says.

Each exterior wall surface has 53 fins, spaced 300 millimeters (11.8 inches) on center, while 212 fins cover the roof. DH&K cut the 39-foot-long fins for the wall from 1,250-millimeter-by-13,500-millimeter (4.1-foot-by-44.3-foot) Kerto panels using a Hundegger PBA machine. The fins measure up to 2 feet deep and are treated with a copper sulfate solution that provides some weather resistance and preserves their natural color. Each fin is bolted to the base layer of Kerto sheets with four T-shaped steel clasps.

The building's first floor sits atop an underground parking garage and is framed in concrete, keeping the LVL components above grade. However, the architects didn't want to deviate from the idea of using timber as the primary construction material. "Wood and concrete have a symbiotic relationship," Attia says. "To do poured-in-place concrete, you need formwork ... so we [created] different ways of sanding the formwork [for the concrete structure as well as for an interior concrete wall to bring] out the grain."

MoDus spent nearly three years designing the project, working closely with DH&K, which ordered the materials, engineered the structure, and constructed the building. The firm also collaborated with Simon Neulichedl, an engineer at the Bolzano, Italy–based civil engineering firm BauCon, for the concrete portion of the structure. The headquarters was completed in 2012.

The headquarters has elevated DH&K's marketing efforts. "It totally raised the bar on their business," Attia says. "They've become a tourist site for architects and for engineers ... [who are] interested in learning how to use wood in their projects."

UP AND RUNNING

STARTING YOUR ARCHITECTURE BUSINESS

Presented by:
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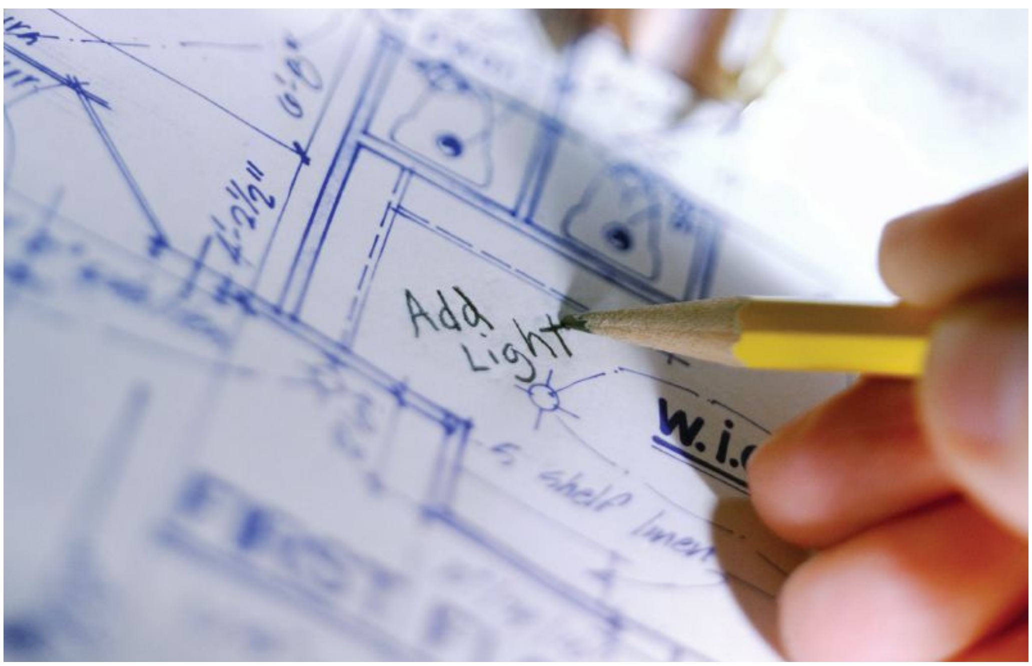

LEARNING OBJECTIVES

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

1. Explain how to create a business plan.
2. Describe your firm's legal framework, including incorporation and liability.
3. Discuss your firm's financial picture.
4. Identify successful marketing and employee recruitment strategies.

CONTINUING EDUCATION

CREDIT: 1 LU

COURSE NUMBER: ARdec2014.3

Use the learning objectives to focus your study as you read this article. To earn credit and obtain a certificate of completion, visit http://go.hw.net/AR1214Course3 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 Kristina Kessler

INTRODUCTION

Recent figures continue to confirm that the architectural profession is on a stable path of growth. According to AIA's 2014 Firm Survey Report, design activity is at pre-recession levels, revenue levels are stabilizing, and gross billings have grown 20 percent from 2011. Half of the architecture firms surveyed anticipate higher revenue in 2014. New firms continue to emerge, reshaping the profession.

Projects have become smaller, smarter, and greener, part of a trend to rethink design in a new economy where energy efficiency is key. Smaller projects have leveled the playing field. Fewer jobs now require large staffs. Emerging firms are beginning to make their mark by responding in novel ways to social, physical, and cultural challenges.

Here are some successful examples:

- **Young Projects**, founded in New York City in 2010 by Bryan Young, designs buildings conscious of physical constraints, such as site, context, and resources. The firm designs everything from inhabitable fireplaces, like the Carraig Ride Fireplace in Alberta, to homes in sync with their natural landscapes, such as the Playa Grande Main House in the Dominican Republic.
- **LCLA Office**, founded in 2011 by Luis Callejas, with offices in Medellin, Colombia, and Cambridge, Mass., positions itself at "the intersection of the fields of architecture, landscape, and urbanism in the territorialism of public space." One of the firm's most notable designs is the Aquatic Center for the XI Medellin South American Games, a 215,278-square-foot open-air complex of four pools separated by tropical native wetland plants.
- **SMA Architecture** was founded in 2012 in St. Paul, Minn., by Marcia Stemwedel, who is continually inspired by the process of collaboration during the design process. Her firm evaluates existing buildings to solve building envelope problems, and to improve their quality of construction and long-term performance. The firm's portfolio includes medical, retail, corporate, sustainable, and industrial food preparation projects.
- Chris Dawson, founder of **Chris Dawson Architect** (CDA) in 2008 in Pennsylvania, has designed 13 projects recognized by the AIA as Design Excellence Award Winners.

> His advice to architects starting their own firms is that "you need to be strong creatively, persistent, patient, and a strong leader."

"The common thread through all [architectural disciplines] might be a deep-seeded concern for the built environment," he adds. Given the competition, architecture, he says, is a field that takes patience to break into. "It is a challenging profession."

Having one's own architectural practice can be rewarding, but being successful at it requires planning, determination, and hard work. Clients are looking for spaces with higher levels of quality both in terms of aesthetics and performance. Architectural firms that can capture the maximum return on their clients' investments will be best positioned for success.

Starting an architectural practice requires a primary understanding of how to be a good entrepreneur, the resources that are required to stay in business, a strong desire to have one's own firm, and a willingness to adapt to changing conditions. False assumptions and lack of preparation sink many start-ups.

THE BUSINESS PLAN

The first step to growing your architectural practices is to prepare a business plan to establish the right steps for starting a new business. Good management requires setting specific objectives. As your practice grows, you will want to keep planning, organizing, and communicating your priorities not just for yourself but for new people who will help your business grow and prosper. Use your plan to set targets for new alliances and for valuation so that investors and/or lenders can decide whether or not to invest or lend. Your business plan should outline the objective, focus, and implementation of your new firm.

Objective

Your objective should be a company summary of ownership and what your firm can offer clients that differentiates it from the competition, such as superior technology that can improve efficiency and increase value, a wide variety of product styles and/or talent, and/or niche or global connections. Find your competitive edge over both larger and smaller firms and convey it as your firm's objective. Your objective should also include at least a three-year targeted sales and market expansion plan.

Focus

Your focus statement should detail the type of architecture in which your firm will be specializing (residential, commercial, industrial, remodeling), where your firm will be based, and targeted market(s).

Look for opportunities in unexpected places. Your firm might be able to make money by working in several different fields such as drafting, modeling, structural design, landscaping, restoration, or specialized structures such as sports facilities, prisons, hospitals, and schools, or by picking up work from larger architectural firms or by acting as a project manager for a construction company.

Your targeted client(s)—home owners, developers, government agencies, contractors—should be fully researched in addition to any market trends that may affect their projects' aesthetics, budget, and needs.

List the particular services your firm can offer such as digital-based design, construction methods, special services, or bundled services.

> Your business plan should outline the objective, focus, and implementation of your new firm.

Implementation

Your implementation statement should address your projected first three years of sales and when you expect your firm to start becoming profitable. You will need to find suitable office space. If you want to attract commercial clients, your firm should ideally be located in a downtown area. If your clients are residential, find a location that is convenient and easy for them to reach. If you are short on start-up money you may want to consider leasing until your firm is established. Many new architecture businesses make the mistake of renting premium office space thinking it is necessary to attract clients and purchasing too much equipment and furniture. Avoid overextending yourself. Keep your overhead as low as possible. Consider starting off in a home office.

Devise a marketing plan to target your prospects, and a recruitment strategy if you intend to hire a small staff. You will need to calculate your start-up costs. Those costs will include rent, utilities, wages, equipment such as computers, software, drafting tables, special printers and paper, office supplies, marketing costs, possible travel, and capital needed to sustain the business until it turns a profit.

Project where you see sales expanding. Strictly local? Regionally? Nationally? Globally?

Determine your sales strategy. What is your approach to selling your services that will provide a positive experience and possible referrals? As a start-up, price your services competitively. Break your billable services into various categories, such as design, production, and construction per project. Sales can be figured as a fixed cost, hourly cost, per-square-foot calculation, or a combination of these. A fixed fee is based on the total project costs and can range from five to seven percent for commercial projects, nine to 10 percent for new construction, basic services, and consulting, to 10 to 12 percent for renovations.

Draw up a management plan, including the founder, other architects, clerical staff, and projected staff needs and personnel expenditures for the first three years.

Your financial plan should address growth projections based on certain assumptions with built-in flexibility for those assumptions to change as market conditions warrant. Determine key financial indicators for the first three years and perform a breakeven analysis. Create a projected profit and loss chart. Assume that net profit will be virtually nonexistent for an extended time.

Determine your projected cash flow, balance sheet, and net worth over the next three years. As an architect, you typically will be paid a small percentage to start a job with the bulk received when the job is finished. This means you will need to have enough capital to cover operating expenses until you start collecting payments from your clients. Calculate the cost of staying in business for three years. Most businesses do not break even until their third or fourth year. Decide how you can acquire funding for your practice. Some owners save before staring their business, while others receive money from their family or investors.

To succeed with your own firm, you need to show leadership capabilities. You need to be able to have a clear vision of the future and be able to steer, communicate, and motivate partners and staff in the same direction and help them stay on message. You must be able to manage people—mentor, supervise, and develop talent—as well as assign tasks, develop plans, and market and sell your firm's services.

You need to be financially resourceful to finance your start-up and have money-management skills to keep your firm on track financially and handle surprises as they arise. Down the road, you might want to partner with someone supportive who you can work with. You should partner with someone who has a skill set different than yours, who can bring another pair of eyes to the firm and the work, and who can cover for you. Ideally, the mix should include people who have business development skills, technical acumen, and the management aptitude to achieve the firm's financial goals but who can assume some responsibility for every area.

At the beginning of each job, devise a comprehensive strategic, financial, and logistical work plan. It will help you set benchmarks and timelines, reinforce fiscal discipline, and enable you to anticipate problems and risks upfront. The work plan will organize your work, help determine whether you should pursue a particular project, help you estimate the cost of the project before negotiating a contract, and will reflect positively on the competency of your firm.

The work plan should include a list of tasks, usually determined by the scope of work, which will help determine the project schedule and staffing needs. These tasks will determine estimating costs, such as the budget for design and contract documents, and profit. With a work plan in place, any changes such as project scope, specifics, and price can easily be incorporated. Each completed project will thus become a valuable source of task, budget, and scheduling information. Planning upfront ultimately will determine how well you compete. A well thought-out project planning worksheet can help your firm adapt quickly to stay profitable.

The Legal Framework

State laws regulate an architecture firm's legal structure and thus can restrict the type of legal entity your firm can assume. An attorney can help you decide what legal structure (i.e., a sole proprietorship, a corporation, a subchapter S corporation, a professional corporation, a limited liability company, or a limited liability partnership) will best meet your needs.
Some states will not allow architecture firms to operate as general business corporations to ensure that only licensed architects own and control their firms. Other states may be less restrictive.

As a licensed professional, you are personally liable for your professional acts and cannot rely on your firm's legal structure to protect you from professional liability. Some liability may be transferred to an insurer, but not to another party, including a corporate entity. Because restrictions vary by state, the structure of an architecture firm might be legal in one state and illegal in another, even if the architects in your firm are registered in both states.

If you choose a sole proprietor structure it is important to maintain a clear distinction between your personal and business finances. The tax implications are different and lenders may require a separate picture of business activity to approve a loan. The disadvantage of this structure is that you may be personally at risk for general business liabilities.

If you choose a partnership structure, you will have to file a federal tax return but will not have to pay federal income tax. The agreement for this type of structure should address:

- Initial investment of each partner
- Distribution of profits and allocation of responsibility for losses among partners
- Fiduciary duties of the partners—how additional investments, if needed, will be made, by whom, and in what proportion
- Management and operational structure of the firm, including each partner's decision-making responsibilities and authority
- Expectations for each partner
- Dispute resolution mechanisms
- Admission of new partners
- Departure of existing partners, including provisions in the event of a partner's death, divorce, or incapacity
- Terms of dissolution, liquidation, or sale of the partnership

If you choose a corporate legal structure, the personal assets of the shareholders generally cannot be touched to satisfy the firm's liabilities. This structure is likely to be more durable than a proprietorship or partnership.

Some states do not allow architecture firms to organize as limited liability companies (LLCs) or partnerships (LLPs), while others permit the formation of professional limited liability companies (PLLCs) or partnerships (PLLPs).

Once you have determined your firm's legal structure, chose a name and register it with your state. To legally operate your firm, you will need a state business license that you can apply for through your state's licensing board. If your state requires state income tax, register for an Employer Identification Number (EIN) from your state's Department of Revenue or Treasury Department. Most businesses also need a Federal EIN to operate. You can obtain one online through the IRS website.

You must have professional liability insurance and general business insurance to protect your company. Your employees will also need to be insured for your protection, especially if they will be visiting jobsites.

Hire a lawyer and accountant for legal and financial planning, as well as a part-time bookkeeper for your firm's monthly expenses and income.

The American Institute of Architects (AIA) Trust offers tools and resources that you may find helpful. The AIA also offers its members LegaLine, a service for small businesses that provides consultations on issues such as contract interpretation and negotiation, ways to improve client communications, and risk-management.

