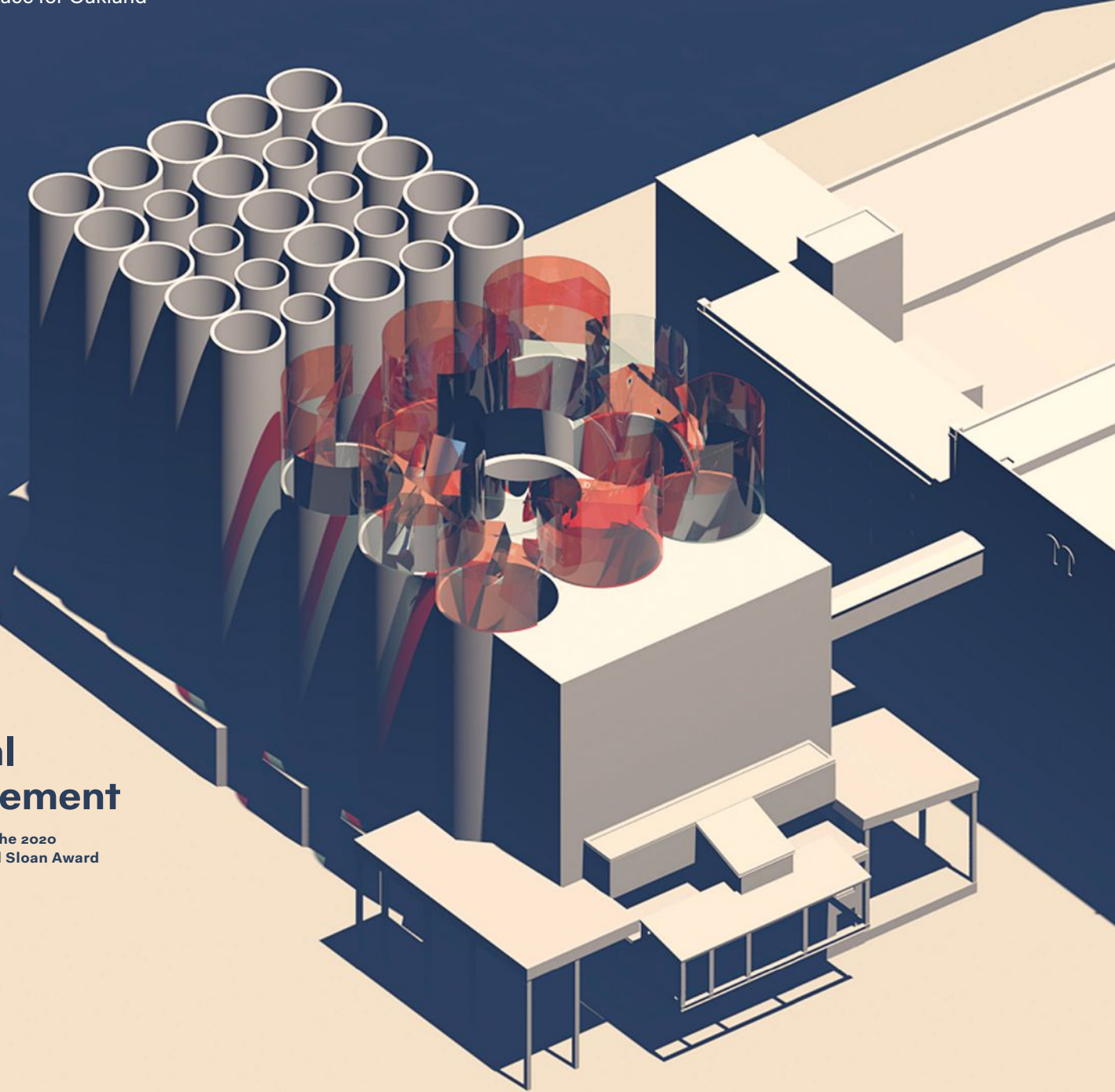


Mabel O. Wilson on Jefferson's Capitol
Design-Minded Gift Ideas
Lighting for the Home Office
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Critical Engagement

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Shown at left: ST-2469 Water Closet with CX-8158 Flushometer in Graphite, Sloan® XLERATOR® EHD-501 Hand Dryer in Graphite, Designer Series™ DSG-83000 Gradient Sink with laminated cabinet-style vertical enclosure, BASYS® EFX-250 Faucet and ESD-500 Soap Dispenser in Graphite, SU-7419 Designer Urinal with CX-8198 Flushometer in Graphite



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Mastering the Convergence of Biophilic and Resimercial Design

Wood ceiling applications present a wealth of on-trend design opportunities.

Has the need for biophilic design ever been greater?

In pre-pandemic times it was estimated that we already spent 90% of our time indoors. Today? It's probably north of that. Small wonder that so much design thought is given to daylighting, plant life, natural materials, and other ways to enhance indoor space with nature.

Evidence abounds that workplaces that incorporate biophilic design return higher levels of staff productivity and engagement. That, combined with the growing trend of resimercial office design challenges architects and designers to incorporate warmth into a work space.

A good place to start: the ceiling. Today, a revolution in ceiling design brings the natural appeal and beauty of wood to ceiling tiles, grilles, planks, panels, matrices, beams, baffles, and canopies. You name the wood species, finish, and texture. Ceilings never looked so good.

New Design Options

Standing at the intersection of this material and design transformation is CertainTeed Architectural's Jim Church. As the sales manager for Decoustics, a leading name in high-performance acoustical ceiling panels, wall panels, and systems, Church has a unique perspective on rapidly evolving ceiling design.

"The ceiling is a major focal point. The days of flat, static ceilings are giving way to lively three-dimensional effects. Architects are bringing a new, more sophisticated, and nature-based design vocabulary to ceiling applications without sacrificing acoustical requirements," Church says.

Signature Focus

Firms like Gensler, Perkins and Will, Pelli Clarke Pelli Architects, NAC Architecture, SmithGroup, and RMTA, among others, have long embraced wood to create signature architectural features.

Church says that "managing the reality of natural materials" is an important consideration throughout the design and specification process. "Rendering a design concept is often photo-realistic today. But is it fair to compare the natural variations in a material like wood to a computer-generated image? Probably not."

Clear Vision

"You're dealing with veneers, coatings, finishes, colors, budget, FSC certification, installation, delivery schedules, veneer cuts, fire ratings, and, of course, acoustic



performance. There are many variables. The key is to recognize that and start the design and specification conversation early," Church says. "There are many ways to achieve a vision."

For example, consider how wood effectively manages acoustic requirements. One technique uses CNC technology to laser-perforate wood with .55-millimeter holes, helping absorb sound waves. With nearly any acoustic preparation you implement, even large holes or grooves, the beauty of wood always survives. "People look beyond acoustical augmentation," Church says.

Speed & Certainty

Church's colleague, Robert Hartogsveld, a business development manager for CertainTeed Architectural Products, offers one more tip when specifying a biophilic-friendly ceiling: "Architects want answers fast," he says. "You may know your budget, project requirements, and design. What are your options? Team up with a company that can advise you with speed and confidence. You may be pleasantly surprised by the result."

Learn more about how the natural warmth and beauty of a wood ceiling can enhance your next project at [CertainTeed.com/Wood-Ceilings](https://www.certainteed.com/Wood-Ceilings).



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Below, left: *Rain Harvest House*, designed by Robert Hutchison Architecture; photo by Laia Ruis Sola.

Below, right: *Towards an Archaeology of the Future*, City College of New York (How It Came About, by Kari Kleinmann)

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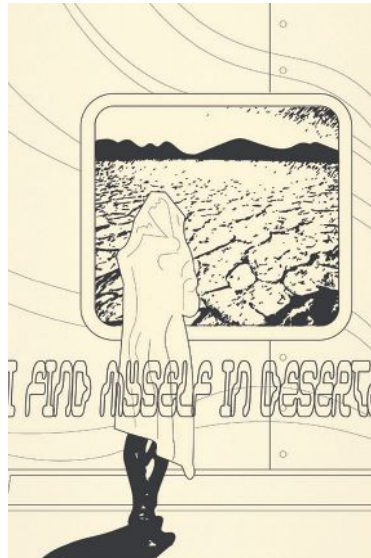
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Boys & Girls Club of Harlem | Dattner Architects | New York, NY



After 30 years of vacancy, Public School 186 was on its last leg. Built in 1903, the school was known for its Italian Renaissance Revival architecture and needed to be preserved for listing on the National Register of Historic Places. The Boys & Girls Club of Harlem called upon owner Dattner Architects and the Pella Architectural Solutions team to save the historical landmark while adding the innovation and performance of a new build.



JARON VOS
Manager, Architectural Solutions

INNOVATING SOLUTIONS

“Preserving history is one of our greatest passions. So when Dattner asked if it was possible to give these windows a performance upgrade while maintaining historical accuracy, we got excited knowing our products offered the solution,” explained Jaron Vos, Manager of Architectural Solutions at Pella.

Original photographs, on-site trim remnants and extant school drawings helped the team envision and recreate the building’s period look while they added a few upgrades. Pella® Architect Series® aluminum-clad wood products – with custom trim – met the criteria for historical accuracy while still delivering low-maintenance exteriors and other modern-day innovations.

RECREATING HISTORY

One of the more complicated projects was recreating the building’s fourth-floor windows. They had curve-top exterior openings and rectangular-top interior openings, requiring a special outside-to-inside transition. The windows were monumental in size, with some

as large as 5' wide by 10' high, making a complicated task even more challenging. Pella created new custom-designed aluminum extrusions for the vertical and horizontal mullions to go between and around windows. This solution matched the original wood trim while adding a new level of durability. Acoustics were addressed with a unique glazing assembly and glass panes of varying thicknesses for better sound transmission resistance.

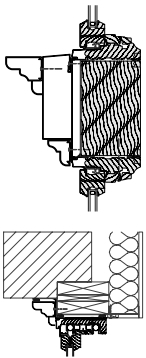
EXPERTISE THAT DELIVERS

The insights and innovation brought to the table by Pella experts made this project possible. And after four years, Public School 186 was transformed from a run-down building to beautiful, affordable housing and headquarters for the Boys & Girls Club of Harlem.

“It was incredibly rewarding taking fragments of history and bringing it back to life with innovations that will stand proud for generations,” said Vos.

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- Aluminum-clad wood
- Curve-top/rectangular-top windows
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Preserving the past, building the future.

As Public School 186 in Harlem, New York, eclipsed 30 years of abandonment, its iconic architecture was in serious jeopardy. Dattner Architects and the Pella Architectural Solutions team worked together to bring new life to the building with custom solutions for complicated needs. Using old photos and architectural remnants found inside, Pella preserved the historical accuracy while adding modern innovations and durability.

FROM REMNANTS TO RESTORATION.



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Pictured: Custom acoustic ceiling & wall elements at Amicus Therapeutics, Philadelphia, PA, a collaboration with CRB, installed by Philadelphia D & M

MEET SAN DIEGO'S AWARD-WINNING WORKFORCE HOUSING SOLUTION

Who says you have to sacrifice design for reduced rents? Discover Jonathan Segal's secret.



Photo Credit: Matthew Segal AIA

To understand the evolving direction of housing in San Diego, Calif., just follow the hyphenated career of Jonathan Segal, FAIA.

The lauded architect is a one-person band on local mixed-use housing projects, operating as investor-developer-owner-general contractor-property manager and, yes, architect. "It eliminates drama. There's never a change order on our projects," Segal says.

Take his latest project, the 2020 Builder's Choice & Custom Home Design Awards "Project of the Year," an eight-story, 27,000-square-foot mixed-use development. Dubbed The Continental, it is a self-described "demonstration project" that now reigns as one of San Diego's first transit-oriented, micro-unit apartment communities. The 42 studio units average 380-square-feet, plus a balcony.

WORKFORCE HOUSING

The Continental's big amenity? A killer location. Residents walk out the front door into the lively heart of the city's Little Italy district. "I asked, 'What can

I do to make living here less expensive?'" Segal recalls. While the units don't qualify as affordable housing, they are a workforce housing option with rents falling 30% below competing properties.

Segal addresses a value-focused approach in several ways:

- **Transit.** "Parking doesn't work everywhere in San Diego. Our transit premise lets residents apply the \$600 they would have spent on a vehicle to other priorities. The issue in California isn't affordable housing. It's housing, period. It's why we look to reduce rents with studio concepts," he says.
- **Amenities.** "Multifamily developers know that only about 20% of residents ever use a pool, community room, or gym. Why add things that drive up costs that only a few will use?" Segal says.
- **Ownership Mentality.** Few things demonstrate that philosophy better than the 3,000-square-foot single-family residence tucked in the corner of The Continental. Segal's architect son, co-designer, and current Continental property manager, Matthew, and his wife carry on the family tradition of living over the company store. "I've built six homes for myself. Each one had the living quarters over the firm's offices below," Segal says. That personal dimension is also reflected in the building's aesthetic and construction systems, starting with concrete, a building material Segal is passionate about.

