

Fall 2023

Oculus

A Publication of
AIA New York
Volume 85, Issue 4
\$10

THE MATERIALS ISSUE

AIA NEW YORK DESIGN AWARDS 2024

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FALL 2023 Vol. 85, Number 4

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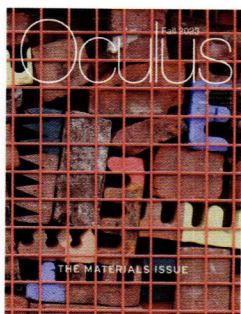
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THE MATERIALS ISSUE



Cover: After Architecture's Sylvan Scrapple repurposed bricks from the 130-year-old Irwin Block building, which burned down in 2022, for an installation at this year's Exhibit Columbus in Columbus, IN. The architects transformed the bricks into keepsakes and collected them in metal gabion cages that doubled as urban furniture and walls.

Above: A successfully broken cross-laminated timber segment following a structural test by the Advanced Structures & Composites Center at the University of Maine in Orono.

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AIANY/Center For Architecture

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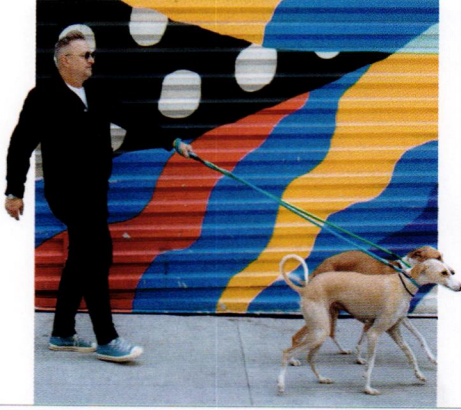
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Our Common Bonds

BY AIANY PRESIDENT **MATTHEW BREMER, AIA**



And just like that, it's fall in New York. Packed subways, snarled traffic, ubiquitous school buses, competing deadlines and priorities, an hour wait at your favorite neighborhood dinner joint—such are our common bonds of New York in autumn. And speaking of a common bond, the Center for Architecture's fall fête, to benefit its K–12 Learning By Design initiative, is just around the corner. Common Bond: The Center for Architecture Gala will again take place at Chelsea Piers, on Thursday, October 26, and I hope to see you all there. What could be a better cause than youth design education? This year we're honoring four truly extraordinary individuals who have committed themselves to transforming New York for the better:

Rohit T. "Rit" Aggarwala, an Indian-American environmental policy adviser, transportation planner, and historian, and New York City's chief climate officer and commissioner of the NYC Department of Environmental Protection for the Adams Administration;

Jeanne Gang, founder and principal of Studio Gang, the Chicago-based firm with a growing New York studio and presence, whose new Gilder Center for Science, Education, and Innovation at the American Museum of Natural History opened this year to widespread praise;

Jolie Milstein, a licensed architect and the president and chief executive officer of the New York State Association for Affordable Housing, executive director of House New York Inc., and a managing member of Closing USA Affordable Housing, who has focused her career on addressing the daunting affordable housing crisis

in New York and beyond through the lens of housing equity;

And lastly, we will celebrate the extraordinary legacy of Joan K. Davidson (1927–2023), president emerita, J.M. Kaplan Fund. As her *New York Times* obituary noted, she was a "philanthropist who championed New York. As president of a foundation established by her father, she focused her grant making on issues related to the city's architecture, design and quality of life."

I also feel compelled to make another worthy mention, and perhaps, a formal introduction, of someone who actually needs no introduction to most of you: Jesse Lazar, the new executive director of the AIA New York Chapter and the Center for Architecture! Most of you have at least met Jesse around the Center or the city sometime over the past 15 years. Yep, Jesse entered the Center for Architecture in 2008 as director of programs, and has become a powerful and indispensable component of our sibling institutions on and off for a decade and a half, with intermediate stints to get an MBA, and to serve New York Economic Development Corporation as a project manager.

What I can promise all of you—having been more involved in this search process than I ever expected to be—is that the Center and AIANY have an extraordinarily knowledgeable and dynamic person at the helm, with an eye on the sea changes ahead. Jesse brings a steady hand and an ambitious appetite for sustainable growth to both the Center and AIANY, as both organizations prepare to undergo strategic planning in the coming months. At first glance, Jesse comes

from outside the conventional "walls and halls" of the architecture discipline, but at second glance, he's been at the crossroads of architectural academia, the profession, and the culture for years. Soon, we'll launch a search for a new director of programming and curatorial affairs, who will guide the Center and Chapter in lockstep with Jesse, a dedicated and talented staff, and brilliant boards, along new paths. In short, we want to remain relevant, ambitious, and indispensable to the New York City design community as well as to our city, especially its most vulnerable citizens, and, of course, the broader public beyond.

As architects in New York, we know we have a commitment to ensure that the city will support all New Yorkers, and be its best self. Our city is blessed with a bounty of incredible non-profit organizations dedicated to architecture and the built environment. We welcome collaborations and discussions across all non-profits, and are thrilled to be connecting more closely with our sibling AIA borough chapters. We must all de-silo ourselves, and figure out how, in a world more connected than ever, to better share in setting and working toward our collective goals as a city. We want to elevate the ecosystem for all to thrive even more, and to be songbirds for **Our City and Ourselves**.

Matthew Bremer, AIA
2023 AIANY President

Tracing the Source

BY OCULUS EDITOR-IN-CHIEF JENNIFER KRICHELS



When I was growing up in rural Maine, I, unknowingly, was very close to the material world around me. My mother kept the books for a stonemason who quarried granite from nearby Mosquito Mountain, and his daughters and I would play around and on top of the piles of remnant stone behind the fabrication shop. My father, a self-taught carpenter, built several small back-to-the-land-type houses with his five siblings, and took on woodworking projects during the summer months. I was often enlisted to hold nails while he hammered, or check oak boards for warping as he laid a new floor. Before the weather turned cold again, I would ride next to him on the bench seat of an old pickup truck into the woods to haul out firewood for the long winter ahead. For anyone who has had similar experiences, I am sure the smells, textures, and even the sounds of working with these materials are still very vivid.

Today, surrounded by the urban environment, I find that these simple interactions with familiar building materials seem quaint. The scale of the projects in New York is so great, it is easy to become disconnected from their component parts, and from the stories behind the materials and processes that make them. In this issue, we seek to counteract that experience, and speak with people who are intimately involved—in many cases, literally getting their hands dirty—with researching and developing materials for large-scale use, in an attempt to find viable solutions to some of our society's most wasteful or damaging building practices.

In New York City's own backyard, the Hudson Valley farming and climate research incubator Wally Farms is home

to two new hemplime-constructed houses, which are the product of years of research by architect and urban planner Kaja Kühl, founder of youarethecity, and several collaborators. In this issue's "Street Level" column, Cornelia Smith explores Kühl's process of working with industrial hemp to build these passive house structures. As a fast-growing material that sequesters up to 10 times more carbon than trees, industrial hemp is on the minds of a lot of researchers and designers these days. In our "Materials Matter" feature, Rita Catinella Orrell spoke with members of both Parsons's Healthy Material Lab as well as Columbia GSAPP's Natural Materials Lab about their work with minimally processed biomaterials and their potential to replace products that are part of more harmful supply chains. As the school's assistant professor of architecture technology, Lola Ben-Alon, points out, "Sustainability rests not solely in the final product, but in the intricate nexus among production processes, material characteristics, and their subsequent integration into the built environment."

To most building-industry members, the idea of this nexus, and that of environmental responsibility when it comes to sourcing materials, is not new. But the issue of forced labor, often obscured by complex supply chains, has also urgently come to the forefront in recent years, in part due to the Design for Freedom (DFF) initiative launched in 2020 by Grace Farms. Three years into this movement, Beth Broome explores some of the pilot projects that have come out of DFF's work with partners who are working to model transparent and forced-labor-free supply chains. The work of creating humane material sourcing

and building practices is, seemingly, never-ending, but the early successes coming out of the DFF movement offer hope that it can, and will, be done. One way to reduce exploitation and environmental impact within material economies is to employ a practice of circularity, and in the third feature of this Fall issue, Bill Millard takes a deep dive into the firms and organizations that are leading the charge to reduce new-material usage in the construction industry.

Of course, this issue is just one of many resources tackling responsible material sourcing. This fall, our editors and contributors have found inspiration all around: in the *New Yorker's* profile of Pavels Hedström, the Swedish-born architect seeking to emphasize our uncertain environmental future with his work; in dual shows at MoMA, "Emerging Ecologies" and "Life Cycles," both of which interrogate relationships to the built environment; and even in the press releases hitting our inboxes. One recent announcement, for example, highlighted a speculative lamp designed by Pearson Lloyd that employs circular-economy materials, including yarn made from marine plastics.

Ultimately, it is the people taking their ideas from the speculative to the expandable who are the difference-makers in the movement toward material sustainability. This fall, we mourn the recent passing of Beverly Willis, FAIA. As we reflect on her legendary life and career, we can't help but feel more invested in improving the world we build around us.

A handwritten signature in dark ink, reading "Jen Kr".

Jennifer Krichels, Editor-in-Chief
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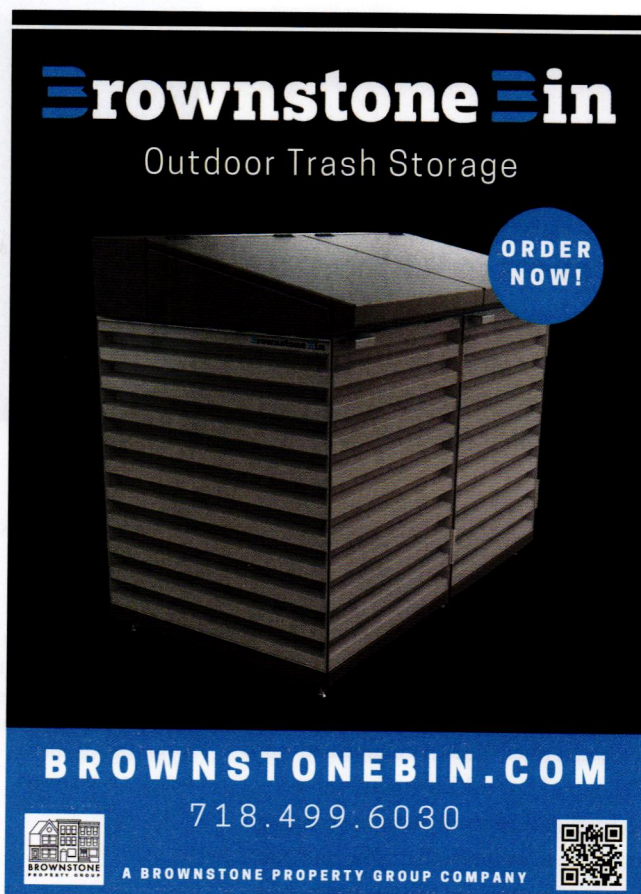
BETH BROOME ("Building Responsibility") is a contributing editor at *Architectural Record* and a writer based in Brooklyn.

BILL MILLARD ("Circularity: Design for Deconstruction, Not Demolition") contributes regularly to *Oculus*, the *Architect's Newspaper*, *Metals in Construction*, *Annals of Emergency Medicine*, and other publications. His book *The Vertical and Horizontal Americas*, assisted by a Graham Foundation grant, moves glacially forward.

RITA CATINELLA ORRELL ("Trust the Process") is a native New Yorker presently based in the Garden State. A former editor at *Architectural Record*, she now covers new building products for *Texas Architect* and her blog, architectstoybox.com.

GIDEON FINK SHAPIRO ("Lit Review: Shigeru Ban: *Timber In Architecture*") writes about architecture and serves as marketing director for MBB Architects. He likes wooden buildings but not wooden prose.

CORNELIA SMITH ("Street Level") is a writer, design researcher, and occasional performance artist based in Brooklyn, New York. She has a master's degree in design writing, research and criticism from the School of Visual Arts, where she devised a thesis project about the design of the pelvic exam.



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On View

AT THE CENTER

Generation Proxima: Emerging Environmental Practices in Portuguese Architecture

Center for Architecture
536 LaGuardia Place
Through March 23, 2024

In recent decades, Portugal's architectural scene has become increasingly recognized by the world at large, often represented by the widely known work of starchitect Álvaro Siza.

But for the Center's winter exhibition, curator Pedro Gadanho—architect, author, former MoMA curator, and Loeb Fellow at Harvard University—chose to spotlight the work of seven emerging practices in Portugal that offer contextual forms of craftsmanship and design innovation in the face of the climate emergency, and whose work brings renewed attention to nature and biodiversity.