The Financial Picture

It is important to understand basic accounting before you start your practice. Two main accounts measure a firm's financial health: the balance sheet (assets, liabilities, and equity), and profit and loss statement.

Assets exist as liquid cash, bank accounts, stocks, mutual funds, movable and immovable assets (such as property, vehicles, equipment, etc.), and intangible assets (such as patents, franchises, copyrights, etc.).

Liabilities exist as accounts payable (unpaid bills) and payments to suppliers or creditors for goods and services, credit card debt, and loans.

Equity is the value of your firm's assets, its "net worth."

This article continues on http://go.hw.net/AR1214Course3. Go online to read the rest of the article and complete the corresponding quiz for credit.

QUIZ

1. Your ______________ will include information on your firm's objective, focus, and implementation.
   a. work plan — b. business plan
   c. partnership structure — d. proprietor structure

2. True or False: In a corporate legal structure, the personal assets of the shareholders generally cannot be touched to satisfy the firm's liabilities.

3. In a partnership structure, you will have to file a federal tax return but will not have to pay _______.
   a. liability insurance — b. state income tax
   c. federal income tax — d. business insurance

4. To legally operate your firm, you will need a __________________.
   a. subchapter S corporation — b. employer identification number
   c. professional limited liability — d. state business license

5. Equity is the value of your firm's ___________.
   a. stocks — b. assets
   c. liabilities — d. cash

6. Your balance sheet reflects your firm's ______________.
   a. profit and loss — b. assets, liabilities, and equity
   c. expenses — d. income

7. True or False: Your marketing plan should cover the vision, mission, and goals of your firm.

8. Your branding message should reflect your __________ statement.
   a. design — b. concept
   c. client — d. vision

9. Advantages to start-up firms that can be appealing to new talent include (select all that apply):
   a. proximity to management — b. high profile positions
   c. culture of togetherness — d. large bonuses

10. Once hired, encourage and empower your employees to succeed by (select all that apply):
   a. showcasing their talents — b. having an open door/communication policy
   c. promising them raises — d. intriguing and challenging them

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HIGH PERFORMANCE

PRECAST CONCRETE BUILDING ENCLOSURES

Presented by:

Nordstrom used the aesthetic versatility of precast concrete to achieve a new facade which will define their brand for future generations. The high performance precast concrete enclosure combined four-different finishes in a single panel including: polished, light sandblast, acid-etch and a finish created and named exclusively by Nordstrom called Burnish. The precast concrete also provides the enclosure's integral thermal envelope; edge to edge insulation, integral vapor barrier and air barrier. Photo courtesy of Gate Precast

LEARNING OBJECTIVES

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

1. Define what a high performance structure is and key concepts of high performance design.
2. Explain thermal mass and how to use it to create more energy efficient buildings.
3. Discuss the concept of resiliency and its role in high performance design.
4. Describe several strategies to improve efficiency of building envelope design.

CONTINUING EDUCATION

CREDIT: 1 LU

COURSE NUMBER: ARdec2014.2

Use the learning objectives to focus your study as you read this article. To earn credit and obtain a certificate of completion, visit http://go.hw.net/AR1214Course2 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 Brian Miller, PE, LEED AP and Peter Finsen, Assoc. AIA

Building enclosure and envelope design are among the biggest challenges for architects today. New and more stringent codes are requiring designers to have a greater understanding of enclosure systems. Details such as continuous insulation, reduced thermal bridging, continuous air barriers, and moisture management are an important part of meeting performance requirements and expectations; however, how to meet these are not as well defined. For example, when you look up the definition of continuous insulation in ASHRAE 90.1, it states "…insulation that is continuous across all structural members without thermal bridges other than fasteners and service openings."[1] Since all enclosure systems have connections or fasteners to the structure, this definition leaves designers at a bit of a loss as to how many, what type of, and size of, connections are acceptable. Essentially how much thermal bridging is acceptable?

Another challenge for designers today is the concept of high performance buildings. High performance buildings are more than just sustainable buildings, they are defined as buildings that integrate and optimize all relevant high performance attributes on a life-cycle basis.[2] The high performance concept includes, but surpasses the goals and attributes of sustainability.

A key component of this definition is a challenge to optimize ALL relevant attributes for a given project. This moves us towards better analysis of the interaction of different materials and systems. It challenges designers to find the sometimes overlooked value in design decisions, which will be discussed later in this article.

What are relevant attributes for most building enclosures? The building enclosure is the separator between the conditioned and unconditioned environments, and must manage and protect the conditioned space by controlling heat, air, moisture and noise transmission. They also provide the appearance or aesthetic for a structure. They must also be durable and provide protection to occupants as well as contribute to a long service life, while reducing life-cycle costs.

HIGH PERFORMANCE BUILDINGS AND PRECAST CONCRETE

High performance building designs are becoming essential to meet new code requirements, as well as the expectations of funding entities, owners, and developers. State-of-the-art building designs require high performance building materials and building enclosure systems. High performance materials must be efficient and versatile in use and in operation, as well as durable, resilient, and capable of protecting buildings and building occupants from weather extremes, natural and man-made hazards, and environmental concerns.

Precast concrete is a high performance material that integrates easily with other systems and inherently provides the versatility, efficiency, and resiliency needed to meet the multi-hazard requirements and long-term demands of high performance structures. Precast concrete construction offers project stakeholders a whole host of benefits which will help optimize a structure, improve performance, and reduce life-cycle costs. A summary of the key attributes and benefits that precast concrete provides is shown in Figure 1.

When working with precast concrete it is important to understand and consider other benefits that are inherently available to utilize for a project. This helps meet part of the challenge set forth by high performance structures—*to optimize all of the relevant attributes for a project.* The chart in Figure 1 can be used as a guide to consider if these attributes can benefit a specific project. For example, if adaptive reuse is a potential consideration for an office project, then designing with a precast concrete structural system will allow for more open floor space (e.g. longer spans, less columns), and hence more flexibility for adapting the use of a structure later in its service life.

BUILDING EFFICIENCY

While design comes first followed by construction and finally building operations, we discuss these in opposite order in this article. Doing so helps to better explain the benefits precast concrete enclosures can provide, and hence will help you better optimize your designs.

We will begin by discussing how precast concrete enclosures can effect building operations. A core goal of high performance buildings is to reduce energy consumption. This is also reinforced by building and energy codes becoming more stringent in this area. A key component in accomplishing this goal is to optimize enclosure systems to provide excellent thermal management, which requires addressing air and moisture management as well.

Managing Heat, Air, and Moisture

To manage heat, air, and moisture effectively, it is necessary to manage all three concurrently. This is because they are inter-related. For example, heat and moisture travel with air; as materials get wet, their insulating properties change; as the relative humidity increases in a structure, so does its dew point, and so on.

Attributes and Benefits		
VERSATILE	**EFFICIENT**	**RESILIENT**
Aesthetic Versatility	**Site Efficiency**	**Structure Durability**
Virtually any color, form, and texture	Minimal site disturbance	Long service life
Façade integration	Negligible waste	Barrier wall system
Historic compatibility	Accelerated construction	Functional resilience
Structural Versatility	**Energy and Operational Efficiency**	**Multi-Hazard Protection**
Load-bearing envelopes	Scalable performance	Storm resistance
Economical sections	Thermally efficient	Earthquake resistance
Long open spans	Low life-cycle costs	Blast resistance
Use Versatility	**Risk Reduction**	**Life Safety and Health**
Recyclable	Design assist	Indoor environmental quality
Deconstructive reuse	Reduced detailing and trades	Passive fire resistance
Adaptive reuse	Enhanced profitability	Meets FEMA 361

Figure 1—Table courtesy of the Precast/Prestressed Concrete Institute

Understanding how all of these work together helps designers improve overall performance.

Heat management

Heat transfer is typically managed through insulation, or materials that have a high resistance to heat flow (R-value). It is important to note, that steel, glass, wood, and concrete all have a low R-value. However, insulating materials, such as polystyrenes and fiberglass, have a relatively high R-value and therefore are commonly used for insulating applications.

Precast concrete systems utilize several types of either rigid or spray-foam insulation. The most common types of rigid insulation include: expanded polystyrenes (EPS), extruded polystyrenes (XPS), and polyisocyanurate (Polyiso). These are often applied at the manufacturing plant. Each of these insulating materials have different properties, such as R-value per inch of thickness, absorption value, maximum temperature, etc; hence, determining which insulation type is the best for a project is based on several factors, such as project location, budget, and enclosure design. Precast concrete producers can serve as great resources to help make these decisions and explain the different options.

Precast concrete enclosure systems allow for continuous insulation (ci), running edge-to-edge in wall panels, which meets ASHRAE's 90.1 code requirement. One of the most common precast wall types is a sandwich wall panel, where insulation is sandwiched between two-wythes, or layers of concrete. This provides excellent protection for the insulation layer. Other wall systems, such as "thin-shell" concepts, only have one wythe of concrete (exterior), but still may apply a layer of rigid or spray-foam insulation.


2a

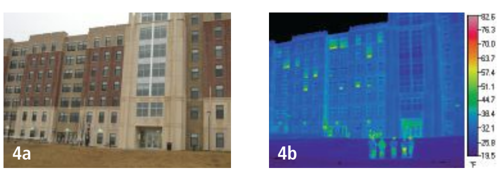

2b

Figure 2a shows a cross-section of a precast concrete insulated sandwich wall panel with edge-to-edge insulation. Photo courtesy of Gate Precast. (2b) Shows a precast concrete thin-shell panel with spray-foam insulation. Photo courtesy of Clark Pacific

Thermal Bridging

Thermal bridging occurs when an element that is more conductive than the insulation, such as metal fasteners or connections, pierces through the insulating layer. Because the material has a higher thermal conductance, the penetration though the insulation creates a short circuit by which heat can be conducted more rapidly. You can think of this as a bucket with a hole in it. The larger the hole or the more holes there are, the faster the bucket empties. Hence, heat travels through an enclosure quicker.

Most precast concrete enclosure systems, such as insulated sandwich wall panels, use composite or coated connectors to attach the outer wythe of concrete to the inner wythe. These connectors do not thermally conduct, so thermal bridging through the wall panel is essentially eliminated. This has been validated through material testing and infrared thermography.



4a & b Opus Hall uses thin-brick embedded, high performance, insulated precast concrete sandwich panels for its enclosure. Thermal imaging shows that there is no thermal bridging through the precast concrete thereby improving the thermal performance of the enclosure system. Photos courtesy of Gate Precast and Thermomass

Another concern is the connections used to attach precast or any enclosure material to the structure. In the case of precast concrete insulated sandwich wall panels, often these connections can be designed so that they do not penetrate through the continuous insulation layer. Among other factors, this depends on the wythe thickness and if it has been designed as a composite or non-composite panel. A precast enclosure system can be designed as a 'hung' façade on another structural material, or it may provide the structural bearing capacity as well. This is another area that precast concrete producers can help designers optimize for their specific projects.

Thermal Mass

Another benefit that is more unique to concrete is that of thermal mass. Precast concrete has a high heat capacity, which means it stores and releases heat slowly. This allows an enclosure system to work like a battery storing up heat energy. Heat comes from several sources beyond the heating, ventilating and air conditioning (HVAC) system including the sun, lights, equipment, and occupants. When proper insulation is combined with very minimal thermal bridging, an enclosure system slows down heat transfer, which reduces the energy needed to heat and cool a structure. And when combined with thermal mass, a portion of the internal heat energy is stored and made available to help maintain the desired indoor temperature. This further reduces the amount of energy needed to heat and cool a structure, thus improving energy efficiency even more. The result can be a significant reduction in the amount of energy needed to heat and cool a building—more than 30% relative to baseline codes. This translates to reduced operating costs.

Another benefit of thermal mass is a delay in when the inside peak heating and cooling times occur. This is the result of thermal lag, or the time it takes for heat to transfer. As temperatures rise and fall throughout a 24-hour period, there is a point when the outside temperature peaks both high and low. The inside of the structure is always trying to "catch-up" with the outside temperature. The greater the difference in temperatures, the more energy required to maintain the indoor temperature. If the inside peak times can be shifted to when the difference in temperature is less, the result will be less energy needed to accomplish the same task. Note: hot air always flows towards cold air (second law of thermodynamics), so whether it's hotter or colder only influences the direction of heat flow.

The thermal mass effect can shift inside temperature peaks by several hours relative to when the outside temperature peaks occur, thereby reducing the difference in temperature and the amount of energy needed. In some areas of the country, the cost of energy varies by time of day. Shifting peaks to later in the day, when energy costs are less, helps save money.

The benefits of thermal mass vary based on project location; however, all areas of the country receive some benefit from thermal mass throughout a year. ASHARE 90.1 takes this into account in its prescriptive tables. This is why the Mass Wall sections of the tables, require less ci.

Combined Effect

It is important to evaluate the net effect of all of these components. Often R-values for an enclosure's section are determined by calculating the material R-value, which is simply the summation of the component R-values. However, this approach does not take thermal bridging and thermal mass into account. To better reflect the actual performance of an enclosure section an effective or performance R-value should be determined. There are several software programs available to run this type of analysis. Insulation providers and precast producers are sources of assitance to help with this type of analysis as well.

Precast concrete systems usually have a greater effective R-value than their material R-value, due to negligible thermal bridging, thermal mass, etc. By using the effective R-value for determining heating and cooling loads, HVAC designers have been able to reduce the size of their equipment and hence reduce first costs for a structure. This results in systems operating more efficiently, further reducing ongoing operating and life-cycle costs.

Air Movement

Air infiltration and exfiltration occurs through gaps, openings, and joints in enclosure materials. An estimated 5–20% of air leakage occurs at windows and doors. However, 20–50% of air leakage can occur through walls. For example, consider how many spaces there are between materials in a typical wood-framed house (between studs, in the siding materials, etc.) These provide numerous places for air to pass through, especially when thermal expansion and contraction are taken into account.

The concern is that air carries significant amounts of moisture and heat. This makes it more challenging to manage the interior conditioned space. Codes now require a continuous air barrier in order to address this issue. Air exchanges or a supply of fresh air can be handled via HVAC equipment.

Concrete has no measurable air leakage[3]. Therefore, precast concrete is an air barrier and meets ASHRAE 90.1 and 2012 International Energy Construction Code air barrier requirements without the need for additional treatment. This provides a very efficient way to meet the continuous air barrier requirement.

Moisture Management

The third part of the puzzle is moisture management. While this is important in managing heat flow, it is also critical to preventing mold growth and damage to interior finish materials. Moisture can enter a structure in one of four ways: bulk water (typically from rain), vapor diffusion, air movement, and condensation.