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STRUCTURAL LIGHTNESS

The post-tensioned concrete structure was erected without an onsite crane, using a mobile crane instead. "Post-tensioning lightens the structure, important in a seismic zone. Lightness helps with lateral stability and the foundations," he says.

Look closely at the structure's south façade. The sculptural pattern may remind you of another design effect. "The cantilevered concrete is derivative of a 1958 Buick grill. It's a classic pattern free of the superfluous." A design lesson worthy of the Project of the Year award.

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The Rules: What's New in IECC 2021

TEXT BY TERRI PETERS

By the end of this year, the latest edition of the International Energy Conservation Code will be available. Updated every three years, the IECC is designed to assist state and local governments to regulate energy use by providing consistent approaches and metrics nationwide and by standardizing performance targets for new commercial and residential buildings.

IECC 2021 contains several updates salient to architects. The International Code Council estimates that the new code requires buildings to be about 10% more energy efficient than the previous edition. New Buildings Institute director of codes Kim Cheslak says it also offers more flexibility and clarifies implementation and performance metrics.

The new edition incorporates research by Pacific Northwest National Laboratory that weighs different energy efficiency measures relative to specific climate zone, occupancy, and building type. Previously, the IECC weighed efficiency measures equally. "In the prescriptive path, a project could get equal credit for increased domestic hot water efficiency in an office building, where it has nominal impact, or in a residential building, where it has significant impact," explains Anica Landreneau, ASSOC. AIA, HOK's director of sustainability, AIA Codes

and Standards committee chair, and a voting member of the IECC 2021 update. "For an office building, a measure such as increased efficiency of lighting controls would [better keep] with the intentions of the code."

IECC 2021 also specifies mandatory plug load controls in commercial buildings to reduce energy use and waste. "As buildings become more efficient and higher performing ... occupant behavior and plug loads can account for 30% or 40% of demand," Landreneau says. (ASHRAE 90.1 has mandated controls since 2010.)

Requiring electric vehicle infrastructure and charging stations was considered for some time. Landreneau says that language in IECC 2018 about supporting a both efficient and effective use of energy motivated this change: Research has shown that installing electric vehicle infrastructure upfront is more cost-effective than retrofitting existing buildings. "As we rethink energy and further electrification," she says, "we need to think about storage and how to use batteries as part of our building infrastructure." However, following appeals by the American Gas Association, the American Public Gas Association, the National Association of Home Builders, and the Leading Builders of America, the ICC's board of directors decided the change was

outside the IECC's current scope and it was not included in the new code.

The appendices of IECC 2021 include additional voluntary guidelines, including the Zero Code Renewable Energy Appendix. Developed with several green building organizations, such as Architecture 2030, and submitted for consideration into the IECC by AIA, the Zero Code requires new commercial, institutional, and mid- to high-rise residential buildings to install or procure enough renewable energy to achieve zero-net carbon. "[The Zero Code] could be adopted as a stretch code [or] could be used to overwrite the base code," Cheslak says. "It may get picked up as an incentive structure through any number of policies, [such as a] utility program [or] zoning incentives."

IECC 2021 faces at least one significant challenge: adoption by jurisdictions. "Since each state sets its own process for adoption," Cheslak says, "there are 51 different adoption processes, all happening on their own schedules and cycles."

Still, Landreneau believes the new IECC's "shift to more outcome-based codes" is a step in the right direction for increasing the energy efficiency of buildings. Then every few years, she says, owners and architects will be "ready for incremental performance requirement increases."

DE	18	18
DC [^]	--	15+
FL [^]	15	15+
GA [^]	15	15+
HI [*]	HR	HR
ID	15	12+
IL	18	18+
IN	--	18+
IA	12	12+
KS	HR	HR
KY	12	09
LA	--	09
ME	09	09
MD	18	18
MA [^]	15	15+
MI [^]	15	15+
MN [^]	18	12+
MS	--	--
MO	HR	HR
MT	12	12+
NE	18	18
NV	18	18+
NH	15	15+
NJ	--	18+
NM	09	09
NY [^]	18	18+
NC [^]	15	15+
ND	HR	HR
OH	12	18+
OK	06	09+
OR	--	18
PA	15	15+
RI [^]	15	15+
SC	09	09
SD	HR	HR
TN	12	09+
TX	15	15
UT	18	15+
VT [^]	18	18+
VA	15	15+
WA	--	18
WV	--	09
WI [^]	15	09+
WY	HR	HR

State IECC adoption equivalent as of Sept. 30. Number indicates edition year (e.g., 09 is IECC 2009).

COMMERCIAL
RESIDENTIAL

AL	--	15+
AK	--	--
AZ [*]	HR	HR
AR	09	09+
CA	--	19
CO	HR	HR
CT	15	15+

* A review of the codes in place in jurisdictions across these states indicates that 86% (Hawaii) and 82% (Arizona) of the population is covered by codes at this level.

[^] When an amendment impacting energy efficiency could be quantified using DOE Prototype Building Models, they were captured in the analysis.

+ With amendments -- May indicate adoption of ASHRAE 90.1 or a state code instead HR Home rule

SOURCE: U.S. DEPARTMENT OF ENERGY AND PACIFIC NORTHWEST NATIONAL LABORATORY

> To read more of *The Rules*, a monthly series covering important regulations in a clear manner, visit bit.ly/ARTheRules.

Gift Guide: Sparks of Joy for 2020

TEXT BY WANDA LAU

This year has relentlessly challenged designers, firms, and families in every way imaginable. Take a respite from reality by sending someone you appreciate—even the person in the mirror—a gift that brings them a slice of happiness. Here are 11 picks curated from the web browsing histories of ARCHITECT editors and contributors.

Blockitecture Garden City

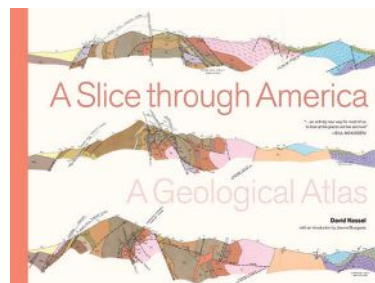
Mega Set, \$75

A whimsical take on massing models, these architectural building blocks come in array of hexagonal, cylindrical, and conical shapes. Stack, cantilever, and array them to form towers, pavilions, or Stefano Boeri's Forest City. Made of New Zealand pine and finished with water-based paint. For ages 6+. areaware.com —EVELYN LEE, AIA



Clam Shell Lamp, \$1,450

From where else but Brooklyn, N.Y., this handmade, molded plastic, bivalve mollusk-inspired luminaire by Charlap Hyman & Herrero and Green River Project can be a hanging conversation piece or casually appear to wash up on your living room floor. 7.5" tall by 17" wide and 21.5" deep. ch-herrero.com —IAN VOLNER



A Slice through America:

A Geological Atlas, \$60

In 50 plates, New York-based artist David Kassel takes us across the continent with an almost fetishistic devotion to the cross-sectional presentation of topography. A guaranteed crowd-pleaser among geology nerds and designers looking for inspiration from the graphical depiction of our planet's structure. papress.com —EDWARD KEEGAN, AIA



Foil Stamped Notecards, \$34

Put that architectural lettering to use by sending a handwritten note. These 4"-by-6" cards feature double-thick paper, gold edging, black foil-stamping, and bold graphics by Los Angeles studio Block Shop. Each set of six contains three patterns. Maybe keep one each for desk art. blockshoptextiles.com —GIDEON FINK SHAPIRO

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Support organizations that are endeavoring to make architecture more equitable, such as the National Organization of Minority Architects, Architects Foundation, and Colloqate.

> See many more gift ideas for architects and the design-minded at bit.ly/ARgifts20.

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Generative Pen Drawings, \$65

Brooklyn, N.Y.-based trained architect-turned-software developer Andrew Heumann creates 9"-by-12" prints on acid-free paper by coding his desired composition in Grasshopper and then deploying the open-source app Inkscape to control his AxiDraw pen plotter. shop.andrewheumann.com —DANIEL DAVIS



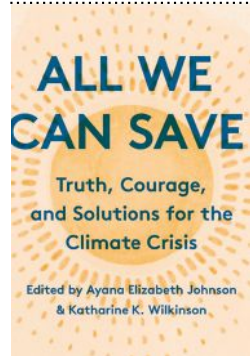
Pen Type-B, \$160

Precision-machined with a subtle flat face to prevent rolling, this minimalist pen offers a satisfying pop when pulled from its sleeve and descends slowly back inside like a piston. It comes with a brass, titanium (shown), or black Cerakote-coated titanium sleeve and black Pilot Hi-Tec-C 0.3mm cartridge. cwandt.com —MICHAEL CATON, AIA



**Ruth Asawa Forever Stamps,
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The sculptor (1926–2013) faced more adversity than most of us will ever know, yet still found enough beauty in the world to inspire her art, using wire to generate space and ethereal forms. 10 designs per sheet. store.usps.com —KATIE GERFEN



All We Can Save, \$29

Save a loved one from doomscrolling with this collection of essays and poems from 40-plus leaders in climate action. The contributors—all women—include Scape founder Kate Orff and Mott MacDonald architect Amanda Sturgeon, FAIA. allwecansave.earth —LINDSEY RASMUSSEN

Stackton Credenza, approximately \$4,400

Calgary, Canada-based AdrianMartinus Design studio repurposes broken skateboards into everything from earrings (\$17) to furniture pieces, such as this solid walnut credenza with sliding tambour doors. Custom sizes available. adrianmartinus.com —WANDA LAU



Nix Pro 2 Color Sensor, \$349

For someone still toting fan decks and swatch books, this ping-pong ball-sized gadget can find a match for any hue in its library of 200,000+ paint colors from brands worldwide. Nix also offers lower- and higher-end color sensors. nixsensor.com —BLAINE BROWNELL, FAIA



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CarbonPositive: Reset the Carbon Budget Timeline

TEXT BY EDWARD MAZRIA, FAIA

In 2018, the United Nations' Intergovernmental Panel on Climate Change, a collection of the world's leading climate scientists, issued a landmark report that took stock of the differences in impacts between a 1.5°C global warming limit and a 2°C limit—in other words, what would happen if we avert a half degree in the rise of average temperatures. The report also contained global CO₂ emission budgets for meeting these thresholds and their probabilities.

The panel found that limiting the rise to 1.5°C could stave off dramatic escalations in the impacts of climate change (see sidebar for examples).

The IPCC has stated that the global carbon budget, or the total amount of CO₂ that can be released into the atmosphere while maintaining a 67% probability of limiting warming to 1.5°C, is (as of Jan. 1, 2020) about 340 GtCO₂. To meet this budget, we have to reduce global CO₂ emissions by 65% by 2030 and completely phase out CO₂ emissions by 2040.

The good news is, if we act quickly and responsibly, we can stay within the 1.5°C budget. We have all the tools, policies, strategies, products, and affordable renewable energy needed to do so as outlined in the International Energy Agency's "World Energy Outlook 2020," which tracks energy production and consumption worldwide. Such strategies are also available in the recorded sessions from the CarbonPositive Reset! 1.5°C Global

Escalating Impacts if Global Temperatures Increase 2°C, Instead of 1.5°C

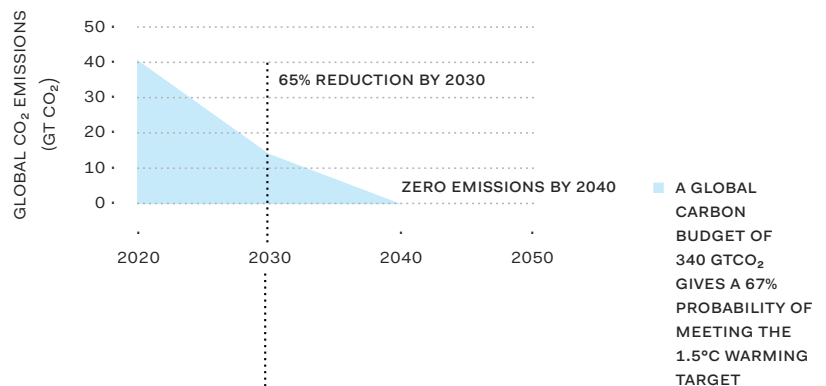
2.6 times more people, or 37% of the world's population, will be exposed to severe heat at least once in five years

Plants and vertebrates (mammals, birds, reptiles, amphibians, and fish) will lose twice as much habitat as they would at only 1.5°C of warming; insects would lose 3 times as much

The decline of fisheries' global annual catch will double from 1.65 million tons to 3.3 million tons

The rate of sea-level rise will increase 30% by 2100

Global Carbon Budget to Meet the Paris Agreement's 1.5°C Warming Target



Teach-In, Architecture 2030's three-day virtual event, which saw thousands of professionals—including architects, planners, engineers, educators, developers, manufacturers, and policymakers—from around the world participate. Ample evidence, actions, and proven strategies from the Teach-In illustrate the feasibility of meeting the 1.5°C budget.