The exhibition builds on Gadanho's recent book, *Climax Change! How Architecture Must Transform in the Age of Ecological Emergency*, which discusses how the current environmental emergency will impact the practice of architecture. Practices such as Artéria, Colectivo Warehouse, and Nuno Pimenta are applying their scarce resources to environmentally conscious proposals, while others, such as Gorvell and Oficina Pedrez, are pushing ecological research forward in building.

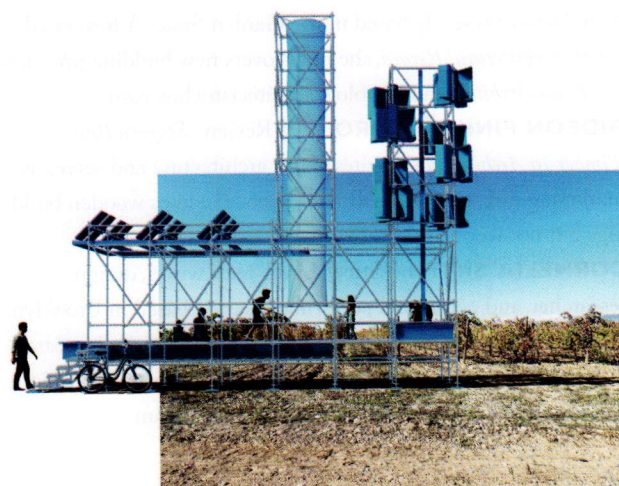
In many ways, Gadanho positions Generation Proxima as a global call to action for architects to respond to the challenges presented by climate change. Yet, with an artful selection of emerging work, he acknowledges that change begins at the smaller scale of each single architectural practice. Whether by exploring new ecological materials, revising construction methods, using fewer

Above: An aerial rendering of the Douro Hotel & Winery in Tabuaço, Portugal, by OODA Architecture.

Right: Poweranks and Watertanks, a project by Nuno Pimenta, creates a temporary infrastructure for emergency power outages and drought.

resources, addressing climate justice, or reintroducing nature as a guiding principle, these emergent practitioners point hopefully towards a much-needed environmental shift.

Graphic designers Atlantic New York, in collaboration with FUZE, have created a visual identity for the exhibition by using unique letterforms to spell out "Proxima," with each letter based on materials and principles from a different studio shown in the exhibition. The result maintains each studio's distinct point of view, while simultaneously representing how their collective shift towards sustainable design will help improve both the planet and people for generations to come. Adding to the exhibition's materiality, Generation Proxima also features an expansive installation of cork, provided by Amorim, which forms model bases and display structures, and extends to cover portions of the floor in some galleries.



BEYOND THE CENTER

A Dark, A Light, A Bright: The Designs of Dorothy Liebes

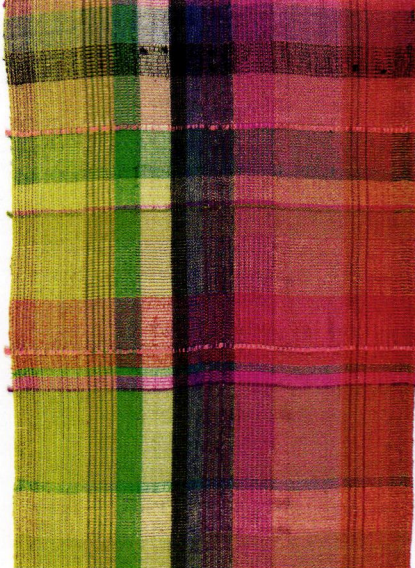
Cooper Hewitt
2 East 91st Street
Through February 4, 2024

Among the most influential designers of the 20th century, Dorothy Liebes (1897–1972) shaped American tastes in areas including interiors, transportation, industrial design, fashion, and film. "A Dark, A Light, A Bright: The Designs of Dorothy Liebes" at the Cooper Hewitt, Smithsonian Design Museum, is the first monographic exhibition to celebrate Liebes in more than 50 years, featuring more than 175 works, including textiles, textile samples, fashion, furniture, documents, and photographs.

From the 1930s through the 1960s, Liebes collaborated with some of the

most prominent architects and designers of the time—Frank Lloyd Wright, Henry Dreyfuss, Donald Deskey, Raymond Loewy, and Samuel Marx, among others—on commissions that included Doris Duke's Honolulu home, Shangri La, and the United Nations Delegates Dining Room. Fashion designers Pauline Trigere and Adrian and Bonnie Cashin also used her fabrics, yielding some of the most distinctively American fashions of the mid-20th century. Her luxurious handwoven fabrics combined vivid color, lush textures, unexpected materials and a glint of metallic—a style that grew so prevalent it became known as the “Liebes Look.” The exhibition's title is a nod to her recipe for creating a successful color scheme for the home or in fashion: “a dark, a light, a bright.”

Despite widespread recognition during Liebes's lifetime, the impact of her long



A Mexican plaid textile, ca. 1938, designed by Dorothy Liebes.

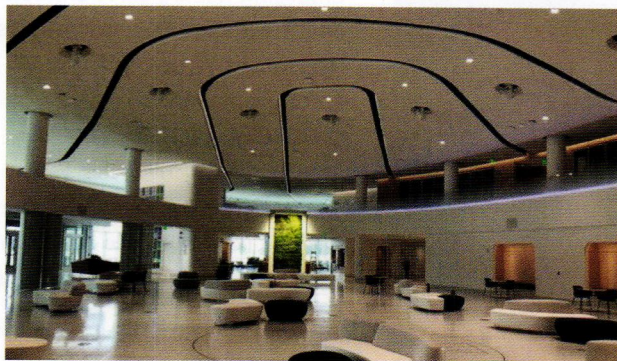
and productive career has been largely overlooked in contemporary scholarship. The Dorothy Liebes Papers at the Smithsonian's Archives of American Art—first digitized and published online in September 2021—reveal the scope of Liebes's collaborations with architects

and industrial designers, her position as a respected design authority, her role as an international ambassador for modern textiles, and her commitment to the experimental design practice that was the hallmark of the Dorothy Liebes Studio.

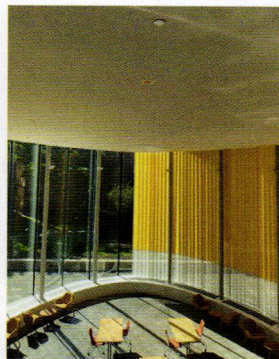
Organized in five sections by Susan Brown, associate curator and acting head of textiles, and Alexa Griffith Winton, manager of content and curriculum, the exhibition opens with an introduction to Liebes and important early works, including the prize-winning Schiaparelli panel for the 1937 Paris Exposition, and objects related to the 1939 Golden Gate Exposition, where Liebes formulated and articulated her vision for the role of handcraft in modern design. A five-minute documentary film, along with a wall graphic that maps key projects and professional achievements, illustrates the broad range of her collaborative work.

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Call for Winter 2024 Op-Eds: Diverse Perspectives

Those who have ever attempted to write about architecture know the discipline's unique challenges. At its best, architectural writing offers the opportunity to deepen our understanding of the built environment. One failing cannot be overlooked, however: the practice relies on the predominantly white and homogenous voices of journalists to locate and publish stories. **In this issue, *Oculus* seeks to further its mission of expanding the perspectives expressed in its pages by calling for op-eds from architects who have never submitted writing before.** We encourage previous op-ed authors to tap colleagues who may be able to offer their own diversity of thought and experience. If you have always wanted to share an unacknowledged or overlooked experience of the profession or the built environment, we would like to hear from you.

Please submit op-eds of 800 words to editor@aiany.org by December 1.



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BEYOND THE CENTER

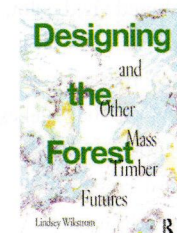
More Local Happenings

From Field to Form: Hemp

The Architectural League

November 8: 7pm

Organized in partnership with Healthy Materials Lab at Parsons School of Design, experts discuss the potential of hemp-based building materials.



Book Talk:
Designing the Forest and Other Mass Timber Futures,
by Lindsey Wikstrom

The Cooper Union Library

Atrium and Zoom

November 28: 12pm

Wikstrom studies each step in the supply chain of mass timber to consider the labor and economies involved, looking closely at the impacts on the biodiversity of the forest and the health of our ecosystems.

Emerging Ecologies: Architecture and the Rise of Environmentalism

Museum of Modern Art

Through January 20

The exhibition includes workflow diagrams by Beverly Willis, FAIA, produced using the digital program CARLA (Computerized Approach to Residential Land Analysis), which she developed in 1970.

A Glorious Bewilderment:

Marie Menken's Visual Variations on Noguchi

The Noguchi Museum

Through February 24

Experimental filmmaker Menken's first solo film, a four-minute, black-and-white work, is screened for the first time at the museum. ■

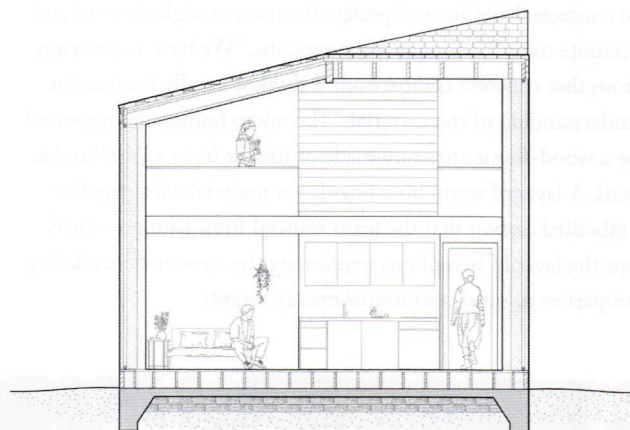
At Home with Hemp: Climate-Positive Micro Homes at Wally Farms

Hemplime, a lightweight, sustainable insulation material, is gaining momentum.

BY CORNELIA SMITH

A micro home at Wally Farms, 100 miles north of New York City, makes use of wood fiber boards and hemplime to reduce embodied carbon.

A pair of carbon-neutral micro homes, quietly nestled beneath an outgrowth of trees at the edge of a clearing in the backwoods of Taghkanic, NY, in the upper Hudson Valley, are unassuming beacons of a climate-positive future. “Home” is a loose classification; the residential structures—technically farmworker dwellings, per zoning laws—belong to Wally Farms, a 1,000-acre experimental farming and climate research incubator located 100 miles north of New York City. They are used year-round as guest accommodation and workshop spaces for researchers, educators, and the environmentally conscious to explore agricultural practices rooted in climate resiliency.



The homes themselves reflect the farm's ethos of sustainability and discovery. Designed by architect and urban planner Kaja Kühl, founder of the urban design and research practice youarethecity, the micro homes achieve carbon neutrality primarily through the application of hempcrete, a relatively new building material. Hempcrete is a carbon negative biocomposite made from a mixture of lime and hemp hurds, the woody inner core of industrial hemp plants. This mixture can be used wet and sprayed directly, or it can be molded, dried, and cut into bricks for quick installation. Industrial hemp is fast growing, sequesters five to 10 times more carbon than trees, and utilizes what would otherwise be agricultural waste. Hempcrete is also mold resistant and nontoxic, making it safe to live and work with. Despite its many benefits, however, there are few precedents for hempcrete as a viable building material—at the time of the project's construction, fewer than 20 buildings in the American Northeast were built with the substance.

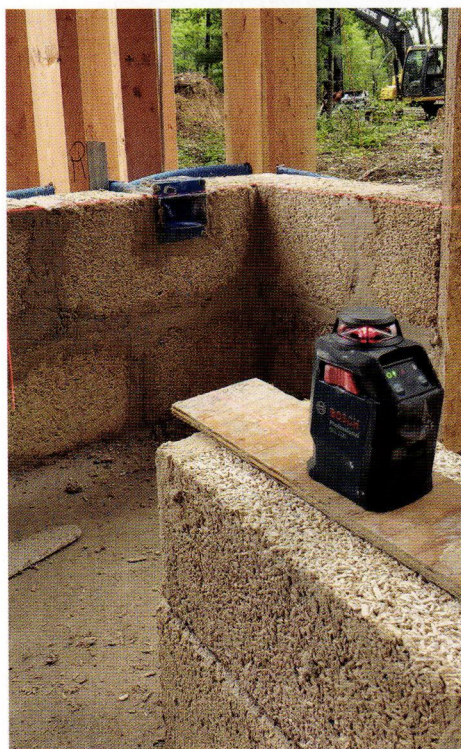


“There was an interest in taking the risk and learning about hempcrete,” says Kühl of the initial planning stages. The founders of Wally Farms—serial entrepreneur Sophie Danziger and her husband, venture capitalist Albert Wegner—sought to commission two small, energy-efficient structures for the property, and “saw this as an opportunity to experiment,” says Kühl. They built on a relationship they had with Kühl in her capacity as a research scholar at Columbia University, where she led the school’s Hudson Valley Initiative from 2018 to 2020. During this period, Kühl worked with students from Columbia Graduate School of Architecture, Planning and Preservation to help develop an initial vision for Wally Farms, which contributed to the program’s overall research on the region’s spatial, economic, and environmental opportunities.