Bulk rain water is managed by a structure's primary enclosure materials such as cladding, roofing, drainage systems, etc. It is also important to maintain these materials and systems over the life of a structure to prevent leaks. Precast concrete is a barrier wall, or face-sealed system, which means that the high-strength, dense concrete itself is a rain barrier keeping bulk water out.

Vapor diffusion is driven by pressure differences. Essentially water molecules work their way through the molecules of other materials in the direction of the lower pressure. This accounts for a relatively small amount of moisture transmission relative to air movement. Vapor transmission is usually controlled by using vapor retarders and barriers. Precast concrete is a vapor retarder at three-inches in thickness or greater. Also, certain types of insulation (e.g. XPS) are vapor barriers.

Air movement was addressed earlier in this article. Again, heat and moisture travel with air so movement must be controlled.

Condensation occurs when the temperature of a surface and the relative humidity of a space reach a point (dew point) where moisture vapor in the air can become liquid moisture on a surface. This is often seen around windowsills where cold spots may occur, which are often a result of thermal bridging in the window frame material. Regardless of how liquid moisture develops, repeated dampening of materials, such as drywall and fabrics, can lead to mold. To control this, designers should avoid having a dew point occur on the inside of a structure's enclosure.

To determine dew point, it is necessary to know the temperature and relative humidity. Dew point is a dynamic condition based on both factors. The air temperature relates to how much moisture can be "held" by the air. The higher the air temperature, the more moisture a unit of air can hold. The relative humidly is essentially the amount of moisture in the air, relative to how much moisture that air can hold. As either of these conditions increase, the dew point increases.

This article continues on http://go.hw.net/AR1214Course2. Go online to read the rest of the article and complete the corresponding quiz for credit.

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PCI
Precast/Prestressed Concrete Institute

The Precast/Prestressed Concrete Institute (PCI) is the technical institute for the precast concrete structures industry. PCI develops, maintains, and disseminates the Body of Knowledge for designing, fabricating, and constructing with precast concrete; and provides technical resources, continuing education, events, and much more. PCI also operates the world's leading certification program for firms and individuals in the precast concrete structures industry.

QUIZ

1. High performance structures challenge designers and owners
   a. to use LEED in their buildings.
   b. to optimize and integrate all relevant attributes for a building.
   c. to assess design decisions over the long-term life-cycle of a project.
   d. Both A and B
   e. Both B and C

2. Precast concrete is high performance because
   a. it inherently provides versatility, efficiency, and resiliency that designers can use to optimize a project.
   b. it provides for fast construction and minimal site impact saving time and money.
   c. it always uses high performance concrete.
   d. it is used for parking structures and bridges .

3. Precast concrete sandwich wall panels reduce thermal bridging by
   a. using less connectors between the wythes.
   b. using steel connectors between the wythes.
   c. using composite connectors between the wythes.
   d. by using thicker sections of concrete.

4. The thermal mass of precast concrete
   a. can offset peak heating and cooling times due to thermal lag.
   b. helps reduce the amount of the energy needed to heat and cool a structure.
   c. helps increase the effective R-value, which can reduce heating and cooling loads.
   d. All of the above

5. The effective R-value of a wall system takes into account
   a. thermal bridging, thermal mass and the materials used.
   b. thermal bridging and materials used only.
   c. thermal mass only.
   d. is always equal to the material R-value.

6. The majority of air infiltration/exfiltration in buildings occur
   a. through the windows and doors.
   b. through the roof.
   c. through the foundations.
   d. through the walls.

7. Precast concrete is
   a. an air barrier, and a vapor retarder at 3 inches thick.
   b. an air barrier, but not a vapor retarder.
   c. is not an air barrier, but is a vapor retarder at 4 inches thick.
   d. None of the above

8. Condensation in buildings can be avoided by
   a. ensuring the dew point occurs outside of the continuous insulation barrier.
   b. eliminating cold spots and thermal bridging.
   c. increasing moisture vapor infiltration.
   d. Both A and B
   e. Both B and C

9. Gray cement is consistent in color.
   a. True
   b. False

10. Which is an example of resiliency and design efficiency?
   a. An envelope system that uses glass cladding over a steel structural frame
   b. An envelope system that uses precast concrete sandwich wall panels as part of the structural system and also to replace interior drywall
   c. An envelope system that uses non-insulated precast concrete wall panels to clad a cast-in-place structure
   d. An envelope system that uses precast panels in conjunction with field-laid masonry and limestone

Wilsonart Presents:

LEARNING CAN HAPPEN ANYWHERE

EXPLORING TWO CASE STUDIES OF EDUCATION ARCHITECTURE IN THE SEATTLE REGION

LEARNING OBJECTIVES

After reading this article you will be able to:

1. Identify how education architecture can enhance sustainability, ecological design, and innovation through space planning and site design.
2. Examine the process followed to design a state-of-the-art educational environment, and the resulting architectural features.
3. Describe how designers took advantage of a school's natural surroundings to create an innovative learning environment.
4. Discuss how the theme of Learning Can Happen Anywhere was embraced through space design and integration of natural site features.

CONTINUING EDUCATION

CREDIT: 1 LU

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Use the learning objectives above to focus your study as you read this article.

Visit http://go.hw.net/AR614Course7 to read more and complete the quiz for credit.

By Paige Lozier

Learning Objective One—Identify how education architecture can enhance sustainability, ecological design, and innovation through space planning and site design.

A STORY OF SUSTAINABILITY, ECOLOGICAL DESIGN AND INNOVATION

We will explore two case studies of replacement schools in the Pacific Northwest—Cherry Crest Elementary and Riverview Elementary. The design of both schools embodies the concept of 21st Century Learning and the idea that learning can happen anywhere. Together, these projects tell a story of sustainability, ecological design and innovation in education architecture.

The architecture firm on both projects was the Seattle office of NAC|Architecture. As a leading designer of educational facilities for more than 30 years, NAC|Architecture has completed over 160 major PK-12 school projects for 60-plus school districts. The total value of that construction exceeds $1 billion.

Embodying the experiential quality of architecture, both schools are designed to make one feel not so much "in the building" as "on the site." The buildings are woven into the landscape in patterns that people discover as they move through the spaces. This integrated experiential environment is intended to enhance the curriculum and stimulate student engagement. The schools offer a variety of unique learning spaces, both formal and informal, which encourages the overlap of academic and social interaction. Transparency and visual connectedness foster shared learning, self-instruction and teacher collaboration.

The space planning and interior design are enhanced with furnishings that enable breakout learning zones and provide ready opportunities for individual or small-group activities. Movable walls and doors between classrooms allow flexible educational arrangements and accommodate team-teaching for groups of various sizes, depending on the learning task.

The schools—both highly energy-efficient buildings on small sites—also were designed to serve as community gathering places. From the fields and playgrounds to the gyms and libraries, these schools are truly neighborhood destinations that have enriched their communities and local education.

CHERRY CREST ELEMENTARY SCHOOL

Cherry Crest is a school in the Bellevue School District of Washington. The City of Bellevue lies across Lake Washington from Seattle. Bellevue includes thriving retail, commercial and residential areas on the developing east side of Puget Sound; it's a part of Seattle's larger metropolitan area. A substantial taxpayer-approved bond measure has enabled the Bellevue School District to replace all its existing elementary schools with new ones that are intended to serve the community for the next 50 years. Cherry Crest students began classes in the new building in September 2012 after spending the two-year construction period in an interim school.

A BUILDING INTERCONNECTED WITH NATURE

A defining factor in the design of Cherry Crest was its heavily wooded site adjacent to a public park. The school district has a joint-use agreement with the City of Bellevue for the neighboring park, which students use for physical education and recess. Initially, district officials considered swapping land, but ultimately they decided to keep the property and the school was built on the existing site.

When the school was constructed, great care was taken to preserve the surrounding trees and the wonderful character of the woodlands so that students, teachers and visitors could fully experience life and learning in the middle of a mature forest. To that end, careful planning went into siting the new building to allow the forest environment to be a visible part of the school experience. This central theme required an understanding of how to site the building to preserve the trees and forest around it while simultaneously trying to accommodate a new school roughly twice the size of the old school. This challenge was met by breaking the new building into smaller pavilions and keeping the forest close to the school's edges wherever possible.

A central theme of Cherry Crest's design was the preservation of surrounding woodlands while remaining innovative in developing the site. Photo Credit: Benjamin Benschneider/OTTO

With the district's strong support, the architectural team decided to use photovoltaics (PVs) on the project. Thus, the building's southern orientation takes best advantage of direct sunlight. Even in rainy Bellevue, the architects felt that using photovoltaics to provide part of the school's power was feasible on this building. Construction crews installed 434 rooftop solar panels, which offset approximately 10 percent of the building's total annual energy use.

Another state-of-the-art step was the use of a ground-source heat-pump system. Ground-source exchange wells were sunk under a sand playfield on the adjacent park property. They allow fluid exchange with the building's mechanical system to either cool or heat the building, reducing long-term operating costs. The wells were placed under a sand playfield on the adjacent city park property; they provide all heating and cooling, as well as hot water. The system eliminates the need to burn fossil fuels on-site.

The architects wanted the theme of green space and a school sited in a wonderful natural setting to continue onto the building itself. Rooftop gardens and outdoor courtyards are living classrooms - and also provide storm water management. Meanwhile, large garden tubs on the first floor rooftop are accessible from the second floor. The flora is far more than attractive: students help care for the plants, use them to conduct experiments and track their growth. It's a very pleasant place to be and also serves an educational function.

The courtyards around the school offer students convenient and abundant spaces where they can observe the abounding outdoor flora and fauna. The courtyards also provide quiet spaces for individual study as well as meeting places for large groups. Groups often use the space to hear speakers deliver presentations.

FOSTERING 21ST CENTURY SKILLS

Now we move on to the building itself, which was conceived to allow views and access to the magnificent natural surroundings. A wealth of windows and window-walls provide outdoor vistas. Even when they are deep within the building, students and staff can see outside as though there were no wall and can look directly into the forest. The opportunity to view the outdoors occurs in many areas of the school, including classrooms and walkways where students and teachers circulate from space to space. Students and staff experience the connection with nature.

The school was conceived to allow views and access to the magnificent natural surroundings. Photo Credit: Benjamin Benschneider/OTTO

The building is composed of learning clusters; each comprises four classrooms that surround a shared flex space. The idea is that the four-teacher teams are working with a smaller group of students, approximately 100, and are able to use both their classroom space and the shared space in the middle to conduct activities. This arrangement accommodates the development of 21st Century Skills.

The principle behind 21st Century Skills is that successful students must do more than simply retain facts. Students need to learn creativity, collaboration, communication and critical thinking—the 4Cs. Educators are finding that to teach these additional competencies, lecture cannot be the exclusive method by which teaching occurs.

Learning by doing is the essential principle behind the 4Cs. Students work on projects in small groups or individually, which allows lessons to "stick" much better than by simply memorizing subject matter. Students are actually performing tasks or creating things that are relevant to their learning. The shared flex spaces provide "hubs" for project-based learning to occur. These areas also allow access to the outdoors, expanding the learning space and experience outside the building.

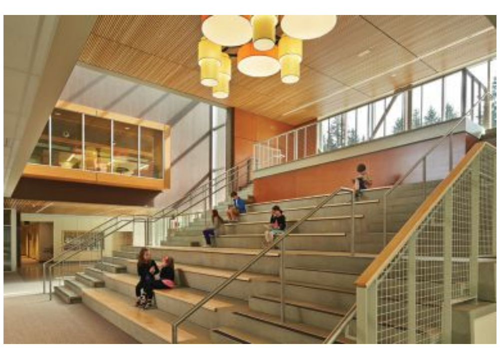
Inside, the classrooms are technology rich. Electronic whiteboards used by students and teachers allow large-scale computer-based instruction. In addition, classrooms contain many typical surfaces for displaying projects, artwork and class materials. There is a variety of built-in casework surfaced with laminate. Laminate was chosen for its durability, which is very important in a high-traffic school environment, and it also adds significant color appropriate to the theme of the building. The floor finishes vary between hard surfaces and carpets to provide a variety of environments for students to use.

THE LEARNING STAIR

The central design feature in the school is what the architects call the "learning stair." As you enter the building, there is a 30-foot wide central stairway leading from the first floor to the second floor, surrounded by a balcony above. The area resembles an amphitheater. The stairs do more than help people ascend to the second floor; they offer a place for spontaneous gatherings and organized activities for teachers and guests.

The learning stair is an assembly spot for administrators, teachers and guest speakers to address large groups of students. Parents often congregate there to socialize while waiting for their students at the end of the school day.

More importantly, the learning stair is a welcoming place for multiple classes of students to meet and collaborate (though not the entire student body at once). Small groups also gather on the stairs to work together. If students have free time between bells, they can lounge on the stairs amid the natural light streaming in from surrounding windows. Students like to congregate in the space that connects with the outdoors and reinforces the theme of Cherry Crest.



The Learning Stair is a main feature of the school and a central assembly space. Photo Credit: Benjamin Benschneider/OTTO

In traditional elementary schools, classrooms or specialized spaces such as the library are meant for learning while corridors are reserved for travel. The architect's approach to these two schools, however, was utilizing the entire school and environment as potential learning areas. The architects created spaces they liken to an eddy in a river: as a river flows there are pools to the side where canoe paddlers often pull off. Similarly, there are multiple places throughout Cherry Crest where students can pull off to the side, where a small group can congregate or an aide can take them to work. These eddies are always visible to a teacher who can supervise.

The learning stair is one such eddy, but there are also smaller spaces throughout the building. School administrators have found that the children like both sizes of eddy, depending on the situation, such as when they prefer a smaller and more enclosed space to think or do a quiet activity. Essentially, the spaces are as flexible as possible so they can respond to the changing demands of educational environments. The goal is to be able to respond to that change by providing an adaptable environment that can be honed.

Learning Objective Two—Examine the process followed to design a state-of-the-art educational environment, and the resulting architectural features.

EXAMINING THE EXTERIOR

Now let's return to the building's exterior. The site is so heavily wooded that the building is difficult to see from off-site. Still, the architects arranged ample parking, drop-off space, bus lanes and other ingress/egress necessities. These transportation zones were precisely plotted to maintain smooth function and convenience while minimizing disruption to the forest.

Given the region's rainy climate, the architectural team designed a large covered area at the front entrance to shelter students, staff and visitors. It is a welcoming entry with a comfortable scale.

The architects worked hard to diminish the scale of the building where it faces the parking lot, which is the view most people see upon arrival. And even though all interior spaces are connected, the building appears to be a series of smaller entities or pavilions that fit neatly within the landscape.