Today, many governments, industries, businesses, organizations, and even U.N. affiliates are still using outdated targets and timelines—many times unintentionally. This must stop. Erroneous claims of meeting the 1.5°C

budget only ensure that the world will fail to avert the worst effects of climate change.

How do we rectify this? The U.N.'s Framework Convention on Climate Change must update and publicly post the 1.5°C carbon budget annually and revise targets and dates when appropriate. Architecture 2030 has sent an open letter to the UNFCCC Secretariat urging it to do so, and we encourage all organizations to do the same. By working together to meet the IPCC's 1.5°C global carbon budget, we can prevent the escalating impacts of climate change.



> To see the recorded sessions from the Architecture 2030 Teach-In that occurred this past September, visit carbon-positive.org.



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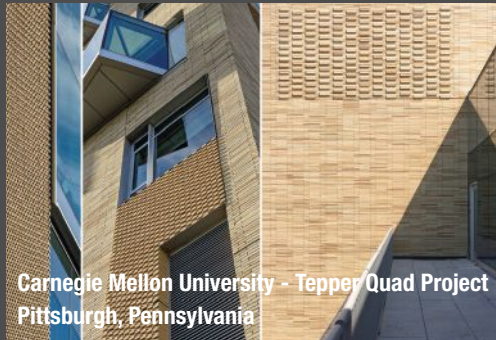
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Architectural Lighting: Wellness and Productivity at Home

TEXT BY MURRYE BERNARD, AIA

Prior to the pandemic, Rachel Fitzgerald, a senior lighting designer in Stantec's Denver office, was "never a work-from-home person." She enjoyed the chance encounters and collaborative nature of working in an office. At the onset of the lockdown in March, she worked from a desk in the corner of her guest bedroom-cum-exercise room. This arrangement lasted only a few weeks before she took out the bed, purchased a larger desk, and embarked on lighting upgrades: removing curtains to maximize daylight; repainting walls to a brighter, lighter color; and adding a new light ledge to provide soft, diffuse illumination above her work surface.

Fitzgerald's experience likely resonates with anyone who is grappling

with new routines and working styles while carving out spaces at home to accommodate it all. But by applying best practices from commercial lighting to the residential realm, you can achieve a lighting scheme that can improve not only productivity, but also your mental and physical health.

Daylighting and Circadian Rhythm

Exposure to daylight regulates our circadian rhythm, which is key to our health and well-being. Circadian lighting research and recent technological developments have focused on commercial spaces, where many of us spent the majority of our waking hours prior to the pandemic. But these lighting principles also apply when you're working at home. The

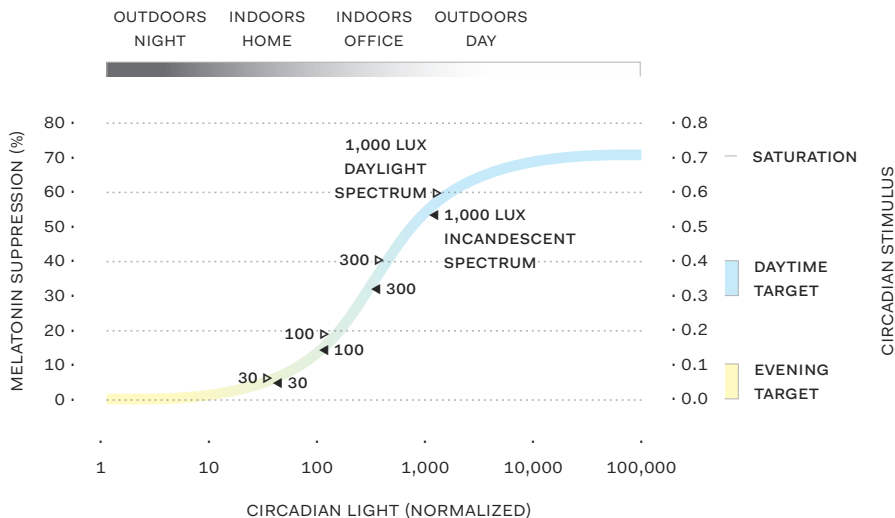
Lighting Research Center at Rensselaer Polytechnic Institute advises that people should have exposure to bright light in the morning and should take a 30-minute walk or run outside at the same time every morning.

During working hours, individuals should face a window and open the curtains or shades to maximize daylight. "Get a lot of bright light every day, especially every morning," advises former LRC director Mariana Figueiro, who was recently appointed director of Rutgers University's Center for Healthy Aging at the Institute for Health and chief of the new Division of Sleep and Circadian Medicine at Rutgers Robert Wood Johnson Medical School.

Ideally, work areas will receive 60 to 80 foot-candles—more than other rooms in the home. Multiply the square footage of your workspace by the desired number of foot-candles to determine the number of lumens required. For example, a 100-square-foot space should get 6,000 to 8,000 lumens total. Then look for light sources with color temperatures between 3000K and 3500K. Investing in a system with dimming capabilities will enable you to control and adjust electric light levels in response to fluctuating natural light throughout the day.

In the evening, Figueiro suggests switching to warmer-toned, low-level lighting. This not only signals a transition from the workday to personal time, but it also helps gear your body down for sleep. She also recommends turning off screens one

Circadian Stimulus Levels at Different Photopic Illuminance Levels



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Architectural Lighting: Wellness and Productivity at Home

to two hours before bedtime. These practices can help reduce depression and anxiety and boost the immune system—basically everything we need right now.

Electric Lighting Strategies

Access to daylight is not equal. Many of us reside in small apartments or cramped spaces with few windows. In the absence of adequate daylight, add more fixtures—and then a few more. If you previously had only one fixture near your home desk, Figueiro suggests adding three more. The goal is to achieve layers of lighting: general, task, and natural.

General lighting typically comes from an overhead fixture that casts diffused, uniform light in multiple directions. Task lighting casts localized light on work surfaces, but it can also cause glare. Fitzgerald, a fan of indirect light, suggests aiming task fixtures at the wall and ceiling. For residential applications, her “go-to recommendation” is the Philips Hue line of products. “They are widely available ... and easy to install,” she says. “You can add switches or use the app to control [the fixtures].”

To alleviate eyestrain, she emphasizes placing a desk in a location that offers options for both the near and far fields of view. “Just as we need to get up and stretch from time to time, we need to be able to look out and see something distant to give our eyes a break,” she says. This can mean wall art or a view through a window.



Designed by Stantec, Lakehouse in Denver integrates daylight and electric light.

Best Practices

Lighting designers should consider all the ways “in which lighting interacts in a space, taking into account reflectance values and surface finishes, and even the tone of a painted surface,” Fitzgerald says. For Lakehouse, a multifamily residential development in Denver that opened at the start of the pandemic, Stantec’s design team focused on “evaluating daylight and right-to-light concepts—getting good usable daylight into regularly occupied spaces,” Fitzgerald says. The project has achieved pre-certification from the International WELL Building Institute.

Anticipating a future in which people continue to work from home, Stantec is exploring a model for high-performance, affordable housing that accommodates remote work. Rather than assuming the occupant can work from a dining table or spare bedroom, the firm is examining how to create a dedicated workspace within a small footprint. This may take the form of a built-in counter in a nook equipped with lighting on par with commercial products to promote productivity.

Lights, Camera ...

Let’s be honest: During this time of increased remote work, the most important function of lighting is to make us look good on video calls. According to Jennifer Brons, director of design demonstrations

at LRC, first you should light your face, which means facing a window or aiming a fixture toward your face. Second, avoid harsh overhead light, which can emphasize facial and skin imperfections. Third, turn off fixtures behind you that are visible on camera.

Diffuse light acts like a skin-perfecting filter. Many fixtures offer built-in diffusers, such as lamps with translucent shades or torchieres that cast light onto the walls and ceiling. If your work-from-home space receives too much daylight, add light-colored, translucent drapes or shades to diffuse it or move farther from the window. Be sure to balance daylight with electric light sources to fill in any shadows.

Figueiro predicts the future of lighting in both commercial and residential environments will include brighter spaces with significantly more daylight and operable windows. She anticipates at least 350 lux at eye level (metered facing straight, perpendicular to the floor). “That is generally about three to four times more light than one normally gets at home. Use indirect lighting or any portable lights that deliver light at the eye [level].” But watch out for glare, she cautions.

“Brighter spaces tend to feel like they are healthier,” Figueiro says. “They convey the perception of health and cleanliness.” But more than that, good lighting can improve our waking and working hours, wherever we are spending them.



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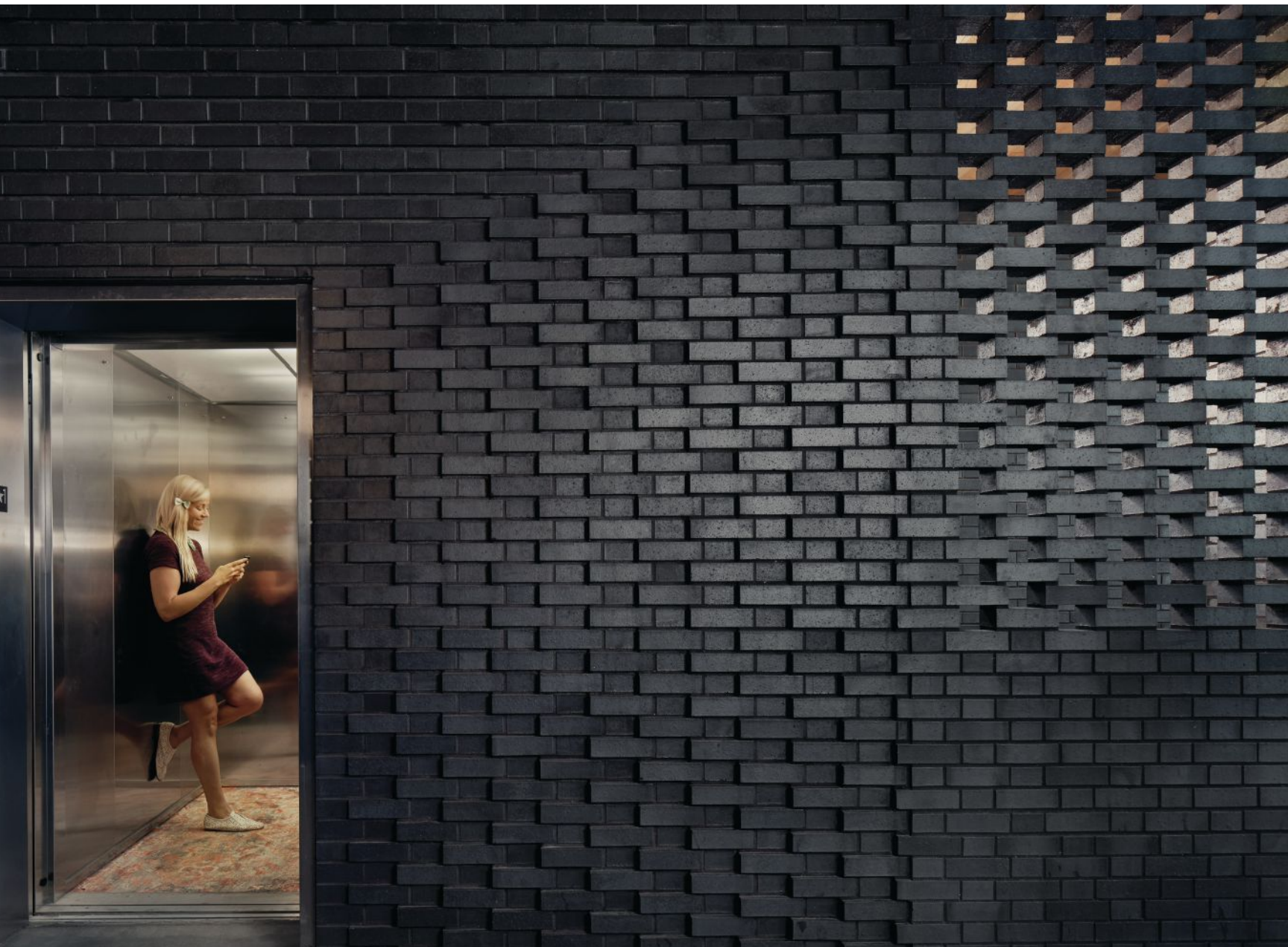
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Opinion: Diversity Initiatives Require Initiative

TEXT BY NATASHA ESPADA, AIA



To truly increase diversity and inclusion in the architecture profession, we must create a stronger pipeline and change the culture of architectural education. Many young people from underprivileged backgrounds don't see architecture as a career choice; the fact that architecture is rarely taught in K-12 schools doesn't help.