After exploring a number of biogenic possibilities for the project, including straw, cork, wood fiber, and cellulose, Kühl landed on hempcrete as the insulation material for both micro homes. It’s important to note that hempcrete is *not* weight-bearing; despite what its name suggests, it is not an alternative to concrete. Kühl instead prefers the more straightforward and accurate term “hemplime.” She explains, “We have to get away from that concrete comparison; I think it’s really hurting the understanding of the material.” The micro homes are supported by a wood-frame structure made of timber from a local lumber yard. A layer of wood fiber boards—a material with negative embodied carbon that the team sourced from Europe—envelops the layer of hemplime, reinforcing the structures’ insulating properties to meet operational energy targets.

Kühl and architect of record Roger Cardinal consulted with the Massachusetts-based construction company HempStone, which assembled a team of fabricators and installers that specialize in the application of hempcrete. The team members installed prefabricated hempcrete bricks for the inner layer of the wall, which they then sprayed with a seven-inch layer of hemplime. Because the prefabricated bricks were already pre-dried, only six weeks of drying time were needed for the spray-applied mixture. “There were lots of other moments when something was missing and we were waiting for material, so over the course of the entire construction, those six to eight weeks we were told we had to wait didn’t seem significant,” says Kühl.

The hemp hurds, as well as the lime binder, were imported directly from a cooperative in France. While this might seem antithetical to achieving carbon neutrality, the amount of carbon sequestered, and the total sum of carbon emitted during the entire process, resulted in a net zero outcome. “I wanted to demystify this idea that only local can be sustainable,” explains Kühl, who wrote extensively on the tension between local and sustainable in a multipart project diary on Medium.com. “Of course, it would be great for many reasons if we could harvest hemp locally as a building material. Many in this field are working towards it. But it’s important to understand that most of our sustainable materials—be it insulation, high-performance windows, or even the tape that most passive house designers and installers use—currently come from Europe. That has some transportation emissions but, being close to the New York port, they’re lower than if we had shipped something from the Midwest.”



Prefabricated and pre-dried hemplime blocks form an interior layer of continuous insulation. An additional layer of hemplime was sprayed on the blocks and in between the structural frame.



Hemplime's benefits are not limited to its negative embodied carbon. It is vapor-open and pest-resistant, and it provides great thermal mass, creating a very healthy interior environment. The interior surfaces of the micro houses at Wally Farms were coated with lime plaster, which acts as an air barrier.

Hemp farming, with restrictions, became legalized in the U.S. in 2018, and hempcrete was only just approved as a residential building material in 2022. The lack of a readily available supply chain means costs for hempcrete are 30% to 40% more than for conventional insulation material. However, the shorter installation time for hempcrete partially offsets the overall cost for the project. Another benefit of hempcrete is its thermal properties; not only does the material provide high-quality insulation, it also creates thermal mass, which keeps the structures cooler or warmer for longer periods of time.

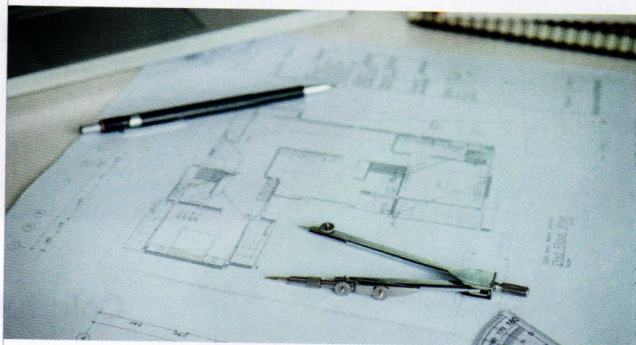
In addition to utilizing hempcrete, the micro homes at Wally Farms achieve carbon neutrality thanks to a small footprint, the use of other organic and locally sourced materials, and passive house techniques. Both structures are less than 400 square feet and connect to a solar microgrid that powers the entire property. The homes are strategically placed under shade trees to help with cooling in the warmer months; their windows face south and west, allowing sunlight to pour through and provide passive heat during freezing New York winters.

While the project provided an exciting opportunity for Kühl to experiment with a new biogenic material, her focus extends far beyond hempcrete itself. "I don't have anything on the drawing boards right now where I'm using hemp again," she says. "The idea is to be the material omnivore for natural materials. I don't see myself becoming a missionary for hemplime alone." ■



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PARC HAVEN

Photo: alanblakely.com

Colorful metal panels mimic signature sculpture

Parc Haven features industrial-style PAC-CLAD Highline B2 metal cladding that references the adjoining train tracks. A punch of colorful Flush panel highlights nod to Symphony Park's Pipe Dream sculpture sited directly across the street.



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THE MATERIALS ISSUE

According to the International Labour Organization, a UN agency, construction and manufacturing are the largest industrialized sectors at the highest risk of forced labor in the world. At the same time, supply chain issues and sustainability goals are changing how and where architects and their collaborators source building materials. In this issue, we look at the systems and processes by which materials come into and leave our built environments. Who are the organizations and people ensuring that materials enter the supply chain ethically and sustainably, and what roles can architects take in the process? Read on for stories of design professionals who are leading the world of building materials to a more sustainable and socially responsible place. *The Editors*

3D-printed earth-fiber bricks from Columbia GSAPP's Natural Materials Lab



Trust the Process

When it comes to today's new building products, some of the most compelling innovation is happening through startup and academic organizations working outside traditional approaches.

BY RITA CATINELLA
ORRELL

The next new thing in material innovation isn't prohibitively expensive or remarkably high tech. In fact, much of it can be found growing all around us. Several of today's material innovators are responding to the building industry's significant contribution to the climate crisis by investigating how to scale up the production of readily available, minimally processed biomaterials such as mycelium, earth, hemp, and wood fiber, to name a few. Others are experimenting with ways to repurpose the most underutilized material of them all—trash streams from construction and post-industrial production.

Material experts value the impact building materials have on social equity, and have taken a cue from the restaurant industry's popular "farm to table" concept to educate design professionals—and the wider public—about the importance of supporting local, sustainable, high-performing product manufacturers. Many agree that the extraction, manufacture, and disposal of building materials is inextricably linked to the health of the larger world. Below, we share the different ways some architecture and design firms, universities, and companies around the country are disrupting traditional architectural material innovation, specification, and application.



Opposite: The Raw Earth Sgraffito installation at Columbia's Reid Hall in Paris, created by the university's Natural Materials Lab in collaboration with Lynnette Widder.

Clockwise from left: Samples of hemplime, lime powder, and a hemp plant at the Healthy Materials Lab; a sample box of healthier affordable materials at the lab; handmade hemplime blocks.

NEW YORK CITY
healthymaterialslab.org

Healthy Materials Lab at Parsons School of Design

Architects Alison Mears, AIA, LEED AP, and Jonsara Ruth co-founded Parsons's Healthy Materials Lab (HML) to address intersectional issues in the built world and raise the standard for sustainable, healthy, and beautiful housing. With a focus on the field of material health—an ecosystem-first approach—the lab's two interrelated priorities are reducing climate-changing embodied carbon and the toxins in building materials linked to human disease. "HML centers a holistic understanding of the current toxic life cycle of common building products—from the mining of raw ingredients to refining, production, installation, and emerging circular systems of material reuse," says Mears.

For the last four years, the lab has taken a deep dive into a plant- and mineral-based product called hemplime. The architects see industrial hemp as a viable agricultural crop capable of rebuilding

denuded agricultural soils and improving the soil's carbon sequestration. A simple matrix of hemp hurd (made from the inner core fibers of the hemp stalk), water, and lime binder, hemplime offers excellent thermal performance and is a sustainable alternative to plastic foam or batt insulation with added flame retardants.

HML is currently working on what it calls a "Farm to Build" concept to create new affordable hemplime housing in rural and Indigenous communities across the United States. One of these is the PA Hemp Home project developed in collaboration with DON Services in New Castle, PA, where it's become a breathable thermal insulation for an existing wood-frame house. Precast hemplime panels have also been used as the structure and insulation components of the exterior walls in the Elder Housing Project on the White Earth Reservation in north-central Minnesota.

In addition to creating new supply chains and improving construction efficiency to support the production of affordable precast hemplime building materials, the researchers would like to see more use of other plant-based building materials, including straw, seaweed, mycelium, cellulose, bamboo, soil, and clay. "We are interested in scaling the production of new building materials made from these sources," says Ruth.





NEW YORK CITY arch.columbia.edu

The Natural Materials Lab at GSAPP, Columbia University

As part of her research as director for the Natural Materials Lab at Columbia GSAPP, Assistant Professor of Architecture Technology Lola Ben-Alon, PhD, investigates raw earth- and fiber-based building materials—addressing their life cycle, supply chains, techniques, speculative design, and policy. By developing design “recipes” and advanced fabrication processes, the lab aims to expand the lexicon of raw materialities in architecture to include natural geo- and bio-materials bound with bacteria, fungi, and the microstructural composition of microbial organisms and inorganic minerals. “The idea is to use the materials as raw, minimally processed, and locally sourced as possible,” says Ben-Alon. “One of my main rules at the lab is that we use only those materials we are able to mix with our bare hands.”

Recent research projects include Farm to Building, an immersive



design-build workshop offering a completely raw and untreated rammed earth sans cement or stabilizers, and *Raw Earth Sgraffito*, an installation in Paris that reflects on the material geographies and supply chains of labor, materials, and resources involved in construction. The lab is currently working on BioMud, wearable earth-based fabrics that can be molded and 3D printed. “Using a novel recipe of soil-based bioplastics,” says Ben-Alon, “we produced flexible fabrics that use earth materials themselves as a circular structure to connect the body to the living and natural processes of Earth.”

“All architecture material decisions resonate globally,” says Ben-Alon, with each material a result of human labor, crafted hands, and specialized tools, often sourced from distant corners of the world. “Sustainability rests not solely in the final product, but in the intricate nexus among production processes, material characteristics, and their subsequent integration into the built environment.”

Clockwise from top left: Compressed earth blocks, created from soil excavated during the railway expansion system in Paris, were used in the *Raw Earth Sgraffito* installation at Columbia’s Reid Hall in Paris, created in collaboration with Lynnette Widder; 3D-printed fiber-based digital basketry; experimenting with 3D-printed New York soil.



BOCA RATON, FL materialbank.com

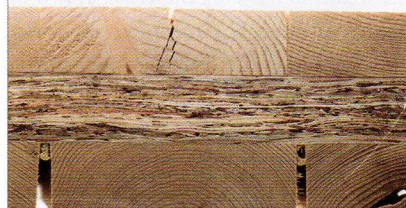
Material Bank

Material Bank was founded in 2019 as a virtual platform for searching and sampling materials with a sustainable twist: deliveries are shipped overnight for free in reusable and returnable packaging without excess bubble wrap, peanuts, or packaging. “Our mission is to identify and remove pain points from a designer’s objective in order to project manage—from material inspiration, to board building, to specifying, to sampling,” says Elizabeth Margles, executive vice president of marketing and brand at Material Bank.

Thousands of materials from hundreds of manufacturers are easily searchable on the site in three categories: Architectural, Materials,

ORONO, ME
composites.umaine.edu/woodcomposites

The University of Maine Advanced Structures & Composites Center



Above: A close-up of cross-laminated timber (CLT), showing the alternating layering of wood sheets.

Right: Structural testing of a CLT segment. Pressure is built from below, bending the wood upward to test its tensile strength.



Left: A box of samples from Material Bank.

Right: Adam Sandow, chairman and CEO of Material Bank, poses with robots that help perform some of the material sample fulfillment at the company's logistics hub in Memphis, TN.



and Furniture; Fixtures; and Equipment. Additionally, Material Bank provides carbon-neutral shipping and a custom search menu to elevate sustainability education. “We focus on providing a platform for all our brands to list whatever sustainable certifications they have earned, as we know this is important to our brands and our members,” says Margles. “On the member side, we have over 120 firms that have signed on for our Carbon Impact Program, which measures their impact in their work, what they specify, and how they design.”

IA Interior Architects became a carbon-neutral partner with Material

Bank in January 2021. “Material Bank provides IA with our firm sampling metrics, tips, and tricks to save packages with each sample order and reduce shipping emissions,” says Anne Karel, LEED AP ID+C, a senior project manager and sustainability expert based in the firm’s Bay Area studio. Karel says the firm uses Material Bank as a consolidated platform to avoid creating waste in the specification process for the firm’s tenant improvement construction projects.

The platform can also serve as an indicator of where trends are headed in material specification. “We are seeing more attention paid to sustainability, local manufacturing, and, interestingly, getting more questions about climate-related conditions (heat, precipitation, etc.) than previously,” says Margles. “After all, designers really are on the forefront of not just identifying trends, but forecasting them as well, since they consider a whole-world approach to their work.”