The site is so heavily wooded that it is difficult to see the building from off-site. Photo Credit: Benjamin Benschneider/OTTO

Horizontal siding was used for a residential connotation, but the material is for commercial purposes. Even though the building is quite modern and nobody would think of it as traditionally residential, by using the textured horizontal siding and a variety of other sidings the architects were able to create an interesting composition that breaks down the scale of the large, 77,000 square foot single building. Trees are visible behind and around the building so that even though it's brand new, it is very nestled into the forest setting.

The colors used on Cherry Crest feature a deep red, selected to complement the evergreen site characteristics, that allows the building to feel that it has been there for a long time.

Cherry Crest was designed prior to the campus tragedies that have made recent national news headlines. Nevertheless, the school uses principles from Crime Prevention Through Environmental Design (CPTED) to create a secure campus. The number of doors is limited in order to control access, the main entrance requires people to go past the front office in a controlled manner so administrators can know who is entering, and of course all visitors must sign in. The school becomes much easier to control because of this configuration.

LANDSCAPING A LEARNING ENVIRONMENT

Low-maintenance landscaping is a must for school districts that want to save on operational costs due to limited maintenance or custodial budget. That's why the landscape design at Cherry Crest called for new low-ground cover and taller hardy species that all are native. This means they can survive and thrive in the area's wet and dry seasons. The native plantings also enhance and reinforce the site's old-forest character.

Another important landscape feature is its contribution to local water quality. Run-off requirements are strict in the Puget Sound region. Even a site where a previous building stood must be restored to pre-Columbian condition as part of any redevelopment. The goal is to prevent runoff and fertilizers from polluting Puget Sound, a vital ecosystem for salmon in the Pacific Northwest. Puget Sound's near-shore region is composed of shallow saltwater, nearby wetlands, estuaries, beaches and bluffs. These areas are critical zones for juvenile salmon as they make the transition from rivers to the ocean.

At Cherry Crest, plantings in the parking lot and other areas of the site act as biofiltration swales or rain gardens. Rain and fluids from other sources flow from hard outdoor surfaces into these planted areas. The roots and other vegetation naturally filter the water, helping separate contaminants that come from vehicles and other sources. The cleaner water is collected, detained and finally allowed off-site.

THE DESIGN PROCESS

To guide the design of its redeveloped schools, the Bellevue School District uses a model educational specification. This specification describes the educational program at the school, the required spaces, their sizes, their planned uses, etc. Additionally, the school district applies an individual process for each school to specify modifications that represent the unique design aspects of that particular building. The district's goal is to satisfy the needs and wants of the community served by each new school while incorporating important innovations used by faculty across the district.

The design process was conducted with a planning and design team composed primarily of teachers, along with some parents and community representatives. This user group helped design the school and provided a better understanding of existing problems and site challenges. The architects initially worked with the group using blocks representing different areas of the school. The group discussed their wants, needs, and perceived issues, and then they tried to arrange the blocks on the site to solve their issues. In so doing, they achieve an understanding of what the challenges are in arranging spaces in a certain way.

Visit http://go.hw.net/AR614Course7 to read more and complete the quiz for credit.

QUIZ

1. Which elementary school is located on a heavily wooded site?
   - a. Cherry Crest Elementary
   - b. Riverview Elementary

2. True or False: No fossil fuels are burned on-site at Cherry Crest Elementary.

3. What is the term used in education to describe a style of deeper learning that develops the natural curiosity, creativity, and interest of students?
   - a. Memorization
   - b. 21st Century Skills
   - c. Montessori
   - d. Parochial

4. What architectural feature was incorporated into Cherry Crest Elementary to serve as a central assembly space?
   - a. The Learning Stair
   - b. The I.D.E.A Lab
   - c. Elevated walkways above the wetland

5. True or False: The design process at both schools mirrors the experiential project-based learning that the schools themselves are using.

6. Which elementary school is located adjacent to a wetland?
   - a. Cherry Crest Elementary
   - b. Riverview Elementary

7. What is the special classroom at Riverview Elementary called that is located close to the front of the school and can be used for art and science purposes and also by the community?
   - a. The I.D.E.A. Lab
   - b. The Library
   - c. The Courtyard
   - d. The Learning Stair

8. True or False: At Riverview Elementary most of the materials from the demolished school were re-used onsite.

9. Which energy-saving measure was used at Riverview Elementary?
   - a. Photovoltaics
   - b. Ground source heat pump system
   - c. Daylighting
   - d. Triple-glazed windows
   - e. Super-insulated walls
   - f. All of the above

10. What material was used in the community meeting spaces at Riverview Elementary to create a level of sophistication?
    - a. Concrete block
    - b. Horizontal siding
    - c. Ochre colored cementitious panels
    - d. Woodgrain laminate

RE-THINKING STEEL—A LOGICAL CHOICE FOR HIGH-RISE RESIDENTIAL DESIGN

OPTIMIZING THE STRUCTURE TO MAXIMIZE USABLE SPACE

Presented by:

Steel Institute of New York

LEARNING OBJECTIVES

After reading this article, you will be able to:

- Identify and recognize advantages to using steel construction for high-rise residential design in an urban setting.
- Investigate the space saving potential of advanced floor profile systems using steel construction and hybrid systems using "D" beams and concrete plank.
- Assess the issues and forward-thinking solutions for high-rise steel residential construction.
- Discuss case studies of high-rise residential buildings designed with steel and thin floor plate systems.

CONTINUING EDUCATION

CREDIT: 1 LU

COURSE NUMBER: ARdec2014.1

Use the learning objectives to focus your study as you read this article. To earn credit and obtain a certificate of completion, visit http://go.hw.net/AR1214Course1 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.

High-rise residential buildings are meeting the needs of a growing urban population with ingenuity and creativity in the way that they are constructed using structural steel. All photos courtesy of Girder-Slab Technologies, LLC, unless noted otherwise

More than half of the world's population (54 percent) currently lives in urban areas. By the year 2050, that number is projected to grow to two thirds (66 percent). According to John Wilmoth, of the UN's Population Division, the source for the above figures, "Managing urban areas has become one of the most important development challenges of the 21st century. Our success or failure in building sustainable cities will be a major factor in the success of the post-2015 UN development agenda"

This assessment may sound like a dire challenge or a great opportunity depending on your point of view. Either way, one thing is clear: As more people come to live in urban areas, large or small, more housing must be designed and constructed to accommodate them. In New York City alone, projections call for one million more residents by the year 2040. As population increases, density usually increases—meaning that buildings necessarily get taller. In this scenario, high-rise multi-family buildings can become the preferred housing choice for many either due to affordability, proximity to transportation systems, or because of upscale, tenant-oriented design. This trend is already playing out in cities across the United States and Canada where high-rise condominiums and apartments have been built and occupied at a healthy, sustained rate over the past decade.

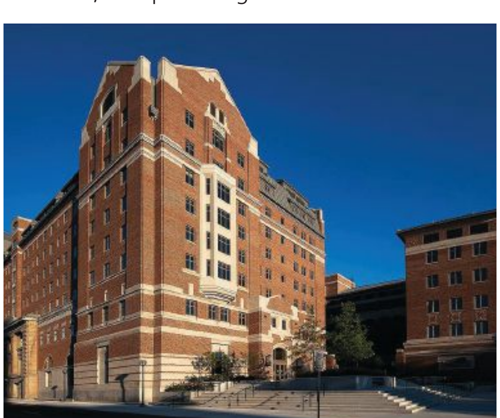
HIGH-RISE MULTI-FAMILY DESIGN ISSUES

For those involved in the design and construction of high-rise residential buildings, it is clear that fundamental design decisions need to be made in order to address a range of building criteria. A design program is defined in consultation with the owner or developer of the property to determine the intended market or occupancy mix. That feeds into the overall design of the individual living units, including features and amenities to be preferred or avoided. With this conceptual framework in hand, the design team can then start to shape and define the appropriate building.

One of the key design determinants in urban settings is the local zoning ordinance that will typically dictate parameters like maximum lot coverage, setbacks, and maximum building height. Developers and owners will of course respect these regulations but often turn to the design team to find ways to maximize the number of apartments or rentable square footage within those guidelines. As such, architects and engineers look for ways to minimize floor-to-floor heights—where solutions are linked specifically to the structural system used for the floor—in the interest of meeting that maximization challenge. Obviously the thinner the floor structure, the more chance of squeezing an additional story or two of apartments within a building's height limitation.

High-rise, multi-family residences in urban locations have other big-picture design considerations as well. Because the building will likely be part of a larger neighborhood,the design of pedestrian and vehicular access and integration with the surrounding area is crucial to maintaining connections with public rights of way and open spaces. These buildings are also subject to more stringent building code provisions regarding fire resistance and other issues of health and safety. In locations where it is warranted, those include seismic resistance to building vibrations and damage. And beyond these mandated requirements, user comfort issues including good acoustical control between living units and durability of the materials used play a large role in the building's popularity and longevity.

The role of a successful design team is to meet all of these various requirements while still creating an architecturally cohesive, human-scaled design that appeals to potential tenants or owners. Further, the construction of the building must be readily feasible and meet the property owner's time frame and budget. That usually means relying on commonly available building technologies and systems installed by experienced tradesmen. It also means using standardized means to coordinate the different building systems including mechanical, electrical, and plumbing.



Academic residential buildings can use concrete or steel construction such as the North Quad at the University of Michigan in Ann Arbor, MI.

When looking to address and reconcile all of these disparate issues, there are only a few practical choices for the structural system of high-rise multi-family buildings. These include concrete, steel, or hybrid systems that combine steel and concrete. We will take a closer look at each.

CONCRETE STRUCTURAL SYSTEMS

Poured in place concrete often appeals to architects because it allows for complete custom design within reasonable structural limitations. That means choices about column spacing and floor spans can be flexible within structural limitations and designed to carry the imposed loads accordingly. It is also inherently fire resistant meaning that it can be readily exposed in high-rise buildings usually without the need for additional fireproofing. However, concrete is also a very heavy material that can require columns and footings to be larger relative to other construction materials. This may be workable in terms of the design, but more weight and more material particularly over many floors usually means additional cost. Its dense solid structure will have acoustical implications as well; these may either contribute or detract from the acoustical properties of the building.

One concrete system that has become somewhat popular in certain cities in multifamily high-rise construction is the use of flat plate reinforced concrete floors. This system uses a solid, structural concrete slab that is formed and poured floor by floor as the building construction progresses. Typically, both sides of the slab are finished relatively flat and smooth to receive final finishes and serve as a floor surface on top and a ceiling surface on the bottom. Assuming the spans between columns aren't too large, then the thickness of the flat plate slabs ends up being around 8 or 9 inches to satisfy engineering requirements. This relatively thin floor system can minimize floor-to-floor height, helping to comply with zoning height requirements and maximize number of floors, which likely contributes to its popularity. And since the floors can be framed and poured using conventional cast-in place concrete techniques, the process is fairly well known.

Of course, this flat plate process has some limitations that need to be addressed. First, the maximum simple flat plate size for residential loading is about 20 feet by 30 feet. Larger sizes are possible but they will usually require either dropped panels, structural concrete capitals around the columns, or a more sophisticated post-tensioned design that increases the

CASE STUDY

Project Case Study 1—Troy Boston

Hybrid Steel and concrete apartment building—Two towers, 11 and 19 Stories; 330,000 square feet; 378 apartments

Location: 275 Albany Street, Boston, MA

Co-Developers: Normandy Real Estate Partners, Morristown New Jersey and Gerding Elden Portland, Oregon

Architects: ADD, Inc. Boston, Massachusetts

Engineers: Odeh Engineers, Inc., North Providence, Rhode Island

General Contractor: Suffolk Construction, Boston, Massachusetts

Steel Fabricator: Canatal Industries, Inc., Thetford Mines, Quebec Canada

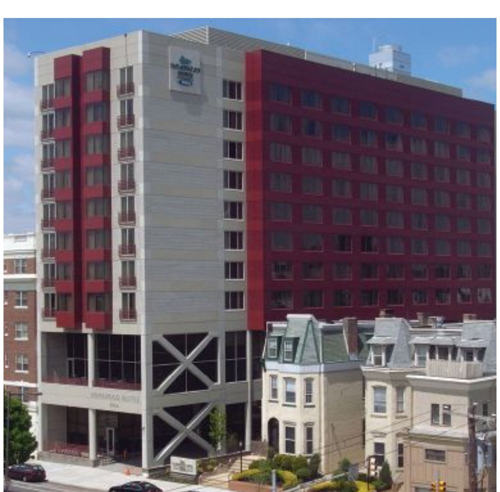
Pre-cast Concrete Supplier: JP Carara & Sons, Inc. Middlebury, Vermont

Dissymmetrical Beams and Pre-cast Plank Speed Construction

In Boston's highly competitive residential market, delivering quality designed apartments that can be constructed in a short time frame can make all the difference to a successful project. Hence, when the design and construction process for Troy Boston was being developed, a hybrid steel and concrete structural system was deemed to be the best choice for economy and ease of construction. Once the site and foundation work were complete for this 330,000 square foot apartment complex the steel and precast concrete work began in earnest and was complete ahead of schedule. "It's been an amazing feat that the ironworkers have erected the steel and precast in less than three months." said Kelly Saito, president of Gerdling Edlen, part of the co-development team which included Normandy Real Estate Partners. Because of the success with the hybrid system, they announced during a July topping off ceremony that they would be able to welcome Troy Boston's first residents before the end of the year—less than five months later. Altogether, the 11 and 19 story towers have added 378 apartments to Boston's South End neighborhood in record time.

complexity of construction. Depending on the location, the first two solutions may or may not be an issue. But if the intent is to conceal the columns in framed or masonry partitions, the fact that these capitals generally extend beyond wall width needs to be addressed. Second, M/E/P systems including ductwork and piping, if provided, will need to be concealed either above or below the slab in soffits or other locations. This is certainly workable, but requires additional construction to address it.

A variation on the cast-in-place, flat plate system is to use pre-cast, pre-stressed hollow core concrete planks. This is an equally well-known system that is common around the country. It provides many of the same advantages of flat plate concrete floor slabs but overcomes some of the limitations. Pre-cast planks provide very smooth floor and ceiling surfaces including joints, which are typically filled with grout. Since they have engineered hollow cores, they provide a lighter weight solution than solid slabs but with similar structural capabilities. In some cases, those cores can allow for small M/E/P lines to be run in the cores but that will vary depending on design coordination details. Perhaps the biggest benefit of the pre-cast planks, though, is their ability to be fabricated off site and brought in as needed to match the sequence of construction. This eliminates the need for the slabs to be formed, poured and cured onsite making for quicker and easier construction. If poured in place concrete columns and beams are used, then they will still need the usual forming and curing time along with the appropriate detailing for the slab connections.