Several years ago, I attended a career day at a bilingual Boston public high school serving a predominantly Latinx population. Most students had never met an architect before. Their questions and concerns centered on how many years of college an architectural degree requires. I, a Puerto Rican, described the role of architects and presented my work in Spanish. Still, architecture as a career seemed unattainable and the students lost interest.

Though touring a building under construction or visiting a bustling design firm may make an architectural career more tangible, high school may be too late to introduce students to design. Introducing elementary school students to architecture, design, and drafting might be better—as would connecting middle and high school students to BIPOC professionals and mentors who could review their portfolios and architectural program

applications, helping them compete in a more equitable way.

My father is the reason I'm in architecture today. I grew up knowing several engineers but few architects. He encouraged me to apply to architecture school to bridge my abilities in math and art, and assured me that I would have other options if I decided I was not interested. If more students of color had someone in their lives who could see their strengths and potential, more might pursue careers not visible to them in their families or communities.

But the push for diversity should not end with early education. Homogeneity perpetuates the architectural profession because it is a reflection of architecture school. It perpetuates in the way projects are taught, developed, and presented, and in the way students and professors dress, speak, and articulate their work.

My own program of study focused on the work of male American, European, and Japanese architects. The faculty had zero women of color and very few men of color. The few BIPOC professors had to follow a curriculum and pedagogy set by a Eurocentric agenda. Those from a different culture repressed fully expressing themselves for fear of discrimination and lack of opportunity.

If professors and administrators do not learn about the different cultures represented among the student body, they cannot understand their students' full potential, nor the precedents and

experiences that guide and form their choices.

Thirty years later, I have seen very few changes in academia. When I was invited to participate in juries early in my career, I would have to restrain myself to ensure I was using architectural language that fit the culture of that specific school. More recently, I taught at Northeastern University School of Architecture, which has a diverse and international student population. I modified my teaching style to connect with the students through my culture and my experiences. It was well received in both the classroom and the studio. Celebrating my ethnicity and heritage was a breakthrough for me as a professor: It gave me confidence to find my voice as an architect.

The challenges of this year have revealed the true inequities in our profession, from the pipeline to architectural education and to practice. They have allowed—and, in fact, required—us to change the status quo, to question and dismantle the existing systems in order to create a more diverse and equitable future.

This work will not happen by itself. Structural changes will occur only with the perseverance and proactivity of educators, professionals, and the entire architectural community. But it can be done.

Natasha Espada, AIA, is founder of Studio Enée and the 2020 president of the Boston Society for Architecture.

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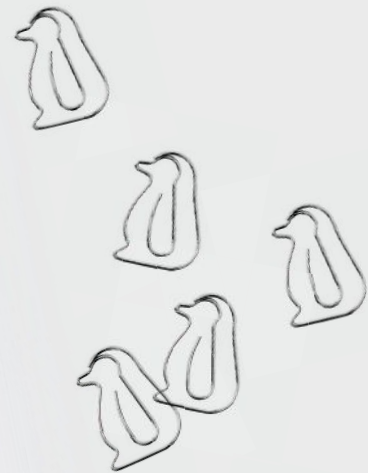
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Year founded:
2017



Firm leadership:

Evelyn Ting, AIA, and Paul Tse, AIA

Firm size:

6

Firm mission:

To make architecture that builds upon the vocabulary accumulated “then” while satisfying the needs and desires of “now.”

Education:

Ting: M.Arch. from Massachusetts Institute of Technology, B.A. from Columbia University. *Tse:* MSAAD from Columbia University; B.Arch. and M.Arch. from RMIT University in Melbourne, Australia.

When did you decide to become architects?

Ting: First year of college. I was intrigued by the relationship between architecture and sociology, and the notion of how space can influence people’s behavior. *Tse:* I grew up in a large building that, in addition to apartments, contained restaurants, supermarkets, clinics, an arcade, a drawing studio, etc. The idea of being able to design such a universe instilled in me a deep fascination in architecture.

Experience:

Ting: Knox Bhavan Architects in London; Ensemble Studio in Madrid; Approach Architecture Studio and MAD in Beijing; lecturer at the University of Hong Kong. *Tse:* Adjaye Associates in London; SOM and OMA in New York; MAD in Beijing; adjunct assistant professor at the Chinese University of Hong Kong.

First commission:

A restaurant in Manila, Philippines.

Most important project and why:

Growing Up, a pavilion located in Hong Kong on the waterfront in the West Kowloon Cultural District, which is a large arts district that has been over 20 years in the making. In 2017, a competition was launched to build a pavilion there. Given the scarcity of these competitions and the significance of the site both culturally and politically, it attracted many

participants. The pavilion was our first free-standing built structure. We wanted to keep the overall form simple while drawing references to the area’s unique urban vocabularies.

Another important project and why:

Middle Man Hong Kong, our research project that consists of 12 videos examining the city’s various architectural and urban elements. We worked on this project in parallel with the West Kowloon pavilion competition, meaning that lots of ideas and observations about the city informed the design process.

Which architects/firms have influenced your studio and how?

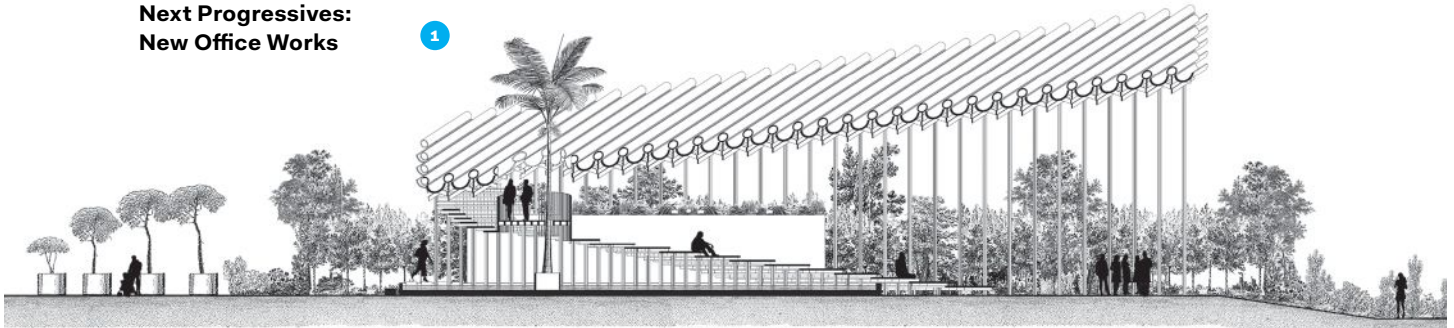
Ting: I’ve always had a strong belief that the production of architecture is more than just building. I worked as an editorial intern at *Log* and a researcher at *Volume*, two New York-based magazines, so the critical and editorial aspects of writing are an instrumental part of our studio. *Tse:* Mostly teachers and mentors I was fortunate to encounter—being a student of Shohei Shigamatsu; teaching with Kersten Geers; working with David Adjaye, HON. FAIA, and Ma Yansong. They are all very different, but share an intense dedication to their work.

Biggest challenge in running a successful practice:

Survival, in both the financial and the creative senses. The character of a practice is defined by how one survives.

**Next Progressives:
New Office Works**

1



1

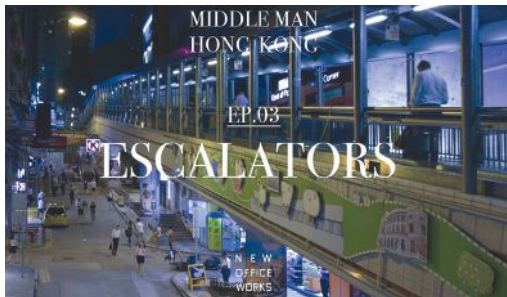


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1. Growing Up, a pavilion in the West Kowloon Arts and Culture District in Hong Kong, uses timber columns to help frame views of the adjacent harbor. 2. The Open Courtyard, a concept for a hotel in China, integrates a collection of existing traditional Linpan buildings with a new modern structure to create a seamless whole that is rooted in nature. 3. New Office Works designed the Haikou Apartment in China with the private spaces (master bedroom and bathroom) on the ground floor and the public spaces (living room and kitchen) on the second floor, all connected by a concrete spiral staircase. 4. Middle Man Hong Kong, a series of 12 video essays, explores the city's architecture—including the dichotomy between efficiency and poetry. 5. New Office Works's installation for the M+ Museum at Art Basel Hong Kong was based on the idea of a "human library," in which visitors engage the staff in conversations about the museum. 6. DFS, a new retail pavilion in the Van Don International Airport in Vietnam, features a transparent façade that allows travelers to glimpse the beauty products on display inside.

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Nearly every common area—and there are plenty of them across the seven-building, 385,000-square-foot residential community—is a showcase of light. By day, natural light floods interior spaces and connects students with one of five beautifully landscaped courtyards.

See and Be Seen

By night, students returning to their \$124-million 'home away from home' behold study rooms and lounges alive with light—a visual connection to the vibrant social and scholastic world within. The Quad greeted its first students in late August under the University's strict pandemic protocols.

"We try very hard not to have visually dead-end corridors where there's no natural light," explains Andy Albin, the project executive and a principal with EYP, the architect of the Quad. "For example, just above the central commons area on the second floor, there's a student lounge, kitchen, and laundry room. Students can hang out and look up, down, or side-to-side to see or be seen. It's all about visual connections."

Quantity and Quality

To create that level of visual connectivity requires lots of glass. "It's a really important material to us," Albin says. "Not just the amount of glass, but the quality of glass. We push for as much glass as we can. Classrooms. Hallways. Lounges. Study rooms."

Their design emphasis on transparency through glass has made EYP architects particularly critical specifiers. If you stake an aesthetic on a material, it had better be a good one.

45-Minute Applications

Take 45-minute fire- and safety-rated glass: The usual default is ceramic glass, but that comes with an aesthetic price in the form of a telltale grayish-green tint. "That industrial tint interferes with the transparency we strive for," Albin says.



Colorful entrance to one of the Quad's seven townhouses across a wide pedestrian thoroughfare from The Commons. Courtesy EYP Architecture & Engineering. Photo: Austin Commercial/Cloyce J. Wall

Safety is also a concern. Ceramic glass is brittle, and breaks easily on impact. For it to meet Consumer Product Safety Commission glazing requirements for doors, sidelites, and other hazardous locations in the IBC, it would have to be either filmed or laminated—which adds to its already high cost.

How do you meet all fire and safety code requirements, including the hose stream test? Is there a way to address life-safety and aesthetics concerns and preserve a uniform look?

When the project was in the design stage, the answer was no. Then a funny thing happened while construction was underway.

The EYP design team received word there was a low-iron glass alternative that not only met the 45-minute fire rating, hose test, and CPSC safety glazing standard, but was also domestically produced and priced below ceramic glass alternatives.

As Clear as Non-Rated Glass

"This was as clear a glass as you can get with a Visible Light Transmittance rating of 90%. The frame comes in a very low profile, which adds even more to the aesthetic. Our lead architect told me, 'This is the best



Clear wayfinding graphics at elevator lobby with natural light from adjacent and highly transparent study spaces. Courtesy EYP Architecture & Engineering. Photo: Austin Commercial/Cloyce J. Wall

product out there,'" Albin says.

The patent-pending glass is called SuperClear 45-HS-LI, and is manufactured by SAFTI FIRST, a vertically integrated, single source, U.S.-based manufacturer of advanced fire-rated glass and framing systems. Because of the product's extensive third-party testing, including Underwriters Laboratories and Intertek listings, SuperClear 45-HS-LI received quick code approval and is featured throughout the Quad.

"SuperClear 45 is integral to the spirit of this building," Albin says. Architects worldwide have an affordable, durable, super-clear design solution for any 45-minute application.

To learn more about specifying an ultra-clear 45-minute fire- and impact-rated glazing product for your next project, visit safti.com.

Residential:

DL1310

Mexico City

Young & Ayata + Michan Architecture

TEXT BY MADELEINE D'ANGELO

From a distance, DL1310 blends easily into its Mexico City surroundings—another concrete structure on the landscape. Upon closer inspection, however, the sculptural punched windows on the 10,300-square-foot, five-story multifamily building—which rises up from a base of local volcanic stone—animate the structure, each one canted to capture light and views and couched in double-curved, fair-faced concrete surrounds. Designed in partnership with New York- and Los Angeles-based Young & Ayata and local firm Michan Architecture, the mid-market, seven-unit structure is influenced by Mexican architect and concrete-innovator Félix Candela, particularly in its exploration of the material's potential.