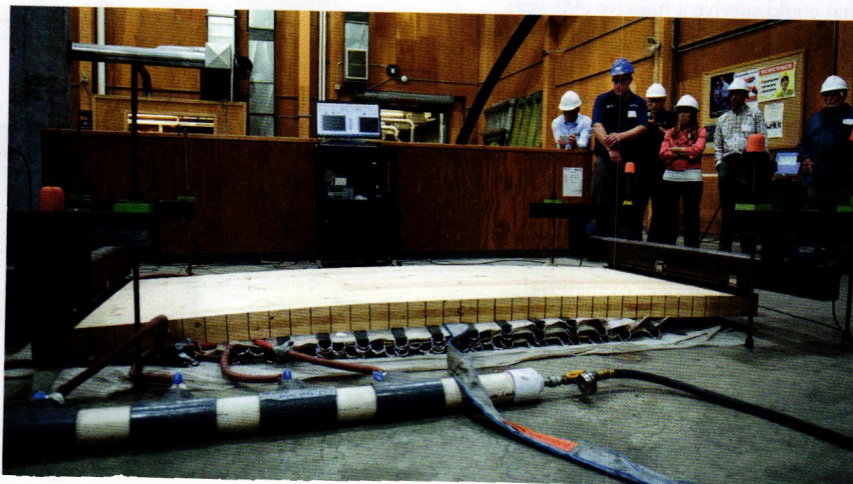
As part of the University of Maine’s Advanced Structures & Composites Center, the Wood Composites team is dedicated to driving research innovation in Green Energy and Materials by testing and manufacturing innovative, sustainable forest products to revitalize and diversify Maine’s forest-based economy. The team’s recent research on wood composites includes mass timber: qualifying cross-laminated timber (CLT) using local species such as Spruce-Pine-Fir South (SPFs); wood fiber insulation (WFI), including a full pilot-scale production line; and assemblies incorporating CLT, oriented strand board (OSB), and WFI. “About half our work is done on behalf of industrial clients looking to improve their products and/or processes, including bio-based resins and fire-retardant composites,” says Russell Edgar, wood composites manager at the center.

The center has a complete Wood Composites Pilot Line allowing the production of up to four-foot by eight-foot

OSB, laminated veneer lumber, particle-board, WFI, and other cellulosic composites on a near-industrial scale. “We work with several architectural firms to educate others on the benefits of using locally sourced wood products in their designs, including CLT and WFI,” says Edgar. This includes work done through the Maine Mass Timber Commercialization Center, which brings together stakeholders in the region to revitalize and diversify Maine’s forest-based economy by way of innovative mass timber manufacturing.

The composites team sees the increasing supply and demand for mass timber

as a major driver for mitigating climate change, replacing energy intensive materials—such as steel and concrete—with carbon-sequestering, sustainable, long-lived wood products. According to Senior Wood Technologist Ben Herzog, the most promising material the team sees for the building industry is WFI from companies such as Maine’s own TimberHP. “WFI can help with forest fire risk,” says Herzog, “by utilizing smaller, underutilized species, removing fuel from the forests, and converting it into a sustainable insulation product to substitute for petroleum-derived foams.”





PORTLAND, OR leverarchitecture.com

LEVER Architecture



With its research into mass timber innovation spanning nearly a decade, LEVER Architecture recently concluded the world's largest shake table test to validate the use of mass timber structures in high-rise buildings in high-seismic areas. According to Jonathan Heppner, firm principal and director of research and innovation, the National Science Foundation-funded project resulted in the successful testing of a full-scale, 10-story resilient mass timber rocking wall structure that could survive a massive 500-year earthquake with no damage.

Inspired by the culinary world's "farm to table" focus on local ingredients, LEVER coined the term "Forest to Frame" to bring a similar approach to architecture, whereby material innovation cannot be separated from the impact of material extraction on the health of the entire

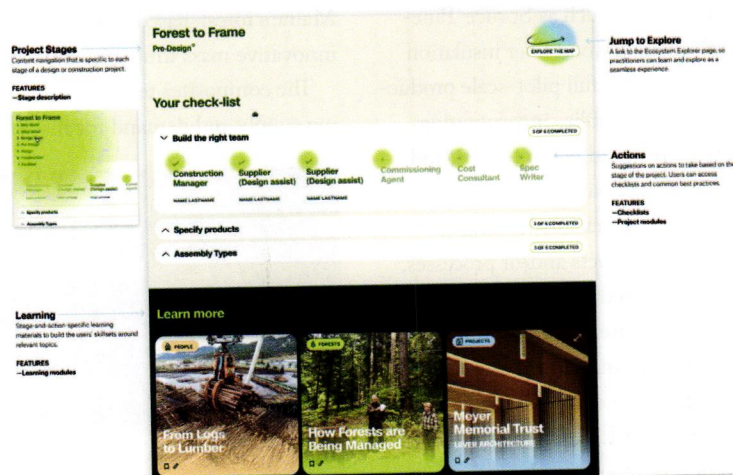
Above: LEVER Architecture and the NHERI TallWood Project, an interdisciplinary research collaborative of university and industry professionals, have studied the seismic resiliency of wood structures.

Below: LEVER developed a digital tool, Forest to Frame, to provide access to information about the forests from which wood products originate, how those forests are managed, and how the wood fiber makes its way through the supply chain.

planet. "Many people see LEVER as a firm focused on material innovation in timber, and this is true," says firm Founding Principal Thomas Robinson. "But it is important to understand our focus on innovation has always been connected to the material landscapes we work in."

Robinson sees trash streams and the byproducts created in the production of new materials as the most underutilized material in construction. "This is also an issue with timber, and finding ways to turn our trash into something of value is critical and likely the most important work we can do," he says. "Timber HP, located in Madison, Maine, is building the first timber insulation plant in the United States, and is a perfect example of how the waste streams from traditional timber milling can become a product that not only sequesters carbon, but also performs."

LEVER works with clients to define what sustainability criteria are important for their unique project. "At its root, sustainable wood is a renewable natural resource representing exemplary harvest, production, fabrication, and building practices contributing to long-lasting social equity, economic prosperity, and environmental stewardship," says Heppner. "While we're often required to check boxes, sustainable wood transcends a trademark, certification, or marketing slogan."



CHARLOTTESVILLE, VA
after-architecture.com before-building.com

After Architecture, LLC



rchitects Katie MacDonald,
AIA, and Kyle Schumann
founded After Architecture

in 2012 with an emphasis on materially driven public interventions and private residential projects. In 2022 they established the Before Building Laboratory at the University of Virginia to conduct novel material research, collaborate with experts in other disciplines, and pioneer new material assemblies to create carbon-sequestering building material systems. "Over the coming years, we hope to incubate ideas in the academy and implement them in practice," says MacDonald. The lab's current work concentrates on grasses, bamboo, and nonlinear wood, exploring possible building strategies for waste logs that are unsuitable for traditional lumber production.

The firm's Sylvan Scrapple project is currently part of the Exhibit Columbus: Public by Design program in Columbus, IN, on view until November 26. The project draws parallels between waste in cooking and construction to engage the public in discussions about circular construction. "Scrapple, which makes use of butchering waste by combining pork scraps, cornmeal, wheat flour, and spices, is leveraged as a metaphor for assemblies

After Architecture used salvaged brick and lumber for an elegant and resourceful installation of outdoor furniture.

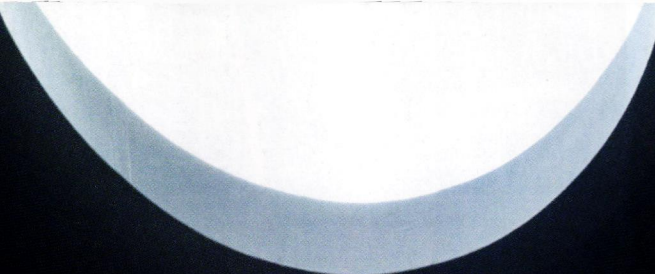
that are greater than the sum of their parts," says MacDonald.

By using different waste streams on the project—walls milled from reclaimed lumber and storm-felled trees, and bricks salvaged from Indiana's historic Irwin Block building (lost in a fire last year) and the ongoing renovation of Eliel Saarinen's First Christian Church tower—the firm hopes to show that a resourceful approach can be translated to locally available materials in any context. Composed of snaking walls and gabion furniture, the project adapts the massive planter situated between the Columbus Area Visitor's Center and I.M. Pei's Cleo

Rogers Memorial Library to the human scale, forming two elevated seating areas, two street level seating areas, and a threshold.

Going forward, the architects hope to close the gap between irregular materials, digital modeling, and construction through the development of both material systems and fabrication technologies. "Our current work investigates how to scale up these new material systems and technologies," says Schumann. "We are always looking for opportunities to work with industry and professional partners and bring other expertise into the fold." ■

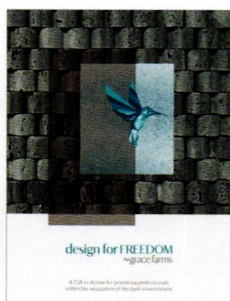




Building Responsibility

Three years into a new movement to eliminate forced labor from the built environment and its supply chains, how are industry leaders putting their goals into effect?

BY **BETH BROOME**



Figures used throughout the article from Grace Farms Foundation's report *Design for FREEDOM*, available to download at designforfreedom.org.

Facing: The 2022 Serpentine Pavilion by Theaster Gates was a Design for Freedom (DFF) pilot project. Materials were traced to ensure they were not sourced from suppliers who engage in forced labor.

Below: Guests at the DFF summit last winter discuss transparency in textile sourcing.

Those in the architecture, engineering and construction (AEC) industries have long considered a host of issues related to environmental sustainability when they decide what materials and products to incorporate into their building projects. More recently, the importance of questioning the social sustainability of these building blocks—whether they are ethically sourced and forced-labor free—has come under the spotlight. Today, anyone in the business of specifying building products needs to be aware of the associated costs to humanity caused by their choices, and should learn how their actions affect the worldwide human rights crisis of modern slavery.

About 28 million people are now held in forced labor conditions, and close to 160 million children are subjected to child labor globally, according to a 2022 report by the International Labour Organization (ILO), a United Nations agency that seeks to advance social and economic justice by setting international labor standards. The ILO also notes that construction is one of the largest industrialized sectors at risk of forced labor.

Design for Freedom (DFF), an initiative of the humanitarian non-profit Grace Farms Foundation, is taking the lead on removing forced and child labor from the building materials supply chain. The program was launched in 2020 by Sharon Prince, CEO and founder of the Grace Farms Foundation, following a working group she convened in 2017 with the late Bill Menking, founding editor-in-chief of *The Architect's Newspaper*. In a 2019 investigation, Sciam Design traced the provenance of materials employed in the 60,000-square-foot roof of Grace Farms's headquarters—an ethereal, serpentine building designed by SANAA that winds across its lush grounds in New Canaan, CT. "I realized that the disaggregated industry at large was getting an ethical building material transparency pass," says Prince, pointing to an extremely complex supply chain that is difficult to oversee, given its global reach. "DFF's core question is, 'Am I subsidizing my ROI with slavery?' Or, put another way, 'Am I okay accepting the slavery discount?'"

"DFF's core question is, 'Am I subsidizing my ROI with slavery?' Or, put another way, 'Am I okay accepting the slavery discount?'"

—Sharon Prince,
CEO and founder of the
Grace Farms Foundation



Since its inception, DFF has evolved into a global movement geared toward raising awareness of forced labor in the materials supply chain. It urges those in the building industry to understand the source of the materials they use and ask for fair labor documentation from suppliers. Annual summits that bring together hundreds of professionals are held at Grace Farms's headquarters, and the DFF Working Group—which commits to engaging with suppliers and employing particular ethical sourcing strategies—has grown from 10 to more than 100 members. DFF has also developed a toolkit to guide practitioners in implementing core principles. Of course, notes Prince, influential regulators and decision-makers must also demand the elimination of exploitation. “We are making fast headway in terms of several top AEC firms, owners, universities, and architecture and business schools,” she says.



undertaken by Diana Kellogg and JDH Urban Regeneration Project.

DFF worked with Centerbrook Architects and Turner construction company on the first building pilot project,

manufacturing community.”

On a smaller scale, the Harriet Tubman Monument in Newark, NJ, designed by architect and artist Nina Cooke John, AIA, is the most recently completed pilot. The effort focused on tracing the dominant materials: steel, wood, and concrete. “The big item was getting the entire team on board,” says Cooke John, noting that the DFF group attended weekly fabricator meetings. Though fabricators did not always have answers to everything, says the architect, the takeaway was the asking of the questions. “I’m hoping that manufacturers will realize they need to have answers as more professionals start asking the questions repeatedly, and that if the answers are not satisfactory, they will have to shift gears in terms of where they are sourcing their materials.”