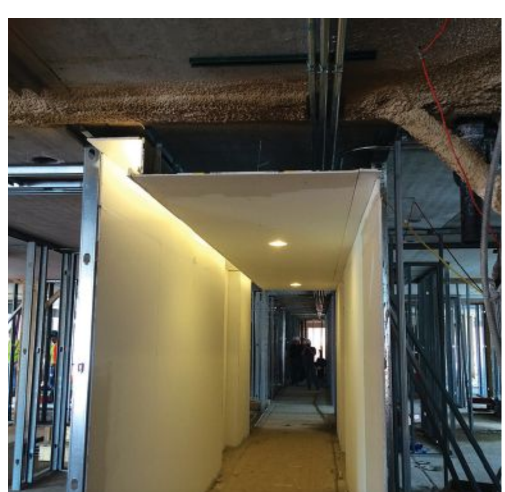


Hospitality buildings such as this Homewood Suites by Hilton in Philadelphia, Pennsylvania often make extensive use of structural steel.

STRUCTURAL STEEL SYSTEMS

Structural steel framing has been a main stay of construction for over a hundred years in this country. Structural steel has been documented as the most popular framing material for non-residential buildings in the United States. It is readily available in a wide variety of shapes and weights to form the engineered skeleton of the building that supports all of its other components. In commercial building construction (including high-rise residential), structural steel framing accounts for a majority (56 percent) of the market compared to other systems including concrete. As such, it has become the benchmark against which other material and structural framing systems are judged.

The reasons for this popularity are many and varied. Compared to concrete, structural steel is usually a lighter weight structural solution. That means dead loads are less and foundations can be sized smaller, typically resulting in a more economical building all around. Structurally, steel is strong in both compression and tension and can be shop fabricated to meet tight tolerances. The wide range of shapes, profiles, and engineering options gives architects considerable flexibility to use large structural grids that allow many interior walls to be non-load bearing. That provides numerous choices in laying out building designs thus encouraging innovation. In design build or fast track situations, structural steel enables the building team to optimize cost and schedule by integrating the design and construction process. Even in traditional design-bid-build



Fire protection of structural steel is commonly achieved either with fire rated gypsum board or with spray on fireproofing over the steel structure.

CASE STUDY

Project Case Study 2—Fordham Law School Dormitory

Staggered Truss dormitory building—22 Stories; 450,000 square feet

Photo Credit: Pei Cobb Freed & Partners, LLC; Drawing: WSPCS Engineers

Location: 150 West 62nd Street, New York, NY

Developers: Fordham University

Architects: Pei Cobb Freed & Partners, LLC

Structural Engineers: WSP Cantor Seinuk (WSPCS), New York, NY

Staggered Trusses Save Steel for Fordham Law School
Design of the new 22-story Fordham Law School located at the university's Upper West Side Manhattan campus required some creative thinking by the design team. Forming part of Fordham University's expansion plans, the project comprises 9 lower floors for the law school to include classrooms, mock courtrooms and a law library, plus 13 upper floors dedicated to residential dormitory rooms and mechanical spaces. Altogether, the building comprises over 450,000 square feet in area.

Structural engineers WSPCS explored various alternative structural solutions to accommodate the tight budget and need for column-free spaces, especially within library and auditorium levels. To maximize the open spaces at the law school below, they developed two curved trusses, extending the entire length of the dorm and supported on six very large columns. Column-free spaces were also created by hanging large floor areas from Vierendeel trusses between the top levels of the law school.

For the floor system, conventional steel framing with composite concrete on metal deck flooring was selected for the law school portions. The framing of the dormitory floors however, consists of 30-foot-long precast planks supported on staggered trusses with the floors alternately supported on the top and bottom chords. "This system results in a considerable saving in both building height and cost," explains Rodica Kestenband, PE, Vice President and WSPCS Project Manager.

The lateral support system of the total building consists of interior moment frames and bracing on the perimeter. The variety of architectural programs and mechanical requirements within the tight space, necessitated extensive coordination between WSPCS, the architect and mechanical engineer.

scenarios, the opportunity to begin fabrication early and have the steel delivered as needed to the construction site allows for the acceleration of project schedules. Once there, it is easily erected in the field allowing for straightforward integration with other building systems. And in this era of sustainability consciousness, structural steel fabrication has been increasingly recognized for its ability to contribute significantly to green and sustainable building design. Structural steel is produced from ninety five percent or more of recycled material and at the end of its useful life in a structure it can be completely reclaimed and recycled again. From an owner/use standpoint, the nature of the steel-frame skeleton affords great freedom to move and relocate partitions or other items to accommodate changing tenant and occupancy needs.

One of the common details to address in conventional steel construction is fire protection. Steel is non-combustible but can buckle and warp appreciably under intense fire conditions, causing structural failure. Fire codes therefore require that all structural steel members in high-rise buildings be fully protected from the potential effects of fire. This is done in a variety of ways of course all based on the level of fire protection required by code (1 hour, 2 hour, etc.) for a particular building application. In cases where the steel members are fully concealed either individually or by a membrane of light-gauge metal framing and gypsum board, the appropriate layers of fire rated gypsum board may satisfy the fire protection requirement. In other cases, spray on fireproofing is needed in thicknesses that yield the desired protection level. If the steel is encased in concrete, then the concrete normally provides that protection. In any case, the means to protect structural steel from fire are well known and documented in building codes and industry standards.

Looking specifically at high-rise residential buildings, structural steel provides both generally advantageous characteristics, as well as other specific benefits depending on the structural framing system used. Some of these are described further in the following sections.

This article continues on http://go.hw.net/AR1214Course1.
Go online to read the rest of the article and complete the corresponding quiz for credit.

QUIZ

1. Architects and engineers often look for ways to minimize floor-to-floor heights, and specifically the structural system of the floor, because:
   a. the structural members can only be a certain length
   b. developers only want a minimum amount of square footage
   c. M/E/P systems dictate floor height
   d. Zoning regulations usually limit building height

2. The floor system that uses a solid, structural concrete slab that is formed and poured floor by floor as the building construction progresses is:
   a. pre-stressed hollow core concrete plank
   b. flat plate reinforced concrete floors
   c. concrete tilt up slabs
   d. none of the above

3. Since precast, pre-stressed concrete planks have engineered hollow cores, they provide:
   a. a lighter weight solution than solid slabs but with similar structural capabilities
   b. a place to run large ductwork in the hollow cores
   c. greater strength than any other option
   d. a finished surface without any need for a leveling topping

4. In design build or fast track situations, structural steel enables the building team to optimize cost and schedule by integrating the design and construction process.
   a. True
   b. False

5. A structural system that uses wide flange beams that are wholly located within interior partitions, such as demising walls between residential units, is referred to as:
   a. A staggered beam system
   b. A flat slab system
   c. An in-wall beam system
   d. None of the above

6. In a hybrid steel and concrete system, the distances between the columns (i.e. structural bay sizes) will be influenced, not only by the layout of the residential units, but also by.
   a. the carrying capacity of structural steel
   b. the span capacity of the floor system
   c. the number of floors in the building
   d. the floor-to-floor height of the system

7. In a staggered beam system, the floor structure that rests on the beams is:
   a. only a flat plate slab
   b. only a concrete floor plank
   c. either a flat plate slab or a concrete floor plank
   d. only a poured in place slab on a metal deck

8. A structural system consisting of story high trusses concealed within interior walls that span the entire width of the building and alternate from floor-to-floor is:
   a. a staggered truss system
   b. a staggered beam system
   c. a composite system
   d. not capable of creating a column free first floor

9. A dissymmetrical beam viewed in cross section looks like
   a. a wide flange beam turned on its side
   b. any other perforated steel beam
   c. an inverted "T" shape with a large flange on the bottom and very small flange on the top
   d. two back to back lintels

10. The assembly and erection process for the entire steel superstructure plus the precast concrete planks in a hybrid system is commonly performed by:
    a. general contractors
    b. two different trades—one for steel and one for concrete
    c. steel fabricators
    d. steel erectors
    e. All of the above

SPONSOR INFORMATION

Steel Institute of New York

The Steel institute of New York is a not-for-profit association created to advance the interests of the steel construction industry. The institute sponsors programs to help architects, engineers, developers, and construction managers in the New York building community develop engineering solutions using structural steel construction. www.siny.org

Every year, the Annual Design Review (ADR) highlights a cross-section of outstanding American architecture. These are projects that, narrowly speaking, were completed either in the U.S. or by a U.S. firm during the course of the past year, and that, more expansively speaking, helped to advance their respective communities as well as the collective design ethos. This year's ADR jury—Thomas Fisher, Assoc. AIA; Rosa Sheng, AIA; and Jennifer Yoos, FAIA (learn more about them on page 136)—tapped 19 projects out of a pool of nearly 200. The winners are highlighted on the following pages, and in even greater detail at architectmagazine.com.

2014 ***ANNUAL***

DESIGN *REVIEW*

PAUL WARCHOL

AWARD
Weiss/Manfredi
Architecture/Landscape/Urbanism

NOVARTIS VISITOR RECEPTION

EAST HANOVER, N.J. Sited at the perimeter of pharmaceutical giant Novartis' East Hanover campus, the new visitor center marks the arrival point for visitors, who park here and continue their trip on company-run shuttles. Designed by New York–based Weiss/Manfredi, a sweeping steel roof structure shelters reception, orientation, and event spaces, which are enclosed by a curtainwall fitted with insulated low-E glass panels to maximize daylight and views. Inside, a spine of columns which support the articulated roof at its lowest point, give way to sculptural ribs that define the ceiling plane. Low partitions ensure that daylight fills the entire volume, and all of the energy for the LEED Gold–certified building is provided by a solar array near the adjacent parking area. KATIE GERFEN

"A beautifully articulated structure. The building's integration with the landscape and the glazing details are exceptional." —Jennifer Yoos

"A handsome prototype of how to get the workers physically active and wanting to climb the stairs."
—Thomas Fisher

CITATION
Weiss/Manfredi Architecture/Landscape/Urbanism

NOVARTIS OFFICE BUILDING 335

EAST HANOVER, N.J. Constrained by a campus master plan that prescribed a rectilinear box 275 feet long, 100 feet wide, and 75 feet high, New York's Weiss/Manfredi embraced the Novartis Office Building 335 in East Hanover as an opportunity to reimagine the paradigm of "the building as a box." The five stories of open office space are connected by an ascending spiral of "living rooms" that encourage informal collaboration between employees throughout the building. Column-free space is provided by suspending the upper floors from 100-foot-long plate girders that cantilever from the building's two cores at the roof. No workstation is more than 30 feet from the exterior wall that utilizes variegated custom aluminum mullions and a variety of glazing types to help mitigate the building's rigid regularity. EDWARD KEEGAN

HONORABLE MENTION
Hacin + Associates

DISTRICT HALL

BOSTON Boston's new innovation center, District Hall, is the first completed structure in the 23-acre Seaport Square development. Boston-based Hacin + Associates took cues from the site's railyard past for the design of the steel-framed, metal-panel-clad building, drawing upon boxcars, boats, and warehouses as inspiration. The 12,000-square-foot structure includes a restaurant and café, a 250-person event space, and lounge and workspaces. In support of the center's purpose as an incubator, the interiors are designed to be easily reconfigurable, and include roll-down partitions, Haworth furniture, IdeaPaint wall surfaces, and Philips Color Kinetics programmable LEDs. SARA JOHNSON

"A strong street presence and form within the urban context of Boston. Flex spaces look inviting and inspiring for collaboration." —Rosa Sheng

OPPOSITE: PAUL WARCHOL; THIS PAGE: GUSTAV HOILAND

AWARD
De Leon & Primmer Architecture Workshop

WILD TURKEY BOURBON VISITOR CENTER

LAWRENCEBURG, KY. This 9,140-square-foot structure welcomes visitors to the 400-acre Wild Turkey Distillery. Designed by Louisville-based De Leon & Primmer Architecture Workshop, the building riffs on the iconic peaked-roof building form. Sited to minimize heat gain through the stained cedar rainscreen cladding, as well as to preserve the natural habitat of a population of, appropriately, wild turkeys, the building sits on a bluff overlooking the Kentucky River. The surrounding landscaping relies on local wild grasses, which require no irrigation and provide a food source for the birds. Beneath the peaked roof, the building contains exhibit and event space on the first floor and a tasting room on the second, which features a floating cork floor and a repurposed copper bourbon still. Douglas fir lattices, ash wall panels, and a pine ceiling bring warm tones to the interior, and provide a juxtaposition to the dark-stained exterior. K.G.

"The use of vernacular materials, building forms, and articulation with deference to the craft of distillery in a modern interpretation is elegant, simple and successful in its execution. The play of light, shadow, and pattern are delightful and inspiring." —Rosa Sheng

ROBERTO DE LEON / DE LEON & PRIMMER ARCHITECTURE WORKSHOP

PLAY

PAUL CROSBY

AWARD
Substance Architecture

PRINCIPAL RIVERWALK PAVILION AND PUMP STATION

DES MOINES, IOWA Two triangular structures along the west bank of the Des Moines River in Iowa's capital frame the city's Court Avenue. Local firm Substance Architecture's solution for the Principal Riverwalk Pavilion and Pump Station had to address U.S. Army Corps of Engineers' regulations while accommodating the broader design goals of the city's Riverwalk master plan, which calls for new promenades and recreation trails. To the north, the 1,950-square-foot pavilion is shrouded in a black zinc skin that unfolds to provide access and views for its public amenities, which include a café. To the south, the opaque volume of the 3,485-square-foot Pump Station conceals pumps, valves, and generators for use during flood events. Together, these two modest buildings define a public plaza—augmented by site-specific art works by Jun Kaneko—that celebrates a sense of place along the river. E.K.

"This is a building type that rarely gets this level of quality and attention. It's nicely handled, architecturally and urbanistically." —Thomas Fisher

PLAY

"The form and idea of this are integrated and appropriate. This is the first metal building I've liked in a long time and the designers have done a lot, both environmentally and architecturally, with a low-cost project."
—Thomas Fisher

HONORABLE MENTION
Steven Holl Architects

EDITIONS DE PARFUMS FRÉDÉRIC MALLE STORE

NEW YORK New York–based Steven Holl Architects' petite, 400-square-foot store for French perfumer Frédéric Malle is a discrete, geometrically inspired insertion within the first floor of a historic red brick townhouse in New York's Greenwich Village. Imagining an appropriate architectural expression for smell, the architects developed a series of "slipped disks" which create imagery for the façade, cabinetry, furniture, and an outdoor space behind the store, dubbed the "Secret Garden." Materials were chosen to evoke various sensory responses, similar to the olfactory sensations of the shop's product: Foamed aluminum walls are porous and reflective; black walnut shelving is dense and smooth; and wool carpet is soft and rough. The garden is paved in schist and offers an acoustic reprieve from the city with the sound of water dripping from a cast-brass disk. E.K.