Located in the Tetelpan neighborhood in the southern part of Mexico City, DL1310's gently sloping site is sandwiched neatly between two existing single-family homes. Though those neighboring structures are currently low-lying, the sites are both eligible for vertical growth under local code; to future-proof against potentially taller future neighbors and a loss of views, the architects shrunk the building footprint, pulling it back from the lot lines to give breathing room between the sites. As an added benefit, local zoning regulations allow for an additional floor of height on the smaller footprint, ultimately maximizing the project's square footage and allowing for windows on all four sides. "By pulling in from



Twenty-two windows based off of five different molds punctuate DL1310's cast-concrete façade.



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**Residential:
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the side lot lines, we're able to get windows, but then you have a window that's going to look into a future building that's right there, which is not so desirable," says Young & Ayata principal Michael Young.

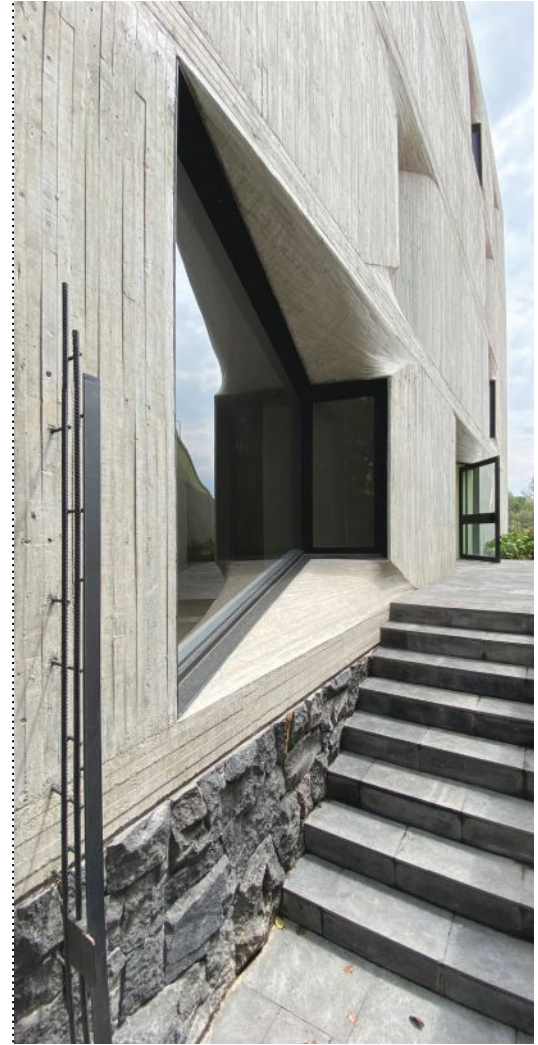
The architects developed a unique fenestration scheme to preserve interior views, setting the windows at a diagonal to the cast-concrete exterior and framing views that run obliquely up and down the street. "The condition that results from these oblique windows fully transforms a normative floor plan in terms of how it's an experienced space," says Young & Ayata principal Kutan Ayata.

The team used traditional timber formwork to create five sizes of more economical fiberglass molds that registered the boards' grain and seams. With them, the contractors

cast 22 windows in total, which together create "a bas relief, more of a simple surface that begins to push in," according to Ayata.

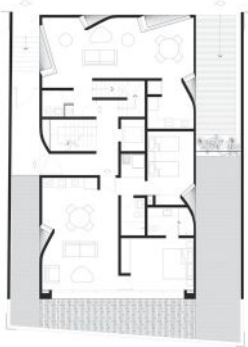
These trapezoidal apertures also bring daylight deep into the floor plate. "Because of the proportion of what's concrete and what's glass, you see a very enclosed building and don't expect it to have that much light" inside, says Isaac Michan, founding principal of Michan Architecture. "It's interesting, this notion that when you're outside, it looks almost like a bunker—like something enclosed—and then you enter and light hits you from all different places."

Contradictions are crafted into DL1310—the design for which won a 2019 P/A Award—including the plasticity and rigidity of its façade and the monolithic exterior and porous, light-filled interior. But there's little mystery. "It destabilizes the familiar," Ayata says. "The strangeness in this project is specifically what happens to a typical window when it rotates out of concrete. It's as simple as that."



The seven-unit, five-story project rests on a base of local volcanic stone.

Ground-Floor Plan



Second-Floor Plan



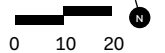
Third-Floor Plan



Fourth-Floor Plan




Fifth-Floor Plan



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Residential:
Young & Ayata +
Michan Architecture

Project Credits

Project: DL1310. Mexico City

Client: Withheld

Design Architect: Young & Ayata, Brooklyn, N.Y., and Los Angeles, in collaboration with Michan Architecture, Mexico City - Kutan Ayata, Michael Young (Young & Ayata principals); Sina Ozbudun (Young & Ayata project team); Isaac Michan (Michan Architecture principal); Narciso Martinez, Jorge Sanchez (Michan Architecture project team)

Interior/Lighting Designer/Landscape Architect: Young & Ayata in collaboration with Michan Architecture

Structural Engineer: Montes de Oca Ingenieros Consultores

MEP/Civil Engineer: Inversa

Construction Manager/General

Contractor: M2 Grupo Inmobiliario

Size: 10,300 square feet

Cost: Withheld



1. The architects set each window—and its double-curved, textured cast concrete exterior—at an angle to the façade, creating views that run obliquely up and down the streets outside. **2.** Despite its monolithic and rough-textured exterior, each of DL1310's seven one- and two-bedroom units feature smooth curving surfaces and light finishes. **3.** A concrete staircase runs through the core of the project, rising to each of its five floors.

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Typology:

Restore Oakland Oakland, Calif. Designing Justice + Designing Spaces

TEXT BY KATIE GERFEN



Colors, a restaurant that offers front- and back-of-house training for low-income women and people of color, anchors the corner at Restore Oakland.

Restore Oakland is a new type of community hub: Formed as a joint initiative between the Ella Baker Center for Human Rights and Restaurant Opportunities Center United, the new facility is home to six nonprofits, all of which focus on community advocacy, empowerment, and restorative justice and economics.

Owning a space was important—the Ella Baker Center alone had been forced to move several times as a result of gentrification. “Once they are able to become an anchor, it opens up opportunities to serve the community,” says architectural associate Shelley Davis Roberts of local architecture and real estate development nonprofit

Project Credits

Project: Restore Oakland, Oakland, Calif.

Client: Restore Oakland

Design Architect/Interior Designer: Designing Justice + Designing Spaces, Oakland · Deanna Van Buren (design director); Shelley Davis Roberts (architecture associate)

Architect of Record: Oscia Wilson, AIA

Structural Engineer: Forell/Elsesser Engineers

MEP Engineer: Canyon Consulting Engineers

Civil Engineer: KLC Consulting Engineers & Architects

Geotechnical Engineer: Geotecnia

Construction Manager: Jerry Jai

General Contractor: BBI Construction

Lighting Designer: Lighting Systems

Kitchen Consultant: Rocket Restaurant Resource

Waterproofing Consultant: Wiss, Janney, Elstner Associates

Size: 20,000 square feet

Cost: \$22 million

**Typology:
Designing Justice +
Designing Spaces**

Designing Justice + Designing Spaces. "You're not constantly worried about: 'Is the rent going to go up,' or 'Can I renew for another two years?'"

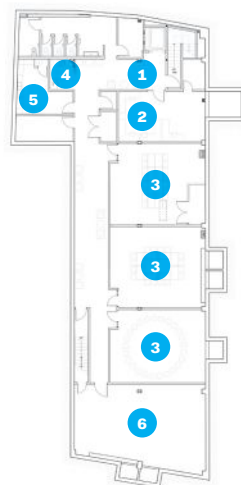
With its dual areas of expertise and social justice mission, DJ+DS was uniquely poised to help develop the idea of the center, as well as to find and renovate a building for it. The 1931 structure's location in the Fruitvale neighborhood and access to public transit were ideal.

The ground floor of the gut-renovated building is largely occupied by Colors—a ROCU-operated restaurant that hosts job training and placement programs for low-income women and people of color. Shared office and meeting spaces in the basement serve several nonprofits, while the second floor holds the offices of the Ella Baker Center as well as dedicated space for Alameda County's restorative justice program.

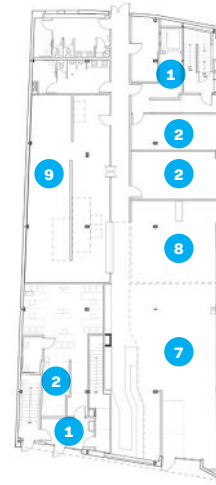
With so many diverse groups to serve—and a tight budget to work with—the team turned to inexpensive yet effective strategies, such as bright paint colors, for creating different identities in the shared space.



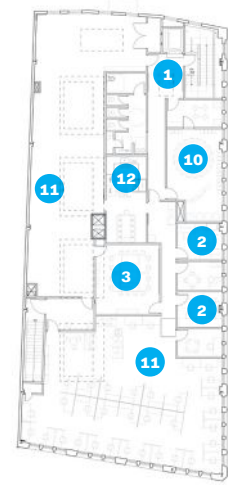
Basement-Level Plan



First-Floor Plan



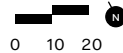
Second-Floor Plan



1. The Ella Baker Center for Human Rights offices have skylights among the wood framing. **2.** The second-floor restorative justice space features a chalkboard wall that allows space for sharing and recording ideas and feelings. **3.** A basement corridor with seating provides shared space for collaboration between organizations.



1. Lobby
2. Office
3. Meeting room
4. Kitchenette
5. Locker room
6. Storage
7. Restaurant dining room
8. Private dining room
9. Restaurant kitchen
10. Restorative Justice space
11. Open office
12. Break room



Restorative justice space is a typology DJ+DS has been exploring for a decade plus, but this is the first to be built in the U.S. The design developed out of community engagement with restorative justice practitioners and with the youth that the facility serves by offering conflict resolution outside of the carceral system.

The engagement process was "very iterative—we check in to make sure that we're listening to their experiences," Roberts says. "We can't design effectively for experiences that we haven't lived. When we're dealing with communities that have been traumatized, it would be a disservice to say, 'I'm creating a healing space,' if I haven't talked to anybody who's been through this about what they need."

There is no one-size-fits-all design for a restorative justice facility; needs

differ in each community. Here, a circle of seating brings parties together and is complemented by soft surfaces, natural light, and elements from nature. Also important are places to retreat, places to record thoughts, and separate entrances for each party.

The success of Restore Oakland has fueled DJ+DS's desire to develop more restorative-justice spaces. "It's a radically different approach that fosters transformation of communities through forgiveness and compassion," Roberts says. "It's a very different path than punishment, fear, and alienation." For architects, she says, the question is, "How do you provide infrastructure, buildings, policy that supports [that] in a real way? Architects have to engage with people who are dealing with policy and education around criminal justice reform."

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Future-Forward Middle/High School Design

To understand this next-generation educational hybrid, start with the washroom.

As you approach Saugus Middle/High School, you'll be tempted to think, "Did I get the address wrong? This doesn't look like a school."

It's an understandable reaction. There's not much that's old school in this visually-stunning 270,000-square-foot, \$160 million new school. That starts with blended middle and high schools and continues throughout the STEAM-focused complex of fabrication labs, collaboration spaces, and project areas. The school even includes outdoor classrooms, designed years before the pandemic.

To say the future has arrived at Saugus Middle/High School might be an understatement.

Credit Cambridge, Mass.-based architecture firm HMFH for a forward-thinking take on public school education. A sense of order, intelligence, and craft imbues nearly every aspect of the structure:

- Interior spaces are flooded with natural light from monumental lightwells
- Colorful graphics identify learning communities
- A trigeneration plant produces electricity and captures waste heat for space heating and cooling, a system that helps cut carbon emissions by a third

Saugus Middle/High School was set to open in September, but has been delayed because of the school district's decision to start the school year remotely. Anticipation for students, parents, faculty, and staff remains high. It's no secret there's a close correlation between quality classroom design and student performance. The investment in skilled design, materials, and construction is a vote of confidence in the community's young people. Studies show students instinctively respond to that emotionally and academically.

Division 10

Quality is easy to spot. Take Division 10 specifications: Once an overlooked, whatever-works specification category, it's now gained new prominence with COVID-19 mitigation. Today bathroom partitions, soap and sanitizer dispensers, and other washroom accessories demonstrate the building owner's commitment to occupant safety.