One pilot announced in March is MASS Design Group’s adaptive reuse of a windowless nightclub into a home for non-profit Unshattered, an organization that provides support to women overcoming addiction and trauma in Wappingers Falls, NY. The project is in conceptual design, and the team has not

\$150 Billion

Dollar value of the modern slavery criminal industry worldwide

To model transparent and forced-labor-free supply chains, DFF has partnered with architects, artists, builders, and others on pilot programs that use the toolkit and incorporate the initiative’s objectives of tracing the origins of materials. To date, there are eight pilot projects, including three that were announced at DFF’s March 2023 summit. Two of these are *Black Chapel*, the 2022 pavilion for the Serpentine Gallery designed by Chicago artist Theaster Gates, and the restoration of a grain market in Jodhpur, India, being

the New Canaan Library, which opened last winter. DFF collaborated with 21 subcontractors, focusing on five materials to make this complex project more manageable. The team did not encounter problems with the materials they were specifying, says Peter Hamill, senior vice president, strategic development and northeast principal at Turner. “But we came to appreciate human rights as an issue that needs to be addressed in design and construction,” notes Hamill, “and we now have a process with which we can do that, if we concentrate on the

Other DFF pilot projects include a grain market in Jodhpur, India, which is being restored by architect Diana Kellogg and JDH Urban Regeneration Project (left), and a Harriet Tubman monument in Newark, NJ, designed by architect and artist Nina Cooke John (below).

yet decided on which materials they will focus. But according to MASS Senior Principal Katie Swenson, “A wholesale mindset shift has to go into the project.” Given MASS’s commitment to green building through efficiency and embodied carbon, “for a long time we have been developing our systems around understanding where materials come from and how they’re transported,” says Swenson. “We have always thought about labor in terms of who is doing it and how to

recruit local craftspeople. Design for Freedom layers on another way to look at this.”

Just as the supply chains are long, the reach of each pilot project is broad. DFF anticipates that over the course of one year, a million people will interact with one of the projects, helping to spread the importance of its mission.

As DFF moves forward, the team acknowledges it will need to bring a host of other players to the table, especially

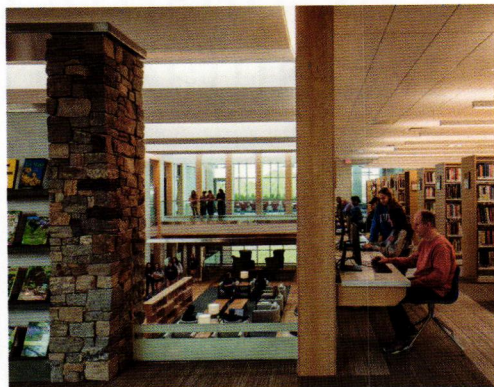
Construction and Manufacturing

are the largest industrialized sectors at the highest risk of forced labor





Working with Centerbrook Architects and Turner Construction for the New Canaan Library in Connecticut, DFF collaborated with 21 subcontractors and focused on the sources of five major materials.



since so much of the built environment is constructed without involving architects. “Responsible procurement is already codified for human safety and wellness,” says DFF Working Group member Hayes Slade, AIA. “The next step is to add fair labor requirements to municipal building codes.” And, she continues, “we are looking for ways to bring clients into the initiative, particularly those that control a large built footprint, like developers, hoteliers, and retailers.”

What is next for DFF? In September, a new report by Yale Center for Ecosystems + Architecture, the United Nations Environment Programme, and the Global Alliance for Buildings and

\$12 Trillion

Construction-related spending globally (USD)

Construction bolstered DFF’s work with its own exploration of the intersection of building materials, climate, and labor. And an upcoming workshop, co-hosted by Grace Farms, Turner, and the U.S. Department of State’s Bureau of Overseas Buildings Operations, will collaborate with major suppliers to propose strategies for navigating global

compliance policies for supply-chain due diligence. Finally, in early 2024, DFF will open its first permanent exhibition at Grace Farms, which will showcase materials that have been traced and verified to the initial extraction point. Designed by Cooke John, it will also feature innovations developed by Anna Dyson, founding director of Yale Center

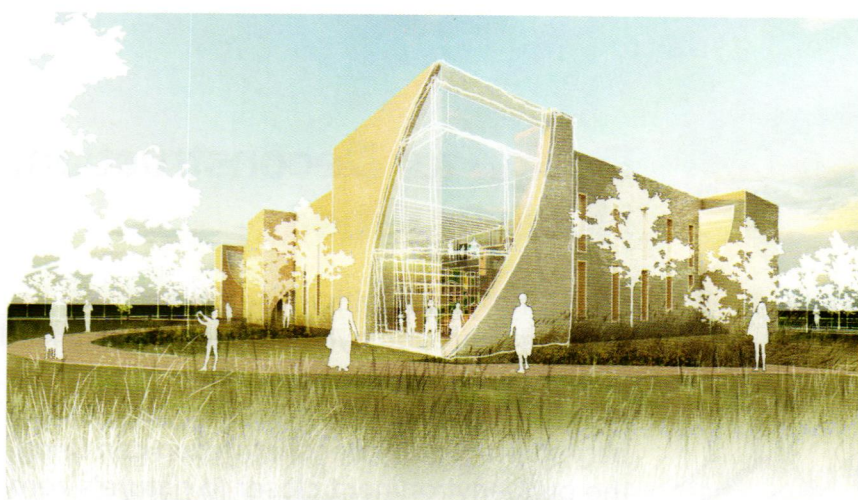
“Almost all modern construction projects around the world are subsidized with slavery... Grace Farms is working to change that.”

—Sharon Prince



Above: Sharon Prince welcomes participants at the 2023 Design for Freedom Summit at Grace Farms in New Canaan.

Left: For another DFF pilot, MASS Design Group is designing new spaces to support Unshattered, a non-profit in Wappingers Falls, NY, that assists women in overcoming addiction and trauma.



for Ecosystems + Architecture, including new biomaterial textiles and ethically sourced solar panels—products typically at high risk for the use of forced labor.

“Almost all modern construction projects around the world are subsidized with slavery,” says Prince. “There isn’t a fair labor inspection of the thousands of materials that arrive on our project sites—even sustainable materials—and therefore there is no accountability. Grace Farms is working to change that.” ■

Circular

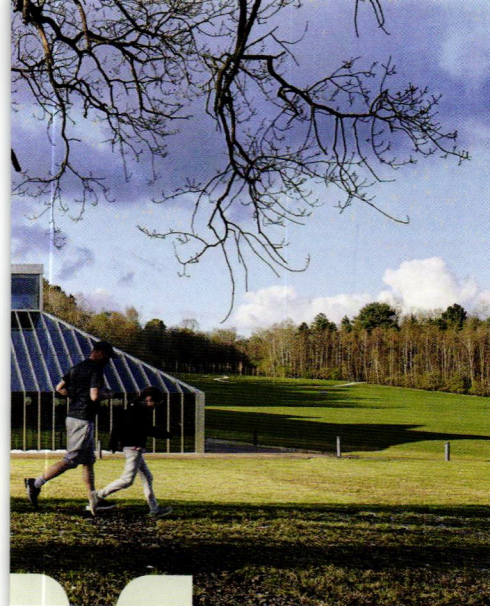


Design for Deconstruction, Not Demolition

Replacing rubble with reuse calls for creativity in redeploying materials, organized approaches to material information, and realistic incentives. Circular thinking and the patient practice of deconstruction can bring the built environment closer to nature's zero-waste condition.

BY **BILL MILLARD**





THE ECOLOGICAL PRINCIPLE

that waste is a human invention, unknown to nature (which discards nothing and transforms everything), is inspiring some architects to jettison the linear economy, where structures at the end of their usable lives are destroyed and their materials squandered in landfills, in favor of one based on reuse, regeneration, and restoration. This circular approach recognizes the value in every building material and looks for ways to recapture that value through transformation, not destruction. “Circularity differs from any number of sustainable design efforts in that it’s focused not just on efficiency or maximizing material lifespans,” says Aaron Dorf, a director at Snøhetta, who concentrates on sustainability and climate design, “but challenges design thinking to be fully regenerative by looking at all aspects, from raw material extraction through removal and reuse.” As Dorf elaborates, a circular approach is a loop, where the end product, after a material’s useful life, should ideally feed its next life—whether it can be reused as is, broken apart into reusable ingredients, recycled into raw materials, or even biodegraded.

A key term in this paradigm shift is *deconstruction*, not in the sense used by Postmodern philosophers and cultural

theorists, but literally: the disassembly of buildings and the preservation, sorting, and adaptation of their materials for future use. Deconstructing and reconstructing buildings addresses the all-too-familiar problems of the status quo—what the Arup and Ellen MacArthur Foundation’s Circular Buildings Toolkit, launched last year, calls “the ‘take, make, dispose’ model.”

The unsustainable consequences of the linear model are well known, says Felix Heisel, assistant professor and director of the Circular Construction Lab (CCL) at Cornell University: some 50% of all resources taken out of the Earth’s crust are associated with buildings, whose construction and operation accounts for about 40% of solid waste and about 39% of carbon dioxide emissions. These are not figures to accept complacently.

“We understand deconstruction as a last resort,” says Heisel. “Before that comes adaptive reuse, and before that building reuse. What we shouldn’t do is demolition.” In conventional demolition, he says, the top priority is simply to clear a site as cheaply and efficiently as possible. The circular approach, in contrast, adds value through material reuse as well as “the preservation of cultural values,

THE CIRCULAR APPROACH ADDS VALUE THROUGH MATERIAL REUSE AS WELL AS “THE PRESERVATION OF CULTURAL VALUES, SKILLS, EMBODIED LABOR, EMBODIED CARBON, AND ENVIRONMENTAL BENEFITS.”

Felix Heisel

Circular Construction Lab

skills, embodied labor, embodied carbon, and environmental benefits,” Heisel says. “The moment you use a mechanical excavator to crunch a house down into pieces, you’re losing the highest utility and value in that model.” The linear economy treats the discarded components as externalities; proponents of circularity “want to close material loops,” he says. “We want to regenerate nature and reduce waste.”

Opposite and above: Arup helped John McAslan and Atelier 10 reuse 16 tons of original glass during a restoration and modernization of the Burrell Collection in Glasgow, Scotland. **Below:** The design team reused the entire western arch in its restoration of the Van Brienenoordbrug, Rotterdam’s busiest bridge.

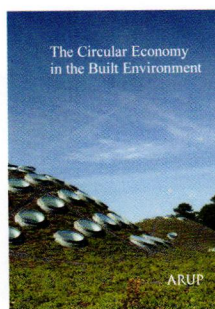


INFORMATION TRANSPARENCY

Most architectural, engineering, and construction practitioners and informed citizens share that desire. One factor that distinguishes circular design, deconstruction, and construction from related and overlapping green philosophies is quantitative attention to the elements in question. “We might not be aware of the construction industry’s part in this problem,” Heisel says. Construction “produces twice the amount of waste that we all produce in our daily lives—essentially, in our name, per capita—without us having any influence on it.” A corrective response, as articulated and practiced by the CCL and related organizations such as the MacArthur Foundation and the Circular Buildings Coalition, and firms like Arup and Snøhetta, is to combine “urban mining” with in-depth research into the materials, sorting out the reusable materials from byproducts, contaminants, potential toxicants, and other substances needing removal from the cycle.

Because much of the built environment (particularly buildings from the 1950s through the 1980s) was “designed with eternity in mind,” circular practice depends on the painstaking work of what those in the field call material passporting. CCL is exploring laser scanning of buildings, documenting materials and creating “digital twins” with metadata indicating the nature, condition, connections, and accessibility of components that can be directly reused. These include steel beams and components that require transformation, such as salvage timber, currently only allowed for reuse in Washington State and Oregon. Other states allow its use if processed into engineered products like cross-laminated timber.

CCL also recently created the plug-in Rhino Circular to aid circularity calculations early in the design process,



Above: A report by Arup, *The Circular Economy in the Built Environment*, reflects on the economic, social, and environmental advantages of employing circular principles.

Top: At 1 Triton Square in London, which Arup designed for the British Land Company in the 1990s and refurbished 20 years later, envelope work included the reinstallation of 3,000 square meters of façade.

outputting material passports; major industry players, Heisel says, are on board with providing beta-testing feedback. Europe’s most prominent material passporting system is Madaster, short for “material cadastre,” accepting building information modeling data in Industry Foundation Classes or Excel formats. Used in six European nations and scheduled to add the United Kingdom this fall, the system aims to create a global registry of materials’ recyclability, toxicity, embodied carbon, and financial valuation. “Material with an identity,” Madaster’s website summarizes, “always keeps its value.”