"A beautifully articulated interior with inventive detailing."
—Jennifer Yoos

CITATION
Jensen Architects

SHED STORE AND CAFÉ

HEALDSBURG, CALIF. Longtime residents of the California wine country town, Cindy Daniel and Doug Lipton founded Shed as a "modern grange" to celebrate locally grown food. Keeping with the theme, San Francisco–based Jensen Architects designed the 10,801-square-foot barn-inspired structure—which includes a marketplace and café on the ground floor, and an event space on the second level—with sustainability in mind. Completed in July 2013, the structure is clad in pre-engineered steel panels finished with Zincalume, which will develop a patina over time. Shed's nine roll-up doors create natural ventilation and encourage free-flowing foot traffic. S.J.

OPPOSITE: MARIKO REED; THIS PAGE: SUSAN WIDES

RASMUS HJORTSHØJ

AWARD
Bjarke Ingels Group (BIG)

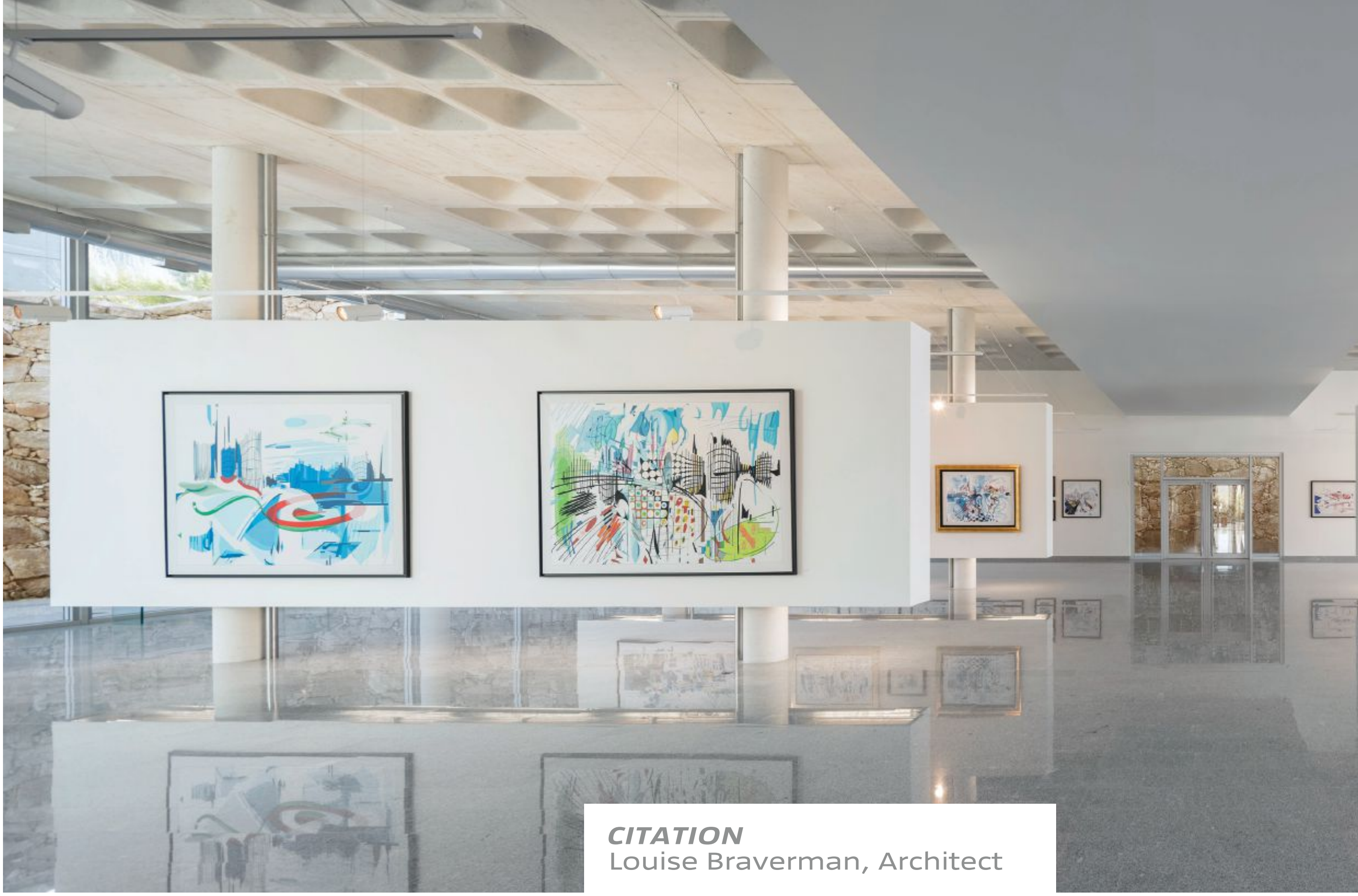
DANISH MARITIME MUSEUM

HELSINGØR, DENMARK The granting of UNESCO World Heritage Site status usually heralds preservation, but for the Danish Maritime Museum, it spelled eviction. Ousted from its space inside Helsingør's Kronborg Castle in order to allow for the restoration of the period interiors as required by the UNESCO nod, the museum moved to a new purpose-built facility in a former dry dock next door. New York– and Copenhagen-based Bjarke Ingels Group's design for the 77,500-square-foot structure couldn't protrude above the ground, in order to preserve views of the castle, and complex site conditions in the sunken dry dock itself led to an innovative solution: a series of steel bridges, fabricated from welded box structures, span the tight site and contain the museum's galleries, auditorium, administration and education spaces, and café. More than 150,000 visitors are expected to tour the facility in its first year. K.G.

"A clever and coherent idea beautifully carried out from the overall design down to the exhibition design. Excellent work."
—Thomas Fisher

BOND

"Beautifully detailed. I like the 'jazz-like' quality of the cladding."
—Thomas Fisher



CITATION
Mark Cavagnero Associates

SFJAZZ CENTER

SAN FRANCISCO   The SFJAZZ Center is the first building in the country dedicated purely to jazz. San Francisco's Mark Cavagnero Associates designed the 35,000-square-foot, three-story structure—which encompasses performance, rehearsal, and office spaces—on a downtown site near the city's existing opera, symphony, and ballet venues. In addition to the center's main Robert N. Miner Auditorium, which can host upwards of 700 people in its grandest configuration, a smaller ensemble room on the street level has glass walls that let pedestrians see the musicians inside. Balconies on the top two floors also open the glass-and-concrete building to the neighborhood. S.J.

OPPOSITE: TIM GRIFFITH; THIS PAGE: FERNANDO GUERRA

CITATION
Louise Braverman, Architect

CENTRO DE ARTES NADIR AFONSO

BOTICAS, PORTUGAL   The Centro de Artes Nadir Afonso, a cultural center and exhibition space, pays homage to the native artist of Boticas, and mediates a challenging urban and topographic site within the medieval town. The building is split into two dominant volumes set against and within a steep hill. The concrete-and-glass profile of the cultural center addresses an adjacent highway and the city hall, while the primary galleries are nestled into a cut in the landscape, topped by a green roof park whose geometrically abstract shapes refer to the artist's work. The open plan exhibition spaces receive natural light from a gap between the structure and the site's rustic stone retaining walls. Afonso practiced architecture with Le Corbusier and Oscar Niemeyer, and New York–based Louise Braverman, Architect's design for the 20,000-square-foot complex recalls the fluid and evocative concrete forms of these 20th century masters. E.K.

"I responded to the simplicity of the form and those cantilevers and the building's relationship to the landscape. While it is a sculpture in the landscape, there are also parts of the center that reflect the landscape." —Rosa Sheng

BOND

HONORABLE MENTION
Davis Brody Bond

ST. ELIZABETHS EAST GATEWAY PAVILION

WASHINGTON, D.C. Located in the Congress Heights neighborhood of D.C., across the Anacostia River from the pageantry of the National Mall, St. Elizabeths is the site of a Civil War–era psychiatric hospital. The pastoral East Campus is now slated for development into a mixed-use community, and the East Gateway Pavilion is the first move to bring vibrant activity back to the site. Designed by the Washington, D.C., office of Davis Brody Bond, the 16,000-square-foot pavilion has dining spaces, a community roof, and a market, and hosts cultural events in the district. The steel-frame structure's butterfly roof, edged in 184 high-performance concrete panels, doubles as shelter for the open-air market below and occupiable green space for visitors, and boasts an overlook point for the campus, which is listed in the National Register of Historic Places. K.G.

"Nicely integrated into landscape. There is a clear idea that extends down to the furniture."
—Thomas Fisher

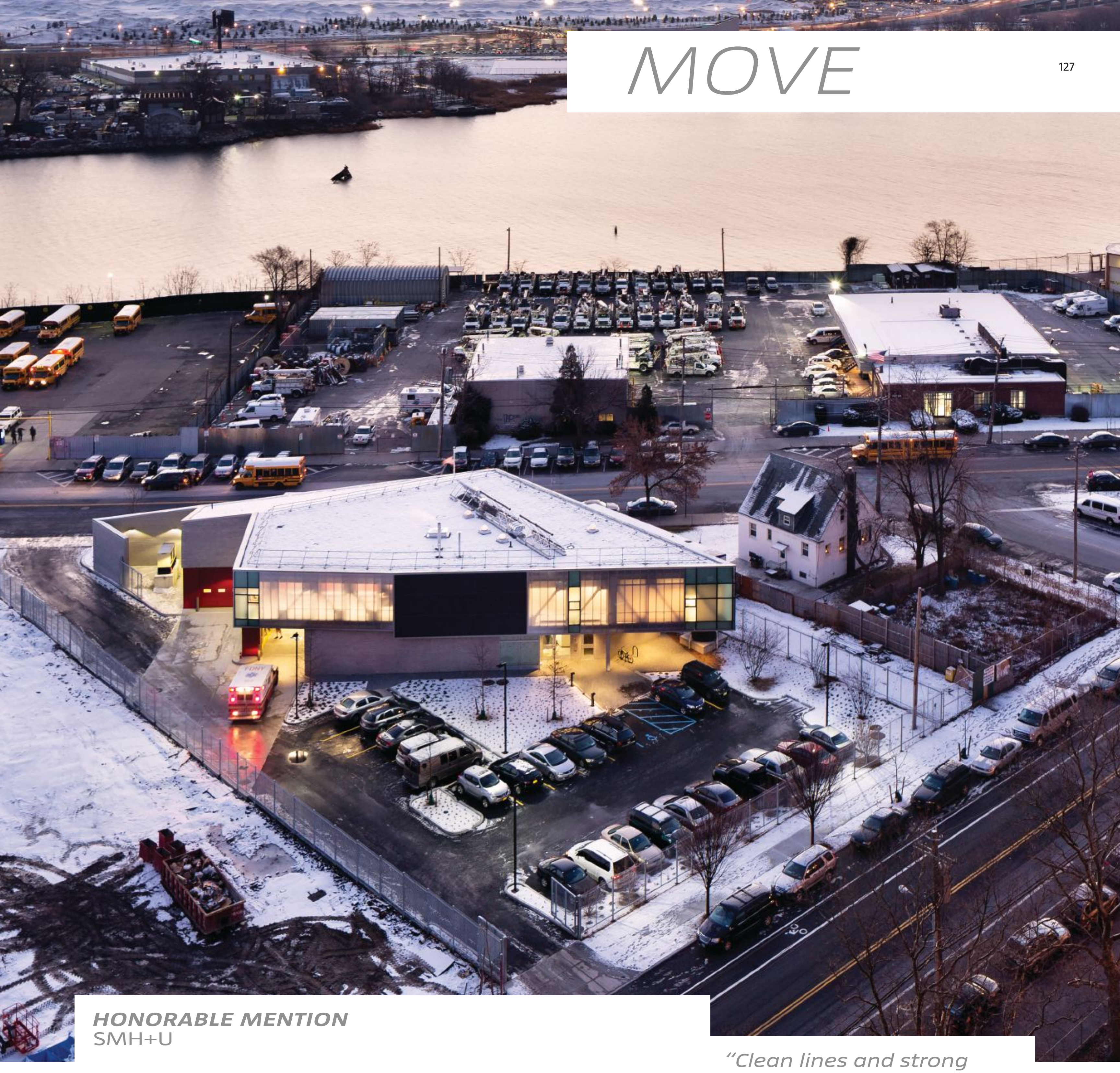
HONORABLE MENTION
Davis Brody Bond

NATIONAL SEPTEMBER 11 MEMORIAL MUSEUM

NEW YORK The National September 11 Memorial Museum in New York City encloses 110,000 square feet of publicly accessible space that memorializes and interprets the events of September 11, 2001, within the original foundations of the original World Trade Center. New York–based Davis Brody Bond's design was driven by four principles: memory, authenticity, scale, and emotion. Existing artifacts, including the tower footprints, slurry wall, and exposed foundations are preserved in their raw state, juxtaposed with an inserted concrete architecture that's denoted by polished, refined finishes. Intricate detailing carefully delineates the new from the old, recognizing that the 9/11 museum is unlike a typical museum. Rather than being an iconic container for exhibits, this museum is an iconic artifact in and of itself. E.K.

"What I felt was really excellent about it was the sectional ideas. There is a lot that was really thoughtful and well-considered."
—Jennifer Yoos

TOP: ERIC TAYLOR; BOTTOM: JAMES EWING/OTTO



HONORABLE MENTION
SMH+U

ZEREGA AVENUE EMS

BRONX, N.Y. The Zerega Avenue EMS provides needed community services—ambulance dispatch and maintenance—from a striking facility on a trapezoidal site in the Bronx. New York–based SMH+U designed the 11,500-square-foot facility to minimize building volume while conveying a sense of security through a limited series of formal moves that include a folded roof geometry, translucent skin, and expressed structure. Although relatively modest in size and design, the facility incorporates numerous features that will allow it to provide essential services throughout natural and man-made disasters. But the technical challenges of crafting a stiffened structure with redundant building and communications services didn't prevent the architects from designing a new neighborhood icon that provides residents with a sense of safety and security. E.K.