The design team at HMFH and their independent specification writer, Kalin Associates, turned to the master specifications for Division 10 guidance. For example, the basis of design for washroom partitions is ASI Group of New York City. The RFQ requires three bids, so HMFH architects weighed equivalent material manufacturers. The final spec decision came down to five factors:

- 1. Single-Source Responsibility.** HMFH, school officials, and the general contractor couldn't afford the potential complications and headaches that multiple manufacturers might represent.
- 2. Quality Products.** "Durability and style were important considerations. The idea is to spec partitions and other Division 10 products that will outlast the building," says Jim Kelaher, the local representative for the ASI Group.
- 3. Delivery Confidence.** Earlier experiences with the master specification established the manufacturer's reputation for on-time delivery, a major consideration with a September 2020 deadline looming.
- 4. Competitive Pricing.** Of course.
- 5. Fast Expert Service.** "Their design requires a large public wall comprised of mark-up panels for the students to write and draw on. Unfortunately, the wall wasn't quite square, meaning panel placement was at an unacceptable angle. Field modifications to the panels were required by our installation team to correct the fit," recalls Kelaher.



Photo credit: Robert Benson

Saugus Middle/High School reminds us how building design and quality materials can help advance educational excellence. Making compromises on structures expected to be in service for many decades serves no one well—especially taxpayers.

Now with COVID-19, working with manufacturers like ASI Group that embody years of global experience, product diversity, and demonstrated quality are specification factors that merit every consideration.

Learn more about Division 10 products that meet or exceed specification requirements at www.ASIGroup.us.

On the Boards:

Pepper Place Market Birmingham, Ala. MASS Design Group

TEXT BY MADELEINE D'ANGELO

When Pepper Place Market started, it was a handful of stands with the goal of supporting family farms gathered in a parking lot in Birmingham, Ala.'s Lakeview District. Two decades later, the farmers market has flourished under the care of founder Cathy Sloss Jones; now, a field of tents hosting more than 100 different producers from across Alabama welcomes roughly 10,000 shoppers each week.

As Pepper Place grew, however, Sloss Jones and her team envisioned "what we could do to put a stake in the ground to say 'this is the home of the farmer's market,'" she says. The team's concern is keeping the spirit of the market alive; the last thing they want, she says, is to "move inside and lose the magic of open air and people talking to each other."

Sloss Jones tapped Boston- and Kigali, Rwanda-based MASS Design

Group to spearhead a collaborative design process with the Pepper Place team. The resulting scheme includes a pocket park anchored by an open-air market pavilion, which knits Pepper Place into the city's existing trail system and catalyzes further business growth in and around Birmingham.

"It's about the systems that go into a piece of architecture that are social, ecological, and physiological, and having not just a place, but a culture that supports it," says MASS founding principal and executive director, Michael Murphy. "That's really what Pepper Place is about."

The design for the pavilion—which, in its intentional use of local timber, tiles, and other locally sourced building materials, echoes the careful ingredient sourcing of the "slow food" principles that the market espouses—comprises a structure

supported by glulam beams made from Alabama timber that span over 100 feet, allowing for an open floor plan that comfortably accommodates 40 vendors and houses a solid core with a shared kitchen and washrooms lined with locally fabricated cast-iron tiles. A gently curved roof clad in metal shingles shelters the interior, and operable glass walls and bi-fold doors create an optional transparent enclosure for winter months.

"Our food culture and our built environment do really important work to make our values as people, communities, societies, and cultures visible, tangible, and material," says MASS's design director Caitlin Taylor. Of the hyperlocal approach to the materials selection, she says, "We come to this specific design process from the opinion that we need the slow food movement in architecture."





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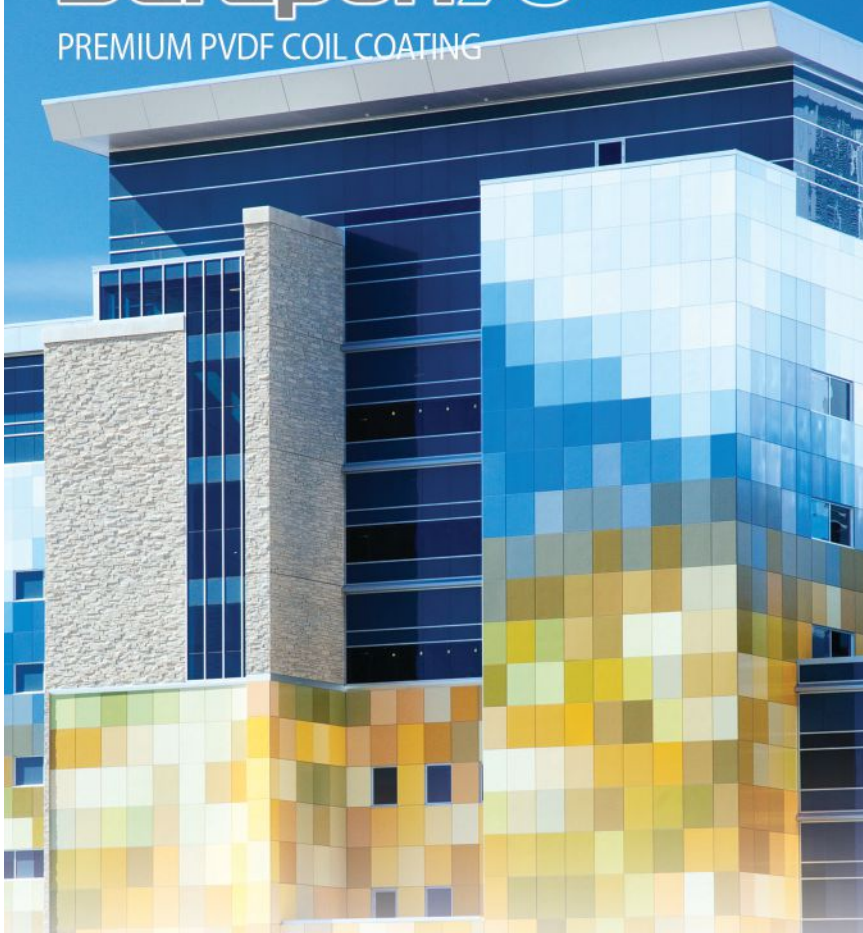
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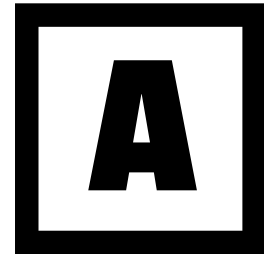
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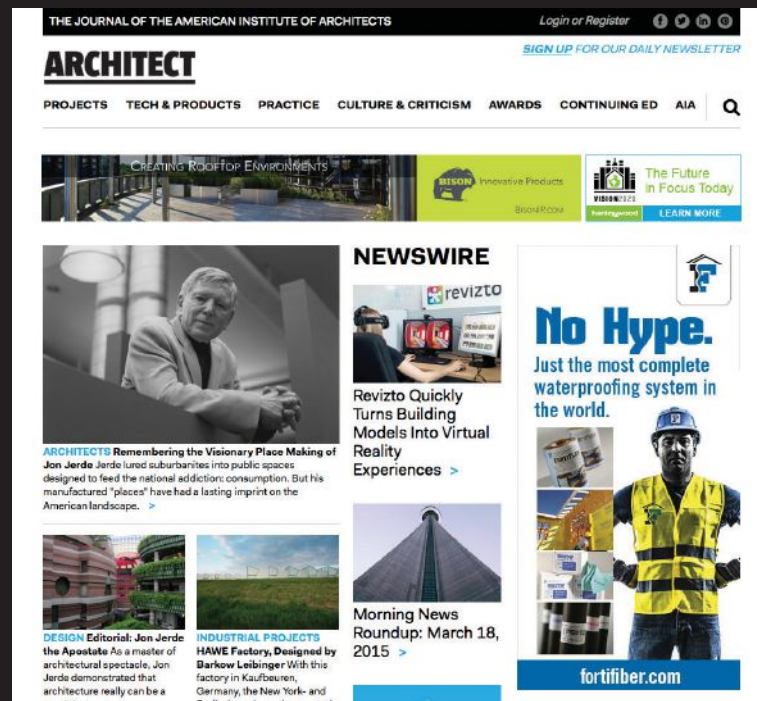
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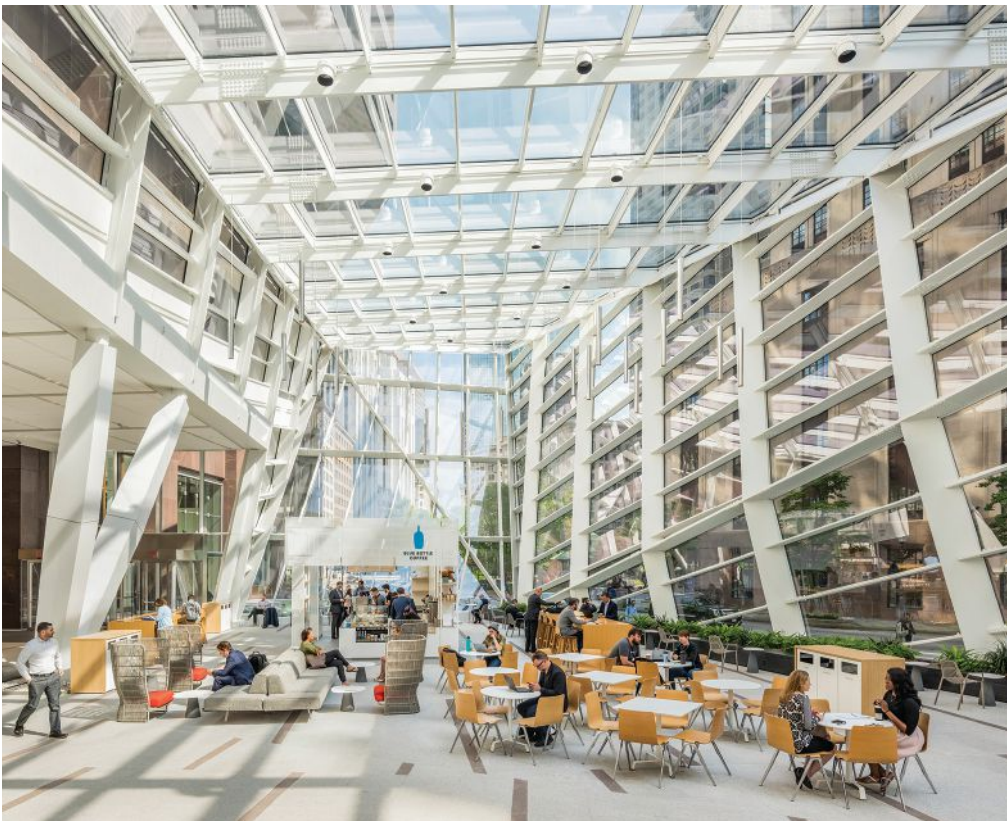
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Improving Designs by Way of Constructability

Presented By:



The design team for The Exchange at 100 Federal Street leveraged their relationship with a local structural steel fabricator to introduce constructability into early project conversations. Photo Credit: Anton Grassl

INTRODUCTION: DEFINING CONSTRUCTABILITY

Constructability, as a design concept, is defined as “the initial step in the integration of the process of steel design, fabrication, and installation.” It allows “the design professional to develop creative solutions and bring enhanced value to the client.”¹ The Construction Industry Institute (CII) further defines constructability as “the optimal use of construction knowledge and experience in planning, design, procurement, and field operations to achieve overall project objectives.”²

More specifically, “constructability includes visualizing the construction of the project prior to beginning the actual design and maintaining that vision throughout the design process. The focus is on maximizing simplicity, economy, and speed of construction, while considering such project-specific factors as site conditions, code restrictions, and owner requirements. Constructability is a design philosophy that begins in the conceptual design stage, continues through design, and links project planning with design and construction.”³

LEARNING OBJECTIVES

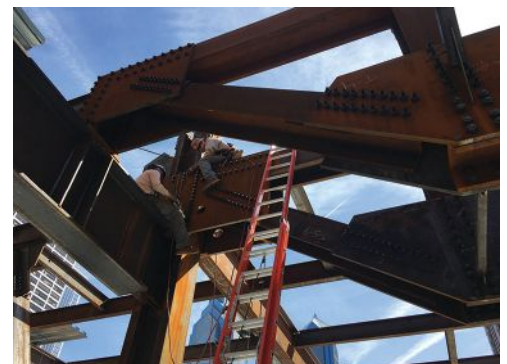
1. Assess and describe constructability, its relationship to structural steel, and its benefits.
2. Evaluate project delivery methods, including their advantages, disadvantages, and how well-suited they are to the incorporation of constructability.
3. Identify the role of architects and structural steel fabricators within the structural steel supply chain, as well as the benefits of adopting new construction technologies.
4. Explain the differences between Building Information Modeling (BIM) and Virtual Design and Construction (VDC) and how they aid collaboration and constructability.