Circular thinking challenges all those with an economic stake in our built environment to measure the long-term gains of avoiding 20th-century-style mechanical demolition more accurately. “Building the best, most sustainable way still comes with a cost premium, although that premium is lowering every year,” Dorf comments, noting that different clients respond to that condition either by flipping assets or by retaining them. “The ones who want to move on have a very short-term view of value, primarily tied to first cost. Those who stick around can reap the full benefit of a life-cycle analysis—where something that costs more on day one may cost less in 15 or 20 years. Each client must be appealed to in different ways to make the most responsible climate-based decision for their project. In the end, bigger subsidies from public institutions likely hold the key to unlocking incentives for the full range of clients, from short- to medium- to long-term stewards.”

MODEL PROJECTS FROM OVERSEAS

Like many green practices, circularity is more advanced in Europe than on this side of the pond. Ilana Judah, AIA, associate principal for resilience, climate, and sustainability at Arup, points to recent projects that make the employee-owned, research-oriented firm a global leader in implementing circular methods. At 1 Triton Square in London, which Arup designed for the British Land Company in the 1990s and refurbished 20 years later, envelope work included the removal and reinstallation of 25,000 separate parts spanning more than 3,000 square meters of façade, saving over 2,400 tons of carbon and 66% in costs compared with a new façade.

For Rotterdam’s Van Brieneoord Bridge, which carries 230,000 vehicles daily across two six-lane, 300-meter-long

segments (an eastbound bridge dating from the 1960s and a westbound bridge built in the 1990s), renovation work began with sensors and cameras gathering 70 billion data points to guide structural and geometric modeling. Arup project manager Daan Tjepkema rejected two conventional new-build plans in favor of “a eureka moment”: taking out the old eastern bridge, replacing it with the refurbished western bridge, and constructing a new western bridge off-site. The structural swap follows circular principles, reusing 3,200 tons of steel and cutting projected annual carbon dioxide output from 187 tons under a new-build plan to 96 tons over a service life extended for another 100 life-cycle years. Construction begins in 2025 and will close the bridge completely for only six weeks, rather than partially for one-and-a-half years.

On a Glasgow museum renovation, a collaboration with John McAslan + Partners and Atelier Ten on the Burrell Collection (one of Scotland’s few Postwar Category A listed buildings), Arup’s pre-disassembly audit of the 1980s-vintage double-glazed façade system showed that, despite structural deterioration and problems with south-facing glass exposing both artworks and visitors to excessive sunlight, it was possible to reuse 16 tons of original glass. Unrecyclable tinted, laminated, and large-scale glass units were processed into other building products. “Being able to reuse the glazing,” Judah notes, “can be challenging because of the existing coatings and framing.” Still, no glass from the building was sent to landfills, over 4.5 km of framework was reused (sparing 8.5 tons of aluminum), and improved solar control saved more than 70 tons of annual carbon emissions. Thermal and airtightness upgrades account for another 130 tons of carbon reduction. The refurbished museum is in the top 10% of energy-efficient buildings in the

U.K., a rarity among listed buildings, and has won multiple honors, including the 2022 Cultural and Leisure Project of the Year in the British Construction Industry Awards.

Arup’s material audits, Judah says, reveal the challenges of reusing products from different eras. Asbestos and lead pose familiar hazards; composite materials and those using adhesives are more challenging to repurpose than pure stone, wood, or uncoated glass. Although data collection from an asset-management perspective is progressing, she says, “We’re missing a significant amount of information from a circularity perspective.” Arup’s Circular Buildings Toolkit also helps apply metrics (many based on European standards and guidance) and can help expand the asset-management knowledge base for circular projects.

The U.S., in Judah’s experience, has been more successful integrating adaptive reuse into codes than material reuse; testing responsibilities and liability issues are challenges here. “If you’re reusing brick, you might have to test a substantial enough sample to prove that it’s structurally adequate,” she notes. Testing needs to be owned by the material supplier, and manufacturers need to determine whether markets for repurposed or new products can support the cost of testing. She looks for policy initiatives to link approvals to disassembly plans built into design, beginning with high-impact material categories (structural and façade) and inducing manufacturers to demonstrate how components can be repurposed.

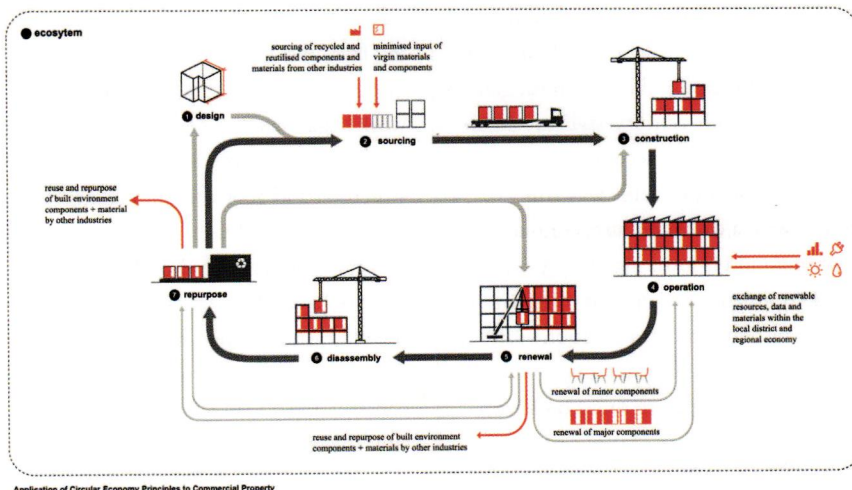
URBAN LABORATORIES OF DECONSTRUCTION

With a unanimous city council vote in 2019, aided by substantial private financing, Ithaca, NY, became the nation’s first city to embrace 100% decarbonization. “The U.S. system is fundamentally

different because local jurisdictions have much more regulatory influence,” Heisel notes, “all the way down to the single person.” This fragmentation can be either an attribute or a bug: “Ithaca, as a city of 100,000 people, can decide to decarbonize every single building in their jurisdiction, which is far more than any European city has tried to do so far,” he says. But the permitting process could differ dramatically in a town just a few miles away.

Other cities are moving in the same direction as Ithaca through deconstruction ordinances. In 2016, Portland, OR, became the first to implement one, linking demolition permits with salvage for reuse for houses and duplexes built in 1916 or earlier, then expanding coverage in 2020, moving the year-built threshold from 1916 to 1940. That same year, Palo Alto, CA, went further, mandating deconstruction for all buildings. The 2022 REcovering Baltimore’s Underutilized Inventory of Lots and Dwellings Act brought the movement to that city’s pre-1970 houses and government buildings. Pittsburgh lightened its landfill burden by mayoral executive order in 2021.

Though sprawling Texan cities are seldom first movers on environmental progress, San Antonio became a national leader with a deconstruction ordinance that took effect in October 2022, after four-and-a-half years of groundwork.

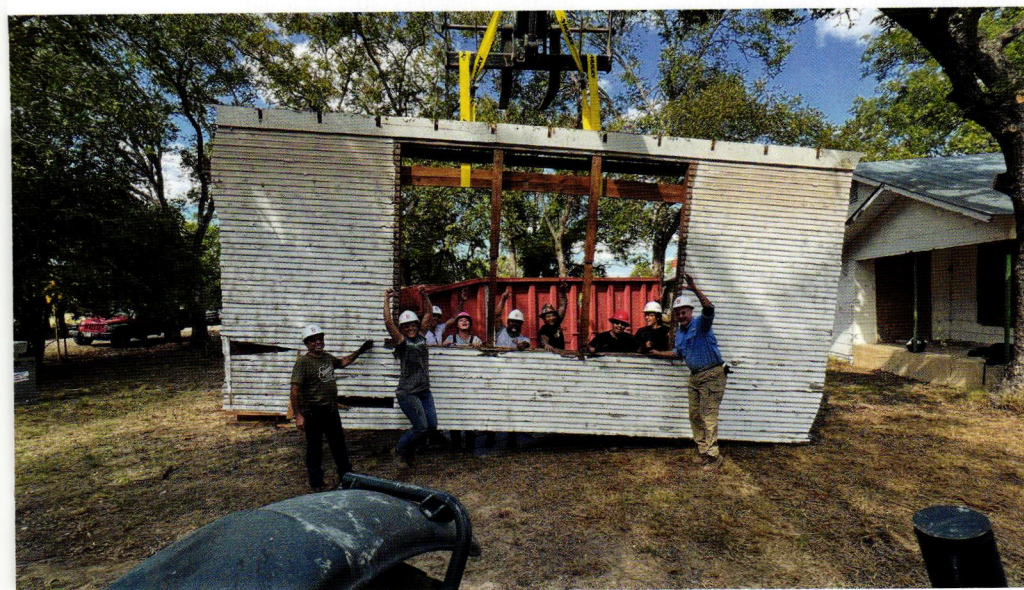


These “nonregulatory steps start shifting that conversation away from demolition and into deconstruction as a possibility,” says Deconstruction and Circular Economy Program Manager Stephanie Phillips of the city’s Office of Historic Preservation. “We tie this into an organ-donor analogy: a building may have reached the end of its life, but its parts and pieces can help extend the lives of dozens of other structures.”

Through contractor training and an intersectional community-outreach approach involving the fields of waste management, workforce development, cultural heritage, housing, and public health as well as design and construction, the program in its first year has

Above: A graphic showing the circular economy at work over the life of a commercial building.

Below: San Antonio is a national leader in deconstruction, training contractors to reroute and reuse materials from small-scale residential projects.



added 26 buildings to its project tracker (deconstructed, scheduled for deconstruction, or permitted) and persuaded two owners to convert from demolition to restoration. An associated Material Innovation Center receives building-material donations to reroute into the city’s affordable-housing projects and ensures that pre-1945 materials are used to repair buildings of a similar construction era, Phillips notes, “matching siding profiles, wood species, hardwood flooring, et

cetera, resulting in a longer-lasting, quality repair.” The program plans to add a Community Tool Library, making tools available on a pay-as-you-can basis.

Fast-growing, low-density San Antonio is currently the nation’s seventh largest city, differing from other major cities in its architectural profile. Its ordinance applies to small-scale residential (single-family to four-plex) with a build date of 1920 or older, soon to be extended to 1945 citywide and to 1960 in protected districts. “The key discussion we had with our advisory committee was what type of building stock should we target,” says Phillips. “We’re also going to have to build up a workforce to do this work, so we wanted to focus on San Antonio buildings that are the most demolished, which are pre-1960, single-family residential structures.” The regulation leaves younger buildings, with more complications in unbuilding (more glue, mastics, staples, and similar obstacles), for future expansion. Local demolition contractors have supported the regulation, she says, realizing that “deconstruction can be a new business

“ THE LANDFILL DOESN’T DESERVE THESE MATERIALS; OUR COMMUNITIES DO.”

Stephanie Phillips
San Antonio Office
of Historic Preservation

avenue for them. Because we’re in an office of historic preservation, we see deconstruction as a legacy trade: what we used to do before we invented all these monster machines. So we’re actually reverting back to the old way of unbuilding buildings. One of our general contractors says it really well: “The best way to learn how to build a good building is to unbuild one first.”

San Antonio’s experience suggests that communities can foster local buy-in to circular thinking through inclusion, consultation, and practical training before implementing mandates, particularly

in areas where green initiatives labeled as such attract pushback. A major development-advocacy group, Phillips reports, invited to the deconstruction-policy planning table in 2018, “ended up supporting our ordinance because we made it very clear that it’s not just about demolition versus deconstruction, landfilling versus saving materials,” but also a “conversation around public health, equity of access to materials, mitigating volatile supply-chain issues by needing access to virgin lumber, and realizing we were throwing away perfectly good reusable materials.”