MICHAEL MORAN/OTTO

"Clean lines and strong geometries, yet understated materials that stay true to this public service building typology. Sustainable features such as water collection/storage and a community garden further strengthen the project's positive design impact." —Rosa Sheng

AWARD
Weiss/Manfredi
Architecture/Landscape/Urbanism

KRISHNA P. SINGH CENTER FOR NANOTECHNOLOGY

PHILADELPHIA The 78,000-square-foot Krishna P. Singh Center for Nanotechnology establishes a new gateway to the University of Pennsylvania's campus while expressing the dynamic, interdisciplinary research that the building itself is designed to facilitate. New York–based Weiss/Manfredi configured advanced laboratories within a network of collaborative public spaces to encourage the exchange and integration of ideas. Glazed public circulation spaces and labs are located around a contemporary variation on the traditional central quad, exposing the work within the complex to visitors and the general public. An interior spiraling sequence of spaces culminates in a multipurpose forum that cantilevers 68 feet over the courtyard. Amber-colored glazing—which prevents ultraviolet light transmittance—marks the cleanroom lab spaces while introducing a distinctive color that notes the high-tech research contained within. E.K.

"A strong design solution for a complex program. The structural cantilever is fascinating, with beautiful and visually stimulating interior environments."
—Rosa Sheng

ALBERT VECERKA/ESTO

"This is an amazing packaging of program on a tight site. There are a lot of nice pieces to this."
—Thomas Fisher

HONORABLE MENTION
Rogers Partners
Architects+Urban Designers

HENDERSON-HOPKINS SCHOOL

BALTIMORE Located on a two-city-block site in Baltimore's Middle East neighborhood, the Henderson-Hopkins School, designed by New York–based Rogers Partners, is a 125,000-square-foot learning community for students in kindergarten through eighth grade. Run by neighboring Johns Hopkins University and Morgan State University as part of Baltimore's public school system, the school is divided into five small learning groups, or houses. Each accommodates up to 120 students in separate structures that have classrooms, flex spaces, and a commons. These low-slung, grooved precast panel-clad volumes are connected visually through large windows, and physically, by an open-air learning terrace at the center of the site. The project also includes an early childcare center and community amenities—including a library, gym, auditorium, and family resource center—which surround the school houses, creating a campus that will serve area residents throughout every stage of their lives. K.G.

"This was the transformation of a whole district. The scale of it is really incredible."
—Jennifer Yoos

HONORABLE MENTION
Perkins+Will

WILLIAM JONES COLLEGE PREPARATORY HIGH SCHOOL

CHICAGO The William Jones College Preparatory High School is located on a compact 100- by 400-foot site just south of Chicago's Loop. The design by the Chicago office of Perkins+Will is a vertical solution that stacks large and small spaces within 278,000 square feet. Classrooms run the length of the building on the fourth and fifth floors, linked to major gathering spaces through the lobby and a commons that rises the height of the structure from the main entrance. The primary spaces requiring long-span solutions—the natatorium and the gymnasium—are located at the top, where outdoor terraces provide students and spectators with views of Grant Park to the east. The mix of uses is expressed on the highly varied exterior façade of unitized curtainwall, composite metal panel rainscreen cladding, and insulated precast concrete panels—visually integrated through a regular pattern of GFRC precast covered columns. E.K.

OPPOSITE: JAMES STEINKAMP; THIS PAGE: ALBERT VECERKA/ESTO

BENNY CHAN

AWARD
Fleetwood/Fernandez

TAT HOUSE

SANTA MONICA, CALIF. When clients Mehran and Laila Taslimi, owners of Taslimi Construction Co., decided to redo their house in Santa Monica, the couple wanted a design that would integrate landscape and architecture and achieve LEED Platinum certification. Local firm Fleetwood/Fernandez designed a 5,600-square-foot house with two levels constructed of poured concrete and a third level wrapped in an Ipe wood–framed rainscreen. Interior and exterior glass walls carry the sense of the outdoors throughout the interior. S.J.

"A nicely handled layout on a narrow lot with some beautiful details."
—Thomas Fisher

PAUL CROSBY

CITATION
Salmela Architect

VLIETSTRA RETREAT

HERBSTER, WIS. The secluded Vlietstra Retreat accommodates a family of four on the shore of Lake Superior. Duluth, Minn.–based Salmela Architect designed the complex using only the simplest of materials—wood frame construction with black paper-resin composite siding and an EPDM roof—to enclose a modest 1,280 square feet. A storage building and wood shed create a rural forecourt for the simple, two-story, V-roofed mass of the 16- by 40-foot cabin. A south-facing deck mimics the main cabin's footprint beneath a cantilevered screen porch that provides shade and shelters the entrance from the elements. The family had previously used the property as a campsite, but the new complex provides a more permanent escape with a remarkable sense of place created through sophisticated spatial and compositional means. E.K.

"A well-proportioned and ambitious cabin, with whimsical interiors and a strong use of color."
—Jennifer Yoos

LIVE

HONORABLE MENTION
Louise Braverman, Architect

VILLAGE HEALTH WORKS STAFF HOUSING

KIGUTU, BURUNDI Located in the 40-acre village of Kigutu, a 2.5-hour drive from Burundi's capital, is Village Health Works—an organization founded by a native Burundian as a New York– and Burundi-based nonprofit that provides healthcare for the surrounding communities. Designed by New York's Louise Braverman, Architect, the 6,000-square-foot, 18-bed staff dormitory takes its inspiration from the local vernacular. The concrete structure is infilled with locally made bricks, and features deep porches that nod to the indoor/outdoor communal living spaces of the region and promote community engagement. Kigutu is entirely off the grid, and a solar array and solar hot water heaters located at the rear of the structure provide all power. Dug into the hillside as it is, the brightly colored dormitory takes advantage of the insulating land mass for natural cooling. K.G.

"A model for social impact, sustainability, and a conversation about how good design can elevate common building materials. I love the use of color and the simplicity of the structural forms." —Rosa Sheng

JUDGES

Jennifer Yoos, FAIA
Yoos is a principal at Minneapolis-based VJAA, which won the 2012 AIA Architecture Firm Award. She teaches at the University of Minnesota School of Architecture and has lectured at more than a dozen universities.

Rosa Sheng, AIA
Sheng is a senior associate in the San Francisco office of Bohlin Cywinski Jackson, a board member of the AIASF chapter, and is the chair of The Missing 32% Project, (see page 20).

Thomas Fisher, Assoc. AIA
Fisher is the dean of the University of Minnesota College of Design. He has written hundreds of articles on design, including ARCHITECT's Past Progressives series (see page 152).

TOP: IWAN BAAN; BOTTOM: PETER ARKLE

HABITAT FOR HUMANITY PROTOTYPE

KANSAS CITY, MO.–BASED EL DORADO AND KANSAS CITY, KAN.–BASED HEARTLAND HABITAT FOR HUMANITY COLLABORATED TO REPROGRAM THE AFFORDABLE HOUSE.

Text by **Charles Linn, FAIA**
Photos by **Mike Sinclair**

AS THE SLOPING metal roofs of this bungalow and its detached garage meet over an intimate enclosed courtyard, its half-scissor trusses and tri-tone cement board exterior clearly state: "Architects were here."

Yet as one considers the rough surrounding neighborhood, where most of the houses have either fallen on hard times or been demolished entirely, that statement turns into a question: "But how did they get here?"

The 1,300-square-foot, three-bedroom, two-bath house is a Habitat for Humanity prototype designed by principal Josh Shelton, AIA, and project architects Brandon Froelich and Steve Salzer, AIA, of the Kansas City, Mo.–based firm El Dorado, and built by Kansas City, Kan.–based Heartland Habitat for Humanity on the Kansas side of the border.

It is a result of the 1% Habitat Initiative, a partnership between San Francisco–based Public Architecture and Habitat for Humanity International. The initiative paired seven of the affordable housing group's most successful chapters with local architects whose design expertise and commitment to pro bono work were well established. Their mission was to improve the quality of homes built by Habitat chapters.

The partnership between the Kansas Citians wasn't without a learning curve. "We are all about simple and affordable," says Heartland Habitat's president and chief executive officer Tom Lally. "El Dorado learned our process, needs, and desired outcomes, and we learned a tremendous amount from them."

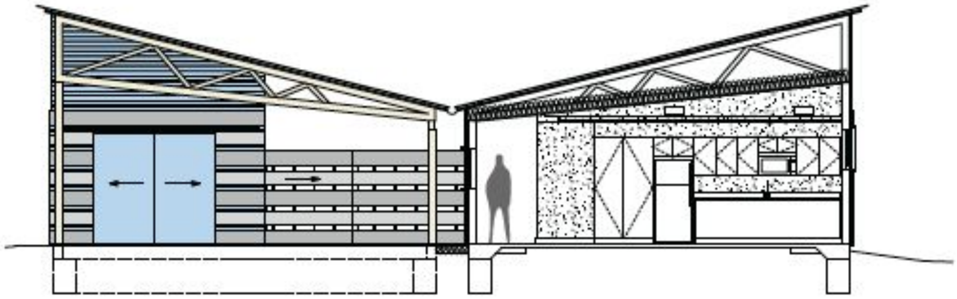
What Shelton observed of Heartland Habitat's standard attached-garage plan was how the layout of the houses could influence family dynamics. "It has two basement bedrooms and one on the main level," he says. "It makes sense from a cost standpoint but it's difficult, especially for a single mom."

He also wanted the house to better connect its owners to the outdoors. "We put everything on one level, moved out the garage, and added an outdoor room between them," Shelton says, "so you transition from one aspect of the house to another, extending the front porch, and providing space for a garden." It is a Joseph Eichler house, Kansas City–style.

"This was a major experiment, and it was a real risk for Heartland," Shelton says. "We've worked with severe budgets before, but designing with volunteer labor in mind was something new for us."

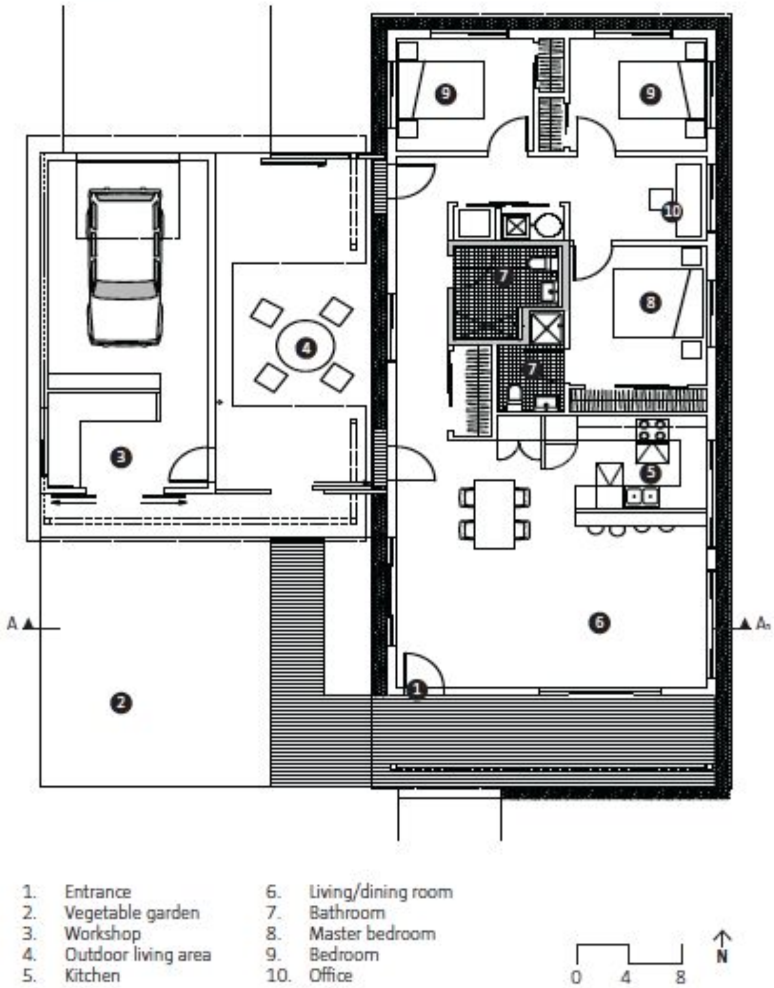
But designing a project with "prototype" in the name didn't go to their heads. "The measure of success of this project isn't necessarily that they build 50 more of our houses," says Shelton. "The important thing is that the conversation left an impact on Habitat, and the way they do things left an impact on us."

Section A–A₁



Previous page: Reconfiguring the typical Heartland Habitat house layout allowed El Dorado to create an outdoor room between the house proper and the detached garage. **Above:** The house and garage are clad in a cement board panel rainscreen, which is low-maintenance and brings color to the exterior. **Right:** Inside, the house was designed to be both accessible and durable. The kitchen, which opens onto the living and dining area at the front of the house, features Formica countertops and Whirlpool appliances.

Floor Plan



1. Entrance
2. Vegetable garden
3. Workshop
4. Outdoor living area
5. Kitchen
6. Living/dining room
7. Bathroom
8. Master bedroom
9. Bedroom
10. Office

The garage is connected to the house by a set of canted metal roof planes, formed from Firestone Metal Products Una-Clad and Galvalume.

ANNUAL DESIGN REVIEW

Work

Novartis Visitor Reception, PAGE 112

Project Novartis Visitor Reception, East Hanover, N.J.
Client Novartis Pharmaceuticals Corp.
Architect Weiss/Manfredi Architecture/Landscape/Urbanism, New York
Structural Engineer Severud Associates
M/E/P/FP Engineer and Security Cosentini Associates
Curtainwall Consultant Heintges & Associates
Renewable Energy Consultant Relab
Lighting Design Consultant Brandston Partnership
Cost Estimator AECOM
Code & Life Safety Code Consultants
Waterproofing James R. Gainfort, AIA Consulting Architects
Construction Manager Sordoni Construction Co.

Novartis Office Building 335, PAGE 114

Project Novartis Office Building 335, East Hanover, N.J.
Client Novartis Pharmaceuticals Corp.
Architect Weiss/Manfredi Architecture/Landscape/Urbanism, New York
Structural Engineer Severud Associates
M/E/P/FP Engineers and Security Cosentini Associates
Curtainwall Consultant Heintges & Associates
Lighting Design Consultant Brandston Partnership
Food Service Consultant James N. Davella Consulting
A/V and Acoustics Consultant Shen Milsom & Wilke
Elevator Consultant VDA
Cost Estimator AECOM
Code & Life Safety Code Consultants
Waterproofing James R. Gainfort, AIA Consulting Architects
Construction Manager Turner Construction Co.