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Ironworkers assemble a steel transfer truss at The Harper residential tower in Philadelphia.

Photo Credit: Christopher Gottschall

Considered a pioneer of the philosophy of constructability, David Ruby, founder of the structural engineering firm Ruby + Associates, explores the concept of constructability (including the above definition) in AISC *Design Guide 23, Constructability of Structural Steel Buildings*. The guide explores specific areas of constructability, such as early involvement; the design process; issues related to structural steel framing, detailing, and fabrication; steel erection; and special constructability issues (such as anchorage to concrete, camber, and tolerances).

Any definition of constructability supports its adoption early in a project and throughout design and construction phases. In other words, constructability is not an event but rather a continuous process throughout the lifecycle of a project. Its main goal is to bridge the gap between design and construction, which can lead to a multitude of benefits. However, there is no universal standard for constructability, as no two buildings are exactly alike. Constructability comes from

following a process that involves all of the right parties at the right time to take into account all of the unique factors associated with the project. Coordination and collaboration with owners, designers, and the steel supply chain eventually create a collection of constructability considerations for a project.

THE BENEFITS OF CONSTRUCTABILITY

In general, an effective constructability program can reduce overall project cost and shorten the schedule; improve project quality (maintainability, reliability, and operability); improve project safety, security, and environmental impact; minimize rework and rescheduling on the project; and reduce requests for information (RFIs).⁴

More specifically, constructability provides the following benefits:

- Enables design success related to sustainability, security, design-build, risk management, hazard mitigation, and performance-based design.
- Enhances building information modeling.

- Promotes team-building among client, designer, and contractor, emphasizing the success of the project instead of the success of the individual, thereby minimizing the commoditization of engineering.
- Provides ongoing feedback from clients, users, and contractors to the design team, eliminating scope surprises.
- Reduces total project costs and engineering scope creep, improving profitability.
- Involves construction expertise in the design phase, identifying field issues early and avoiding obstacles, unnecessary construction costs, and lawsuits.
- Improves the quality of construction documents, minimizing change orders and subsequent post-construction claims.
- Provides feedback from the field, which improves the quality of the next design.⁵

In addition, there are benefits from other trades being involved collaboratively in a project, particularly the mechanical, electrical, and plumbing (MEP) teams. The MEP groups usually have to resolve clashes between the steel framing and ducts/conduits in the field. If those trades are brought in for collaboration in the design phase, the project will have added constructability benefits beyond just the framing system. The benefits of constructability ultimately extend to the

The focus is on maximizing simplicity, economy, and speed of construction, while considering such project-specific factors as site conditions, code restrictions, and owner requirements.

GLOSSARY

Building Information Modeling (BIM)—extends beyond 3D modeling and may include analytical data, construction simulation data, scheduling data, cost data, facility management data, and possibly 2D drawings.

Contract documents—define the responsibilities of the parties that are involved in bidding, fabricating, and erecting structural steel. These documents normally include the design documents, the specifications, and the contract.

Constructability—“the initial step in the integration of the process of steel design, fabrication, and installation”; “the optimal use of construction knowledge and experience in planning, design, procurement, and field operations to achieve overall project objectives”²; “focus is on maximizing simplicity, economy, and speed of construction, while considering such project-specific factors as site conditions, code restrictions, and owner requirements; design philosophy that begins in the conceptual design stage, continues through design, and links project planning with design and construction.”³

Construction Manager At-Risk (CMAR)—“a project delivery method in which the Construction Manager acts as a consultant to the owner in the development and design phases but assumes the risk for construction performance as the equivalent of a general contractor holding all trade subcontracts during the construction phase.”¹⁶

Design-Bid-Build (DBB)—“the traditional U.S. project delivery method, which customarily involves three sequential project phases: design, procurement, and construction.”⁹

Design-Build (DB)—“combines architectural and engineering design services with construction performance under one contract.”¹²

Design documents—the design drawings, or wherever the parties have agreed in the contract documents to provide digital model(s) or the design model. A combination of drawings and digital models also may be provided.

Fabricator—the entity that is responsible for detailing (except in Section 4.5, the RFI Process as defined by the American Institute of Steel Construction (AISC) *Code of Standard Practice for Steel Buildings and Bridges*) and fabricating the structural steel.

Integrated Project Delivery (IPD)—“contractually requires collaboration among the primary parties—owner, designer, and builder—so that the risk, responsibility, and liability for project delivery are collectively managed and appropriately shared.”¹⁹

Virtual design and construction—the process of collaborating and creating models.



The developer and design team of Lincoln Square were able to squeeze one additional level within the tower by coordinating with the steel and MEP teams earlier in the process. Photo Credit: CKC Structural Engineers

owner, construction manager, architect, structural engineer, steel fabricator, detailer, mill or service center, and to the project itself.

The Owner

Constructability can influence the cost and quality of construction over the life of a project. It has the ability to reduce costly delays for the owner while preventing discrepancies and possible litigation.

The Construction Manager

Because constructability permits the construction manager to pull all disciplines together, the schedule can be made more efficient, costs can be reduced, and safety can be improved.

The Architect

Constructability creates a collaborative relationship between the architect and other disciplines, enabling architects to take advantage of new, cost-effective production methods in the fabrication shop and other new technologies that might benefit the project.

The Structural Engineer

For the structural engineer, constructability helps identify design issues and provide design ideas to overcome problem areas.

The Structural Steel Fabricator

Through the collaboration enabled by constructability, the fabricator can better understand design goals, provide input into the best methods available, and deliver an accurate bid. Constructability also reduces revisions to the steel and requests from more information.

The Steel Connection Detailer

Revisions are reduced for the detailer, too, and detailers will be able to provide complete production drawings earlier in the process.

The Steel Mill or Service Center

Constructability enables the mill or service center to provide timely information about material availability and delivery to the steel fabricator, which allows for advance procurement planning.

The Steel Erector and Construction Manager

Familiarity with the project allows the erector and construction manager to plan a sequence of assembly with advance knowledge and solutions for potential safety, transportation, site logistics, shift requirements, and other issues.

The Project

In terms of the entire project, successfully implemented constructability programs mean that designs are thought out and completed earlier. Delays are also minimized during fabrication and erection, which streamlines the schedule and reduces costs.

Overall, when properly executed, constructability increases collaboration between all parties. By gaining knowledge of material manufacturing, craftsmanship, new product technologies, and equipment capabilities as well as site constraints, designers can improve the design of the structure and thus improve schedule time. Constructability programs can further lead to

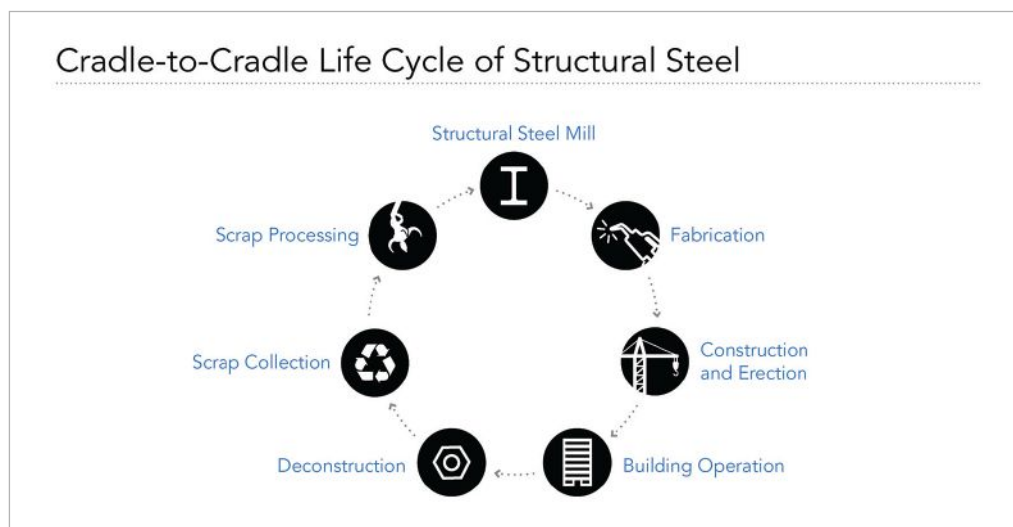
cost-effective construction due to increased teamwork and better communication.

Cost Savings

The owner and design team must weigh the benefits of the constructability process, taking into consideration the complexity of the design and any unique circumstances, including site, labor, and schedule. Projects generally end up being less costly overall when relevant parties have the information to provide more accurate upfront costs. It should be noted that the early involvement for constructability may move project costs from the middle or end of the project to the beginning of the project, during the planning stages.

Involving all disciplines during the conceptual stages of a project means that any input received can be incorporated into a more efficient design to reduce the cost of changes over the timeline of the project. Additional cost savings can be realized at later stages in the project due to the following:

- Reduced schedule
 - Pre-planning of site layout and equipment requirements allows for more efficient construction.
- Reduced material cost
 - Streamlining the manufacturing and installation process will result in less material waste.
- Reduction in revisions
 - Revisions to project design and schedule are most costly during the erection phase



Overall, the CII estimates that the constructability process reduces overall project cost by an average of 4.3% and reduces schedule by an average of 7.5%.⁶

Responsibility for Design and the Role of the Fabricator

The responsibilities of each discipline mentioned in the sections above vary according to project delivery methods and contract documents. For instance, if the owner's designated representative for design provides the design, design documents, and specifications, the structural steel fabricator and the erector are not responsible for the suitability, adequacy, or building-code conformance of the design.

If, on the other hand, the owner enters into a direct contract with the fabricator to both design and fabricate an entire, completed steel structure, the fabricator is responsible for the suitability, adequacy, and conformance with owner-established performance criteria as well as building-code conformance of the structural steel design. The owner is responsible for the suitability, adequacy, and building-code conformance of the nonstructural steel elements and must establish the performance criteria for the structural steel frame.



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The American Institute of Steel Construction (AISC), headquartered in Chicago, is a non-partisan, not-for-profit technical institute and trade association established in 1921 to serve the structural steel design community and construction industry in the United States.

QUIZ

- Constructability can be defined as which of the following?
 - The initial step in the integration of the process of steel design, fabrication, and installation
 - The optimal use of construction knowledge and experience in planning, procurement, and field operations to achieve overall project goals
 - Includes visualizing the construction of the project prior to beginning the design and maintaining the vision throughout the design process
 - All of the above
- Which of the following is a benefit of constructability?
 - Reduces total project costs and increases profitability
 - Promotes sustainability, security, risk management, and hazard mitigation
 - Improves the quality of the construction documents, as well as the quality of future design
 - All of the above
- The CII estimates that constructability reduces overall project cost by 4.3% and reduces schedule by an average of _____.
 - 1.5%
 - 10.6%
 - 7.5%
 - 8.1%
- Which of the following is the traditional U.S. project delivery method?
 - Design-bid-build
 - Integrated project delivery
 - Design-build
 - Construction manager-at-risk
- Which project delivery method is best suited for a fully integrated adoption of constructability?
 - Design-bid-build
 - Integrated project delivery
 - Design-build
 - Construction manager-at-risk
- Which project delivery method can be described as combining "architectural and engineering design services with construction performance under one contract"?
 - Design-bid-build
 - Integrated project delivery
 - Design-build
 - Construction manager-at-risk
- Steel fabricators can aid the design team, including architects, by _____.
 - Providing detailed information on new processes and talent
 - Providing information on capabilities and limitations of tools and processes
 - Suggesting new design ideas
 - All of the above
- The St. Vincent Medical Center Heart Pavilion project used constructability concepts alongside the _____ delivery method.
 - Design-bid-build
 - Integrated project delivery
 - Design-build
 - Construction manager-at-risk
- The advantages to a _____ include the ability to develop shop drawings rapidly, because individual repetitive parts of the system have their own independent drawings developed in advance.
 - Kit of parts
 - Panelization
 - Modularization
 - Connection technologies
- _____ describes the process of collaborating and creating models.
 - AID
 - VDC
 - BxP
 - BEP

Steel is the most resilient material—it's designed to last, whether it's exposed to fire, blast, or the ravages of time. And when a steel building reaches the end of its life, the steel is recycled and retains all of its fantastic physical characteristics.

Today's beams and columns are nearly 40% stronger and offer greater constructability benefits than beams and columns produced just 30 years ago!

Steel is the most recycled material in the world. In fact, according to the American Iron and Steel Institute, more steel is recycled than all other materials combined. In the U.S. alone, domestic mills recycle more than 70 million tons of scrap each year. Currently, structural steel includes 93% recycled content!