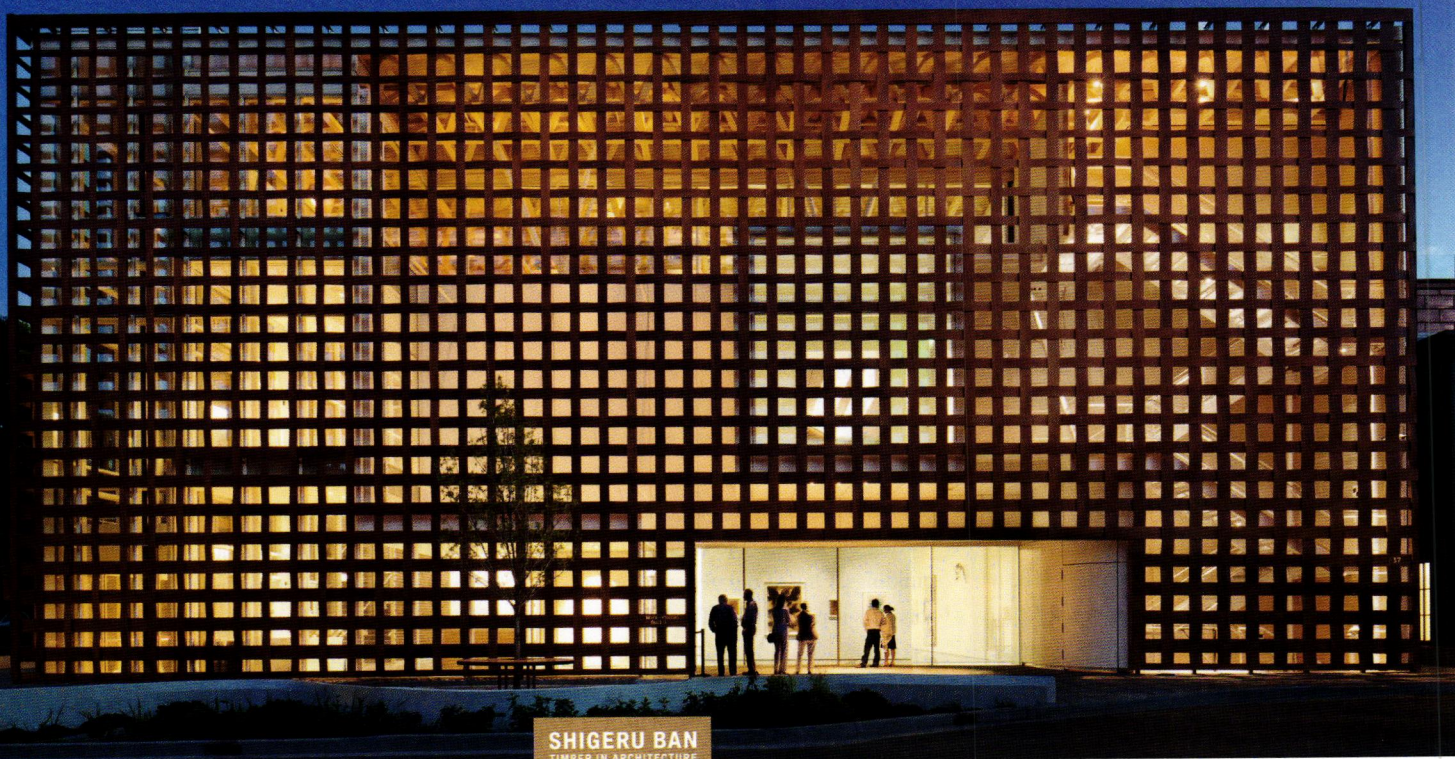
Phillips’s message that “the landfill doesn’t deserve these materials; our communities do” has resonated with San Antonians and is arguably applicable more broadly. Although New York City, despite its strongly carbon-conscious Local Laws, lacks a deconstruction ordinance, the concept is part of the architectural conversation here. (The AIA New York Chapter’s Civic Leadership Program panel Design for Deconstruction and the state Preservation League’s Deconstruction Summit are two salient examples, held a few days apart last December.) Any policy measure that could encourage this form of tangible respect for buildings at the end of their service lives would also be a creative application of Justice Louis Brandeis’s idea that state and local governments can be laboratories of democracy, the test beds for concepts whose time is at hand. ■



In San Antonio, building material donations are rerouted into the city’s affordable-housing projects, ensuring that pre-1945 materials are used to repair buildings of a similar construction era.

Lit Review

BY GIDEON FINK SHAPIRO

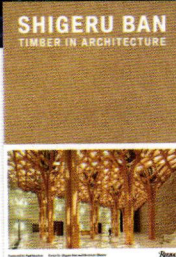


Shigeru Ban: Timber In Architecture

In a lecture at Japan Society, the architect discussed his new book and a life spent thinking about wood.

Shigeru Ban continues to shred expectations about what paper, wood, and other materials can and cannot do in architecture. Speaking at the Japan Society last winter to promote his new book, *Timber In Architecture*, Ban ran through his greatest hits and showed why his work defies blanket categories like “Japanese” and “wood buildings.”

More and more architects are working with mass timber these days, but



Shigeru Ban: Timber In Architecture

Edited by Laura Britton and Vittorio Lovato. Contributions by Shigeru Ban and Hermann Blumen. Rizzoli, 2022, 272pp.

Ban stands apart not only for his prodigious output—at 66 years old, with offices on three continents, he shows no signs of slowing down—but also in his yen for elegant structural expression. He has long shunned “complicated” steel joints or bracing, preferring to join wood members directly in legible patterns that recall handicrafts or the skilled carpentry that inspired him as a child. Simplicity in architecture usually requires doing extra work, and Ban’s success in maintaining his craftsmanly aesthetic while taking on increasingly large and technically complex commissions reflects his quiet determination, coupled with support from clients and collaborators, such as structural engineer Hermann Blumer. Among his latest achievements is the 508,337-square-foot Swatch/Omega Campus in Switzerland (2019), a three-building ensemble whose wood structural components were milled so precisely that they were tapped into place with rubber hammers, Ban said.

Ban earned his fame in part by designing inexpensive yet ingeniously humane, sustainable, temporary housing for people displaced by earthquakes and other disasters. Today, he said, members of his firm are erecting relief structures in Turkey, where a huge quake wreaked havoc last February. “The design

is improved,” he said, from previous iterations—in Turkey, Japan, India, and beyond—that typically consisted of a peaked, plastic roof atop water-resistant, paper-tube walls and a foundation of beer crates. Another of his signature relief innovations, a system of paper privacy screens for people sheltering in gyms and other huge halls, gained a new use during the COVID-19 pandemic: some hastily expanded hospital and quarantine facilities adopted the screens after deeming them effective in blocking the spread of the virus.

Although Ban, who began his career as an exhibition designer, embraces the fleeting nature of many of his projects, he challenges assumptions about longevity in architecture. “What is a temporary structure? What is a permanent structure?” he asked, observing that “permanent” buildings in New York are often torn down, while some of his “temporary” pavilions have far outlasted their intended service life. For example, his Paper Concert Hall (2011) in Italy and his Cardboard Cathedral (2013) in New Zealand are still standing—because, he says, they are valued by their communities. “A temporary building can become permanent if people love it,” he said.

Ban evidently feels a rivalry with Tadao Ando, whose name he mentioned several times, politely but pointedly. The two architects, despite their shared nationality and Pritzker honors, produce work with opposite sensibilities, and took different paths to architectural eminence. A student of architecture at



Clockwise from top left: Shigeru Ban's mass timber projects include the Aspen Art Museum in Colorado, Centre Pompidou-Metz in France, and the Swatch Headquarters in Biel, Switzerland.

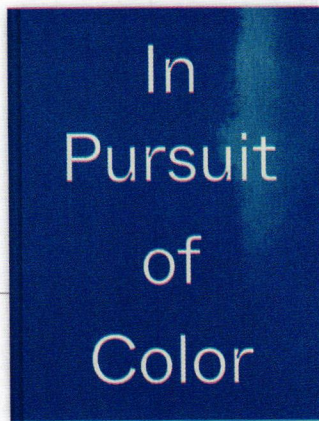
SCI-Arc and The Cooper Union, Ban won a competition in 2013 to take over the design of the Paris performing arts center known as La Seine Musicale, situated on a river island. After construction had already begun under a different owner and architect, Ban recalled, “The first thing I had to do was remove the piles made by Tadao Ando.”

Interviewed after his talk by author-curator Matilda McQuaid, Ban reiterated his disdain for the “commercialized” sustainable-industrial complex, as well as his respect for nature and efficient construction. “Simply, I do not like to waste things,” he said.

For a deeper analysis, I opened the handsome, 272-page book with a brown paper cover, and began reading Ban's introduction: “Why do I love wooden architecture? It is because of my childhood.” ■

Lit Review

BY THE EDITORS

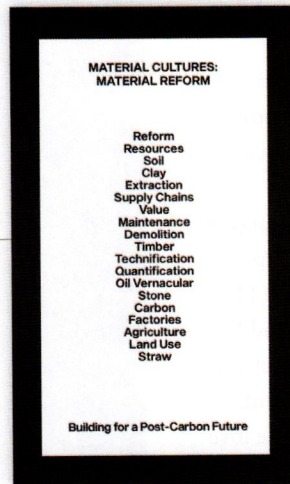


In Pursuit of Color

By Lauren MacDonald

Atelier Éditions, 2023, 239pp.

With *In Pursuit of Color: From Fungi to Fossil Fuels: Uncovering the Origins of the World's Most Famous Dyes*, anthropologist and textile artist Lauren MacDonald brings together historic techniques, archive photography, specimens, and present-day events to tell the histories of some of the world's most important dyestuffs. A 32-page supplement accompanies the volume, detailing practical applications and the chemistry behind dyeing processes. The pursuit of color has long spurred economic and social context, and the book explores dyeing's complex relationship to nature, our troubling ideas about progress, and our understanding of power and labor.

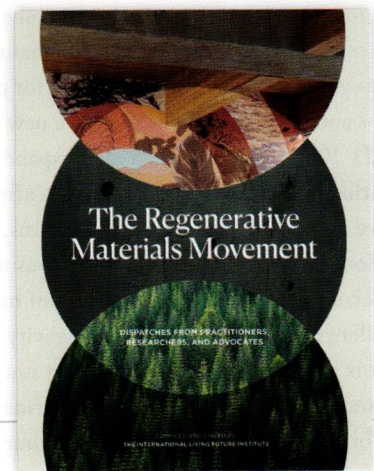


Material Cultures: Material Reform – Building for a Post-Carbon Future

Co-authored by Amica Dall

MACK, 2022, 144pp.

This book, the first by the design and research practice Material Cultures, assembles a series of short essays and conversations exploring the cultures, systems, and infrastructures that shape the architectural industry and the destructive ecologies it fosters. The building practices dominating contemporary architecture are rooted in the exploitation of people and the degradation of our landscapes. Through text and visuals, concepts and practice, Paloma Gormley, Summer Islam, and George Massoud explore how developing a direct relationship with materials can help us find new languages with the potential to supersede those we have inherited from a narrow lineage of authors. These discursive threads come together to form a vital sourcebook for rethinking our relationships to materials, land, and development, in all their crucial intersections.

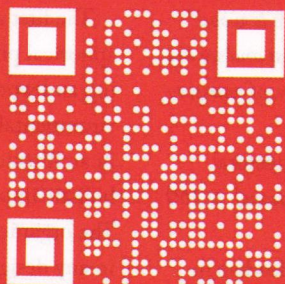


The Regenerative Materials Movement

International Living Future Institute/
ECOtone Publishing, 2023, 248pp.

The Regenerative Materials Movement: Dispatches from Practitioners, Researchers, and Advocates draws on the expertise of a diverse range of thought leaders across the industry who share their stories, experiences, research, revelations, and insights in a series of dispatches, which together help sketch a bold vision for overcoming the drawbacks of our current materials economy. Includes contributions from Robin Bass & Lauren Sparandara (Google); Gina Ciganik (Healthy Building Network); Kelly Alvarez Doran and James Kitchin (MASS Design); Alison Mears and Jonsara Ruth (Parsons School of Design's Healthy Materials Lab); Sharon Prince (Grace Farms); and many others.

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The Forest and the Trees: On Leadership

BY PETER MACKEITH, ASSOC. AIA

"Thus it is an instance of technê when we cut down a tree to make lumber for a house, or logs for a fire, or paper for a book. From these admittedly commonplace examples we may derive all the essential principles of technê: that it is conscious, willful, materially violent, and materially productive. Interestingly, the ancient Greek word most commonly used to mean 'matter' or 'material' is hule, whose first meaning is simply 'wood.' This word in its ambiguity represents a missing link between the natural and the artificial. It points simultaneously back towards trees and ahead towards matter, thus revealing the passage from one to the other. Wood, halfway from tree to raw material, is still recognizably natural and yet is, in the multiplicity of its uses, a metaphor for all that is malleable. Wood is not what the architect sees either firstly or finally. First there is the tree and finally there is the house. In the meantime, there is wood."

"This, then, is the core of human genius: to look at a forest and see not the trees but a village of houses or a fleet of ships...and then, of course, to materially realize one's vision."

—"Technê," Robert Meagher, *Perspecta: The Yale Architectural Journal* (1988, New York: Rizzoli International Publications), p. 160

Several years ago, during a workshop organized for leaders in architecture and design—both practitioners and educators—the participants attending were asked at the outset to draw or diagram their understandings of "leadership," as a means of introduction and as a prompt for further discussion. I drew an image of a forest.

Throughout my life, across the years, across geographies, I have walked in forests: in the fir forests of the Pacific Northwest, and amid the aspens of the lower Rockies; through the sloped forests of the Blue Ridge and the Appalachians; in the birch forests of Finland and the deep spruce forests of Slovenia and Austria; and now in the oak, hickory, and pine forests of Arkansas. In hindsight, and with the limited foresight I possess, I believe that while "the forest" has been a consistent context, an unacknowledged background and setting for life and work, it has also offered a steadily growing "mental map"—a way of understanding the world, being oriented in the world, and providing abstract and specific lessons in work and life.