District Hall, PAGE 115

Project District Hall, Boston
Client/Owner The City of Boston
Architect Hacin + Associates, Boston
Structural Engineer McNamara · Salvia
Civil Engineer Nitsch Engineering
Geotechnical Engineer Haley & Aldrich
Landscape Architect Reed Hilderbrand
General Contractor John Moriarty & Associates (builder); Cafco Construction Management (restaurant fit-out)
Specification Consultant Kalin Associates
Commissioning Agent Jacobs Engineering
Acoustical Consultant Acentech
Developer Boston Global Investors
Operator Venture Café Foundation
Sponsors IdeaPaint, Philips ColorKinetics, John Hancock, Artaic

Play

Wild Turkey Bourbon Visitor Center, PAGE 116

Project Wild Turkey Bourbon Visitor Center, Lawrenceburg, Ky.
Client/Owner/Developer Gruppo Campari (USA-Campari America)
Architect De Leon & Primmer Architecture Workshop, Louisville, Ky.
Structural Engineer Stanley D. Lindsey and Associates
M/E Engineer Kerr-Greulich Engineers
Specifications Conspectus
General Contractor Lichtefeld

Principal Riverwalk Pavilion and Pump Station, PAGE 118

Project Principal Riverwalk Pavilion and Pump Station, Des Moines, Iowa
Client City of Des Moines
Architect Substance Architecture, Des Moines, Iowa
Structural Consultants Veenstra & Kimm (Pump Station); Charles Saul Engineering (Pavilion and Pump Station)
General Contractor Cramer and Associates (Riverwalk); Larson & Larson Construction (Pump Station)
Contractor Covenant Construction Services (Pavilion)
Civil Engineer Stanley Consultants (Pavilion); Veenstra & Kimm (Pump Station)
M/E Engineer KJWW Engineering Consultants (Pavilion)
Landscape Architect Wallace Roberts & Todd (Pavilion and Pump Station)
Art Installation Jun Kaneko

SHED Store and Café, PAGE 120

Project SHED Store and Café, Healdsburg, Calif.
Client Cindy Daniel & Doug Lipton
Architect Jensen Architects, San Francisco
Structural Engineer ZFA Structural Engineers
Civil Engineer Atterbury & Associates
Geotechnical Engineer PJC & Associates
M/E/P Engineer Guttmann & Blaevoet Consulting Engineers
Food Service Muller Design Associates
Surveyor Curtis & Associates
Landscape Russian Riverkeeper
Interiors Cindy Daniel, Susan Volkel, Cathy Smith, Scott Constable, Jeremy Foster
Contractor Oliver & Co.

Editions de Parfums Frédéric Malle, PAGE 121

Project Editions de Parfums Frédéric Malle, New York
Client Editions de Parfums Frédéric Malle
Architect Steven Holl Architects, New York
Lighting Consultant L'Observatoire International
Cabinetry Javier Gomez

Bond

Danish Maritime Museum, PAGE 122

Project Danish National Maritime Museum, Helsingør, Denmark
Client Maritime Museums
Architect BIG (Bjarke Ingels Group), New York and Copenhagen
Engineer Rambøll i Danmark
Fire Consultant Freddy Madsen Rådgivende Ingeniører
Client Consultant Alectia
Exhibition Design Kossman.dejong
Construction E. Pihl & Søn, Jakon
Technical Installation H. Helbo Hansen
Landscape Architect Anlægsgartner Jens Ravnholt

SFJAZZ, PAGE 124

Project SFJAZZ, San Francisco
Client SFJAZZ
Architect Mark Cavagnero Associates, San Francisco
Structural Engineer Forell/Elsesser Engineers
M/E/P Engineers and Lighting WSP Group
Theater and Video Consultant Auerbach Pollock Friedlander
Acoustics and Audio Consultant SIA Acoustics
Landscape Architect Monica Viarengo Landscape Design
Civil Engineer KCA Engineers
Façade Consultant McClintock Façade Consulting
Specifications Emily Borland Specifications
Code Consulting Arup
Vertical Transportation Syska Hennessy Group
Telecom TEECOM
Security Guidepost Solutions
Signage Propp + Guerin
Contractor Hathaway Dinwiddie Construction Co.

Centro de Arts Nadir Afonso, PAGE 125

Project Centro de Artes Nadir Afonso, Boticas, Portugal
Client Camara Municipal de Boticas
Architect Louise Braverman, Architect, New York
Associate Architect Paulo Pereira Almeida
Structural Engineers JP Engenharia, Hugo Pimenta, José Pimenta
M/E Engineers MM Engenharia, Pedro Espadinha, Joaquim Marques
Landscape Architect Maria João Ferreira
Fire Safety Engineer Palhas Lourenço

St. Elizabeths East Gateway Pavilion, PAGE 126

Project St. Elizabeths East Gateway Pavilion, Washington, D.C.
Client The District of Columbia Department of General Services
Architect Davis Brody Bond, Washington, D.C.
Structural Engineer Robert Silman Associates Structural Engineers
M/E/P Engineers/Sustainability and Lighting Consultants WSP Flack + Kurtz
Landscape Architect Gustafson Guthrie Nichol
Civil Engineer A. Morton Thomas & Associates
Contractor KADCON Corp.

National September 11 Memorial Museum, PAGE 126

Project National September 11 Memorial Museum, New York
Client The National September 11 Memorial and Museum at the World Trade Center Foundation
Architect Davis Brody Bond, New York
Structural Engineer WSP USA; Guy Nordenson and Associates, Simpson Gumpertz & Heger (slurry wall)
M/E/P Engineers/Vertical Transportation Jaros, Baum & Bolles
Blast Design Weidlinger Associates
Lighting Designer Fisher Marantz Stone
Geotechnical Engineering Langan Engineering & Environmental Services; Mueser Rutledge Consulting Engineers (slurry wall)
Code Consulting Code Consultants
Acoustical and Vibration Design Cerami
Graphics C&G Partners
Historic Preservation Higgins Quasebarth & Partners
Security Design Arup
Sustainability Consultant Vidaris
Building Envelope and Waterproofing Wiss, Janney, Elstner Associates
Specifications Construction Specifications
Cost Estimating Faithful+Gould
Contractors Port Authority of New York and New Jersey, Bovis Lend Lease

Move

Zerega Avenue EMS, PAGE 127

Project Zerega Avenue EMS, New York
Client New York City Department of Design and Construction
Architect SMH+U, New York
Structural Engineer Robert Silman Associates Structural Engineers
M/E/P/FP Engineers ADS Engineers
Landscape Architect Scape/Landscape Architecture
Lighting Designer Claude R. Engle, Lighting Consultant
Civil and Geotechnical Engineering Langan Engineering & Environmental Services
Fuel Systems Engineer Hatch Mott MacDonald
General Contractor Kel-Mar Designs
Construction Manager LiRo Group

Grow

Krishna P. Singh Center for Nanotechnology, PAGE 128

Project Krishna P. Singh Center for Nanotechnology, Philadelphia
Client University of Pennsylvania
Architect Weiss/Manfredi Architecture/Landscape/Urbanism, New York
Structural Engineer Severud Associates
M/E/P/FP Engineers and Lab Consultant M+W Group
Civil Engineer Stantec
LEED/Sustainability Consultant Viridian Energy & Environmental
A/V/Acoustics Consultant Cerami & Associates
Curtainwall Consultant Heintges & Associates
Elevator Consultant Van Deusen & Associates
Food Service Consultant JNDavella Consulting
Lighting Design Consultant Brandston Partnership
Green Roof Consultant Roofmeadow
EMI Consultant VitaTech
Vibration Isolation Consultant Colin Gordon & Associates
Cost Estimator AECOM
Construction Manager Gilbane

William Jones College Preparatory High School, PAGE 130

Project William Jones College Preparatory High School, Chicago
Client Public Building Commission of Chicago/Chicago Public Schools
Architect Perkins+Will, Chicago
Associate Architect The Architects Enterprise, Chicago
Civil Engineer Terra Engineering
Landscape Architect Site Design Group
Structural Engineers Halvorson and Partners; Drucker Zajdel Structural Engineers
M/E/P/FP Engineer Primera Engineers
Acoustical and A/V Consultant Talaske
Theater Design Consultant Schuler Shook
Food Service Cini-Little International
Swimming Pool Consultant Bill Robertson Pool Design
General Contractor Walsh

Henderson-Hopkins School, PAGE 131

Project Henderson-Hopkins School, Baltimore
Client East Baltimore Development; Johns Hopkins University School of Education
Architect Rogers Partners Architects+Urban Designers, New York
M/E/P/FP Engineer Global Engineering Solutions
Landscape Architect Floura Teeter Landscape Architects
Data, Audiovisuals, Voice, Security, and Acoustics Spexsys
Geotechnical Engineer EBA Engineering
Civil Engineer Phoenix Engineering
Sustainability Terra Logos: Eco Architecture
Food Service Cini-Little International
Theater Fisher Dachs Associates
Signage Designer Salestrom Design
Construction Manager/Builder Whiting-Turner Contracting Co.

Live

TAT House, PAGE 132

Project TAT House, Santa Monica, Calif.
Client Mehran and Laila Taslimi
Architect Fleetwood/Fernandez, Santa Monica, Calif.
General Contractor Taslimi Construction Co.
M/E/P Systems Glumac
Structural Engineer Taylor & Syfan
Landscape Architecture GSLA Studio
Graywater System Grey Water Corp.
Lighting Horton Lees Brogden Lighting Design
Green Rater GB Works
Civil Engineer JMC²

Vlietstra Retreat, PAGE 134

Project Vlietstra Retreat, Herbster, Wis.
Client Withheld
Architect Salmela Architect, Duluth, Minn.
Builder Lake Effect Builders
Structural Engineer Meyer Borgman Johnson

Village Health Works Staff Housing, PAGE 136

Project Village Health Works Staff Housing, Kigutu, Burundi
Client Village Health Works
Architect Louise Braverman, Architect, New York
Structural Engineer Liam O'Hanlon Engineering
Plumbing Engineer Plus Group Consulting Engineers
Construction Management Curtis Bertrand, Roy Greenwald, Matt Krupanski, Astere Niyonkuru
Global Procurement Gam Kagan Procurement

RESIDENTIAL

Habitat for Humanity Prototype, PAGE 139

Project Habitat for Humanity Prototype, Kansas City, Kan.
Client Heartland Habitat for Humanity
Architect El Dorado, Kansas City, Mo.—Josh Shelton, AIA (principal architect); Steve Salzer, AIA, Brandon Froelich (project architects)
Structural Engineer Bob D. Campbell & Co.
Electrical Engineer PKMR Engineering
Construction Manager Heartland Habitat for Humanity—Steve Thompson (vice president of construction & project management)
General Contractor Heartland Habitat for Humanity—Matt Trusty (site supervisor)
Size 1,300 square feet (excluding garage)
Cost Withheld

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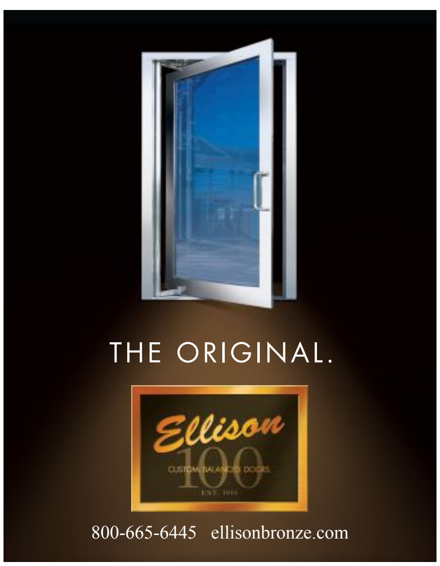

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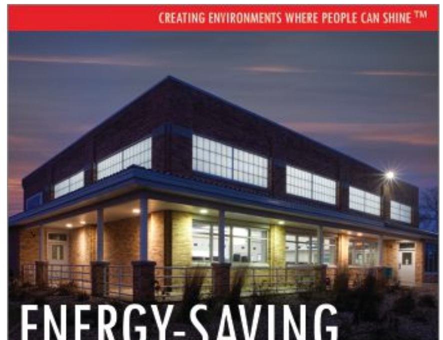

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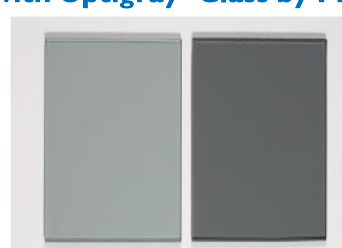

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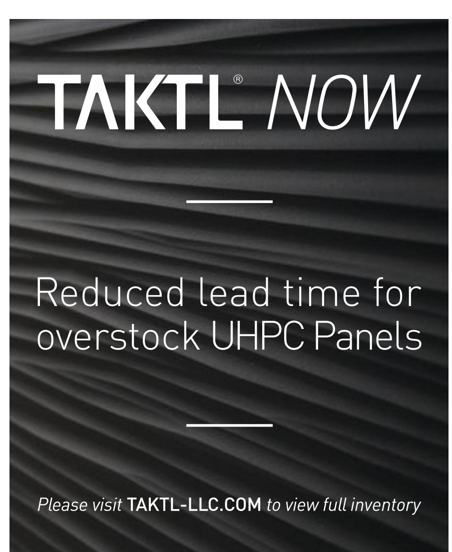

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INFRASTRUCTURAL IMPACT

THE VERMONT/SANTA MONICA STATION IN LOS ANGELES SHOWS HOW INFRASTRUCTURE CAN INFLUENCE A PLACE AND EVEN THE PROFESSION.

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

THIS METRO RED-LINE STATION has an iconic presence in the visually chaotic surroundings of its Los Angeles neighborhood. Designed by Mehrdad Yazdani, Assoc. AIA, then with Ellerbe Becket (now the design principal of CannonDesign's Yazdani Studio), the station features an almond-shaped canopy—internally illuminated and metal-clad—that looks like a streamlined piece of a train lifting above ground to beckon us aboard. The canopy's unexpected design seems fitting in Los Angeles, the home of special effects and visual wizardry, and oddly contextual, given all of the metallic vehicles that pass by. And it serves its primary purpose well, effectively drawing people into the subterranean station, where elliptical louvers echo the lines of the canopy above.

The station also shows the impact that public investment can have on a community. The shops envisioned along one side of the station's plaza would have brought more activity to that space than occurs now, but the rest of the plaza was built as designed, with a leaning glass elevator, tall red-painted light standards, and glass-block pavers that admit daylight to the station underfoot. Located a block from Los Angeles City College, the station has helped generate pedestrian activity and a healthy amount of commerce. If only the MTA would take better care of it.

The jury admired the boldness and "the minimal means used here to achieve a special character," in Steven Holl's words. "Architects should be more involved in projects like these," he added—advice that this station supports.