I make no claim to originality of thought or proposition. My friend and colleague, the Finnish architect and educator Juhani Pallasmaa, has written often of "a forest mentality," one derived from one's own experience of residing in the forest, but also from living within an entire culture residing in the forest, for generations, even millennia. The deep psychological structures of our being in the world (our perceptions of space, material, color,

pattern, and proportion); our kinesthetic awareness of how we move through the world; and our valuation of what we make to use in the world, he argues, are profoundly affected by this sensibility.

For me, an educator in architecture and design, the proposition of "a forest mentality" has further ramifications for the essential work to be done in educating the next generation. If this moment is simultaneously a time of constrained or diminishing economic and environmental circumstances; a time of dynamic, expanding flows of people, products, finances, and information; and a time of intensifying struggles for racial and social justice, then the architects' and educators' tasks and responsibilities become problematic and vital. Amid these complex challenges, conceptual frameworks and guides for assessment, deliberation, and decision—for leadership, if you wish—possess great value. The proposition of "a forest mentality" as a useful, applicable conceptual framework for work in architectural education—and, by specific extension, for work focused on the architectural applications of mass timber and wood products—has value in at least three ways.

The first and primary value of the forest mentality is as a metaphorical proposition for a committed ethos of ecological thinking and working. By this I mean to assert not only the overt environmental agendas to be addressed, with ever greater urgency, in architecture and design, but also our need to comprehend the holistic implications of our choices in architecture and design. The organic, networked, interconnected relationships implicit in any design decision—certainly those addressing the complex challenges involved at any scale, from a spoon to a city—are best represented, in my view, by this image of a forest. Implicit in this assertion is the forest as an image of the interdisciplinary, collaborative, and interdependent education necessary for wise action within a complex context that includes the political, economic, and social processes of society. This is "ecological" thought and work at a grand scale, in the truest sense of the word "ecology": "the totality or pattern of relations between organisms and their environment; an often delicate or intricate system or complex." To live and work within the conceptual forest as an architect and designer, I propose, is to live and work within a creative ecology of thought, perception, and activity.

A second value of the forest mentality is as a metaphorical proposition for "the circular economy" in specific. Many have outlined the intellectual dimensions and practical applications of this important, even essential, approach to work in architecture and design, and our collective work in identifying the economic and environmental value of working across forestry, mass timber, and architecture is a direct demonstration of its potential. But here I want to suggest that the superlative refinement of that approach by economist Kate Raworth—her proposition of "the doughnut economy"—can best be represented spatially by the abstracted landscape of the forest. Raworth's two-dimensional concentric circular diagram is described as

"a twenty-first-century compass. Between its social foundation of human well-being and ecological ceiling of planetary pressure lies the safe and just space for humanity." In the spatial experience of the forest, the varying terrain of our movement and activity—"the social foundation of human well-being"—is sheltered by the foliage and canopy of the trees—"the ecological ceiling." The safe and just space for humanity, as she phrases it, lies in the space between the ground terrain and the forest canopy. To live and work within the conceptual forest as an architect and designer, I propose, is to live and work within the responsibilities and potentials of the in-between spaces of the forest, the space between the social terrain (foundation) and the ecological canopy (ceiling).

The third value of the forest mentality is as a proposition for our vision and imagination, for the wise exercise of human activity within and upon the forest, for the conversion of the forest to human use, and for our stewardship of the forest for future generations. This is "the core of human genius," which philosopher Robert Meagher refers to as that capacity for *technê*, for the application of imaginative vision, and the labor and technique to materially realize that vision. Wise students of architecture know that the ethos of *technê* is intrinsic to their self-identity; in fact, it is embedded in the very name of "archi-tect." The fundamental proposition here is that the imaginative vision is, at least in part, originally rooted and cultivated in a vision of the forest. Implicit in the assertion of *technê* and its origins in the forest, however, is that forest-centered vision is focused on more than immediate needs or desires. It is implicit that those who exercise it are doing so responsibly, with foresight and imaginative vision into the future, on behalf of others we may never meet, know, or live with contemporaneously. Historically, civilizations of the world have understood the forest to have both sacred and utilitarian character.

As an architect and a designer, I propose that to live and work within the conceptual forest is to live and work within the ethical landscape of our society and natural world, and to know deeply, with insight and foresight, the far-reaching responsibilities and compassionate qualities intrinsic to our profession. ■

Peter MacKeith, Assoc. AIA, has been the dean and professor of architecture at the Fay Jones School of Architecture and Design at the University of Arkansas since 2014. In that position, he's been advocating for a low-carbon design and construction culture, specifically in the use of mass timber and related wood products, as an agenda for education from within a public land-grant university. He is currently overseeing the completion of an \$80 million capital campaign for the school, and guiding the design and construction of the Anthony Timberlands Center for Design and Materials Innovation, a regional center for research and development of new wood products and approaches in sustainable construction materials. The project is being designed by Grafton Architects, the 2020 Pritzker Prize laureates.

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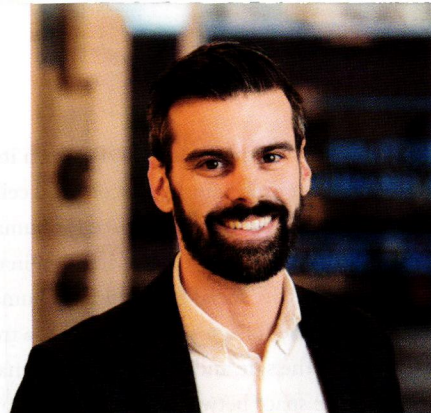
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20 Years and Still Growing

BY **JESSE LAZAR**, EXECUTIVE DIRECTOR,
AIANY/CENTER FOR ARCHITECTURE



"The opportunity for public outreach is great."

That was what 2003 AIA New York Chapter President George Miller, FAIA, told the *New York Times* for its March 2003 article about the Chapter's plans to open a brand-new Center for Architecture later that year.

That new Center, designed by Andrew Berman after a competition process, did open that fall—exactly 20 years ago. In the last two decades, Miller's words have certainly proven true, sometimes in unexpected ways, and the sentiment continues to guide the Center into its next era.

When construction on the Center began, Michael Bloomberg was in his first term as mayor, the city was still early in its recovery from 9/11, and there were nearly 500,000 fewer New Yorkers than today. AIANY had 3,200 members; today, we have 5,000. The growth in programming in our space is undeniable, with the Chapter's over two dozen program committees, our many partner organizations, and the Center's own events and exhibitions lighting up 536 LaGuardia Place almost daily.

The Center has seen other important changes, too. In 2015 its public-facing activities were consolidated into a 501c3 non-profit organization, governed by a Board of Trustees that collaborates closely with the AIANY Board of Directors. These organizations share leadership, staff, space, and values, but have unique missions, strengths,

I know how proud our community is of what we have built together at the Center for Architecture. As we move into the next two decades of the organization's life, I am excited about the ways we will grow our impact and broaden our public reach.

and approaches. The combination of these two entities is powerful, and we are still discovering new and exciting ways of elevating one another's complementary goals.

I know how proud our community is of what we have built together at the Center for Architecture. As we move into the next two decades of the organization's life, I am excited about the ways we will grow our impact and broaden our public reach. We will continue to be the vital gathering place in New York for architects and other design professionals to exchange ideas, while also connecting more and more people to the power of the built environment. We'll engage in new ways with communities that have not always felt included in architecture and design, and we'll keep offering innovative programs that bring together both those who create and those who experience architecture. To that end, we are excited about new partnerships we are pursuing through our education program; closer and more collaborative relationships with AIA members and leaders in Brooklyn, Queens, the Bronx, and Staten Island; the Center for Architecture Lab program, which will open an exhibition in November; and many more alliances to come.

Thank you for continuing to support and believe in what the Center for Architecture can do and be for the profession, for the public, and for New York City. ■

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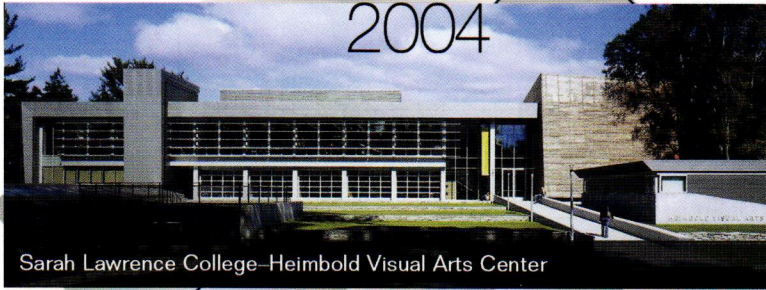
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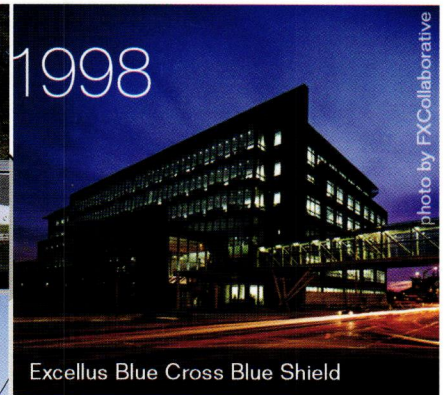
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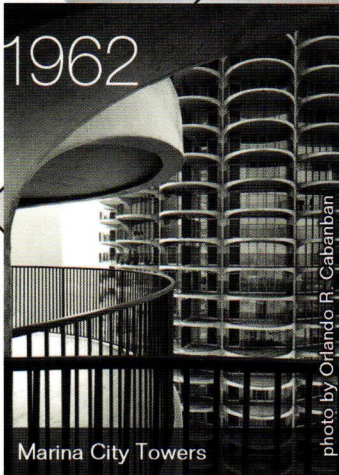
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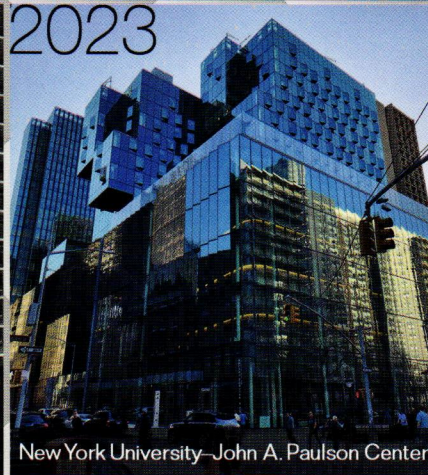
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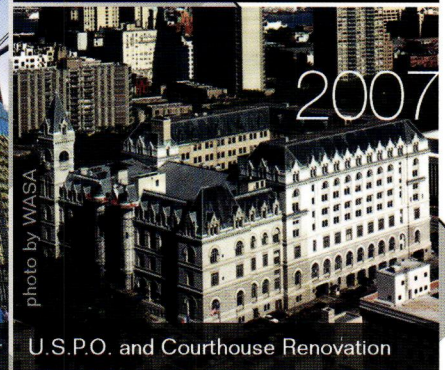
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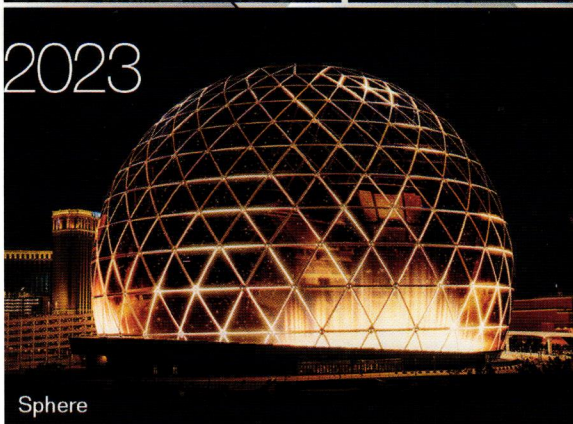
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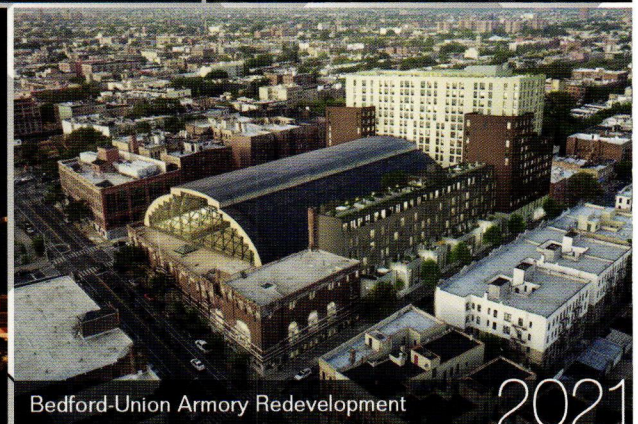


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