Steel doesn't add to our waste problems. More than 98% of structural steel is recovered for reuse at the end of a structure's usable life.

Structural steel features an incredibly sustainable manufacturing process.

- The steel manufacturing industry has cut its carbon footprint by almost 40% since 1990.
- It takes a third less energy to make a ton of steel than it did in 1990.



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Structural steel has a low global warming potential. In fact, most of the greenhouse gas emissions associated with steel is from electricity use—and as power plants in the U.S switch to renewable energy sources, steel's global warming potential will continue to shrink! (Research is underway on new production processes with the goal of carbon-neutral steel.)

The steel industry features superior water resource management. The structural steel-making process boasts a 95% water recycling rate with no external discharges, resulting in a net consumption of only 70 gallons per ton!

The steel industry offers transparent reporting of environmental impacts. The American Institute of Steel Construction provides environmental product declarations (EPDs) for fabricated hot-rolled structural sections, fabricated steel plate, and fabricated hollow structural sections (HSS). These EPDs cover the product life cycle from cradle to fabricator gate. Simply visit aisc.org/epd to access the data!



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Introduction to Metal Roofing Fundamentals

Presented By:



LEARNING OBJECTIVES

1. Recognize the most common roof materials used in steep slope roofing and understand various types of metal roofing substrates.
2. Identify different metal roofing configurations, coatings, and fastening applications.
3. Analyze the importance of roof system components and testing standards.
4. Assess the development of design plans for regional impacts affecting metal roofing systems.

CONTINUING EDUCATION

AIA CREDIT: 1 LU /HSW

IDCEC CREDIT: 0.1 CE /HSW



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INTRODUCTION: STEEP SLOPE ROOFING OPTIONS AND CONSIDERATIONS

Most steep slope residential roofing applications, or those with slopes greater than 3:12 (25%), are suited to a variety of systems and materials; however, there are some applications where only a few systems are viable. Architects and engineers should therefore have a solid understanding of material and system options. Steep slope residential products primarily fit into one of these roofing type categories: asphalt, cedar shake, concrete tile, clay tile, slate tile, composite tile, rubber tile, and metal roof panels or shingles.

The Whole Building Design Guide (WBDG) recommends that designers establish the

following criteria prior to specifying a roofing system. Some of these criteria, as they relate to metal roofing, will be discussed throughout the course:

- Factory Mutual (insurance underwriters') requirements.
- Structural engineer to do wind uplift analysis per ASCE 7.
- Required R-value/u-factor for energy code compliance.
- Cool roof: yes or no.
- Aesthetics: can the roof be seen from above?
- Interior and exterior temperature/humidity parameters.
- Owner's risk tolerance (i.e. data center versus common commercial space).
- Owner's ability to maintain the roof.

- Roof access to public?
- How much mechanical equipment on roof?
- Need for early enclosure with temporary roof to facilitate construction?
- Local trade practices and preferences.
- How much subsequent construction over low roofs while working on walls above?
- Ability to reach the roof in the future such as in high-rise situations.
- Requirements for fire resistance rated assemblies.
- Smoke developed/flame spread criteria.
- Hail resistance.
- Hurricane zones: high winds and elimination of small missiles (ballast).
- Owner's expectation for warranty coverage: will the owner expect and pay

for a warranty that extends all the way to the predicted wind speed.

- Life-cycle costing.
- Where is drainage and what type? Is the structural deck sloped?
- How is secondary (overflow) drainage to be accomplished?
- Design of parapets.
- Available height for base flashings.
- Presence of animal fats or other exhausts that can harm some membranes.
- Presence of other contaminants, such as jet fuel for roofs at airports that can damage some membranes.
- For re-roofs: there are many more criteria.¹

Metal Roofing

Metal roofing can be produced using various types of substrates or base metals. Common substrates include zinc, copper, aluminum, galvanized, stainless steel, and Galvalume². Galvalume is “carbon steel sheet coated with aluminum-zinc alloy by a continuous hot-dip process,” typically comprised of 55% aluminum and 45% zinc. A small amount of silicon is added to the coating alloy to ensure “adhesion to the steel substrate when the product is roll-formed, drawn, or bent during fabrication.”³

For residential steep slope applications, the most common metal roofing substrates include Galvalume and aluminum, with galvanized and copper being less common. For commercial applications, Galvalume and aluminum still represent the most common substrates, but depending

on the design application and architectural detailing, all six substrates can be used.

Dissimilar Metals

When designing with metal roofing, one of the key factors to consider is material compatibility.

When two dissimilar metals are electrically coupled in the presence of a corrosive electrolyte, one of them is preferentially corroded while the other is protected from corrosion. An alloy, for example galvanized steel, will be preferentially corroded when coupled to a less active alloy such as copper. This action is termed “galvanic corrosion”; the relative activities of various metals are ranked in the galvanic series of metals, which is “a list of metal and alloys

based on their relative potentials in a specified environment.”⁴ Seawater is the environment, or corrosive electrolyte, most commonly used.

Put simply, it is important to avoid combining dissimilar metals. When combining metals, it is best to consult a manufacturer’s representative for more detailed information related to the product (or products) being specified.

Technical Features of Metal Roofing

With metal roofing, it is also important to understand that the thickness of the roofing substrate has a direct impact on the performance, weight, and workability of the material. Gauge is an indication of the thickness of a sheet of material; common



GLOSSARY

Bare Metal—finish requirements are typically limited to a polished or matte surface; products such as copper, aluminum, and zinc are selected for their material properties and longevity

Galvalume—“carbon steel sheet coated with aluminum-zinc alloy by a continuous hot-dip process,” typically comprised of 55% aluminum and 45% zinc

Galvanic Corrosion—when two dissimilar metals are electrically coupled in the presence of a corrosive electrolyte, one of them is preferentially corroded while the other is protected from corrosion

Gauge—an indication of the thickness of a sheet of material; common metal roof panels can vary from 20-29 gauge

Metal Roof Shingles—most often be bare metal substrates of a lower gauge or thicker material, such as copper, aluminum, or zinc

Painted Metal Roofing—often selected for its clean and crisp appearance; has a shiny or gloss finish; commonly found in commercial applications rather than residential; improves building energy efficiency as finish specifications take into account solar reflectance

Pressed Panels—utilization of a mechanical power press and die tool allows manufacturers to mimic the look of other roofing styles such as wood shake, Spanish and Mediterranean tile, shingles, and slate-type roof materials; commonly made from

Galvalume, aluminum, copper, and galvanized, and have a thicknesses ranging from 24 up to 29 gauge

Roll Formed/Corrugated Metal Roofing—roofing tends to be a substrate of galvanized, Galvalume, or aluminum; although it is a higher gauge or thinner material, it gains strength from the increased number of corrugations

Standing Seam Metal Roofing—tends to be made from Galvalume and aluminum substrates and is usually a lower gauge metal

Stone Coated Steel Finish—a popular choice providing a finish/aesthetic that is similar to more traditional steep slope roofing products while offering the performance and benefits of a metal substrate

metal roof panels can vary from 20–29 gauge. The lower the gauge, the thicker the material will be. In turn, thicker material is typically an indication of strength and durability.

The fabrication of lower gauge metal roofing can be more difficult due to weight and workability, and a thicker or lower gauge metal substrate will be more expensive in both material cost and labor. However, using a thinner or higher gauge substrate may not provide the same level of performance and durability.

Metal Comparison Chart

Here is an overview of the substrates that have been discussed so far. It includes advantages, drawbacks, and more. While the raw substrate is important for the longevity of the design, it is important to note that the substrate can be improved with coatings and finishes that extend the life of the product.

METAL ROOFING COATINGS AND CONFIGURATIONS

In addition to substrates, it is important for designers to have an understanding of common configurations and coatings used in metal roofing. These include

- Shingles
- Roll Formed / Corrugated
- Standing Seam
- Pressed Panels
- Bare Metal
- Stone Coated
- Painted

Metal Roofing Configurations

Shingles

Metal roof shingles will most often be bare metal substrates of a lower gauge or thicker material, such as copper, aluminum, or zinc. The shingle overlap allows for unique aesthetics to better accent architectural roof



detailing while creating a stronger, more durable shingle. Because they provide an artistic element, metal shingles are common in commercial architectural design.

Roll Formed/Corrugated

Roll formed/corrugated metal roofing tends to be a substrate of galvanized, Galvalume, or aluminum. Although it is a higher gauge or thinner material, it gains strength from the increased number of corrugations, which allows for the reduced steel gauge thickness. This type of roofing will typically have interlocking vertical and horizontal seams in the field area, and it will utilize an “exposed” or “through” fastener application. Roll formed/corrugated metal roofing is referred to as “AG Panels” and is commonly used in agricultural or large commercial building applications.

Standing Seam

Standing seam metal roofing tends to be made from Galvalume and aluminum substrates and is usually a lower gauge metal. Since panels are installed from the ridge to the eave and interlock, there are only vertical seams. These seams typically utilize a concealed fastener.

MATERIAL	ADVANTAGES	DRAWBACKS	INCOMPATIBLE MATERIALS	LONGEVITY*	THERMAL EXPANSION** (10-6 in/in/°F)
GALVANIZED STEEL	Least expensive. Strong and dent-resistant. Zinc coating heals small cuts and scratches.	Rusts after zinc wears away from oxidation. Field-cut edges vulnerable to corrosion.	Brass, bronze, untreated iron and steel, redwood, cedar, pressure-treated (PT) lumber.	Unpainted: 15 to 30 years. Exposed to salt spray: 5 to 10 years.	7.5
STAINLESS STEEL	Provides a true barrier to corrosion rather than a sacrificial by incorporating chromium in the alloy.	Expensive. Bright shiny appearance fewer finish options.	Galvanized screws, aluminum rivets, brass, bronze, copper, steel.	60+ years	9.6
GALVALUME	Combines barrier protection of aluminum with healing characteristics of zinc. Reflects solar radiation.	Field-cut edges vulnerable to corrosion in coastal areas.	Lead, copper, unprotected steel, wet mortar, PT lumber, and graphite.	Unpainted: 30 to 40 years	7.5
ALUMINUM	Superior corrosion resistance. Lightweight and good for coastal areas.	Expensive. High level of thermal expansion. Relatively soft. Low melting point.	Brass, bronze, lead, copper, unprotected iron and steel, wet mortar, redwood, cedar, or PT lumber, and graphite.	Unpainted: 30 to 40 years	12.7
COPPER	Easily roll formed. Superior corrosion resistance. Attractive green patina.	Very expensive. Greenish runoff can stain building. Avoid contact or runoff from cedar shingles.	Aluminum, stainless steel, zinc, unprotected iron and steel, galvanized steel, lead, brass, bronze.	60+ years	8.8
ZINC	Easily formed into intricate patterns. Superior corrosion resistance Bluish-white patina.	Very expensive. Runoff can stain building.	Brass, bronze, copper, untreated iron and steel, stainless steel, redwood and cedar.	60+ years	15.1

Chart Provided by 2006 John Wiley & Sons, Best Practices Guide to Residential Construction

Along with being a great solution for low slope applications, the continuous panel design provides improved shedding of water and snow.

Pressed Panels

The utilization of a mechanical power press and die tool allows manufacturers to mimic the look of other roofing styles such as wood shake, Spanish and Mediterranean tile, shingles, and even slate-type roof materials. Pressed panels are commonly made from Galvalume, aluminum, copper, and galvanized, and have a thickness ranging from 24 up to 29 gauge. Based on the shape of the design, most pressed panels create an air space between the roof material and the sheathing. This forms what is called “above sheathing ventilation” and leads to improved energy efficiency.



Metal Roofing Finish Characteristics

Finish characteristics and coatings include bare, stone coated, and painted metal, each of which has different attributes.

Bare Metal

For bare metal, finish requirements are typically limited to a polished or matte surface. Bare metal products such as copper, aluminum, and zinc are selected for their material properties and longevity. When specifying bare metal roofing, a key consideration is understanding that materials can “weather” over time, impacting the appearance, causing finish variations, and in some instances, changing the color of the material. As shown, an example of this is copper roofing and its evolution from new material to a matte green finish over time.



This article continues on
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QUIZ

- For residential steep slope applications, the most common metal roofing substrates include _____.
 - Copper
 - Stainless steel
 - Galvalume and aluminum
 - Galvanized
- Common metal roof panels can vary from 20-_____ gauge.
 - 29
 - 30
 - 31
 - 32
- Which of the following metal roofing finish characteristics is chosen for its material properties and longevity but will “weather” over time?
 - Painted
 - Bare
 - Stone coated
 - None of the above
- Which metal roofing configuration gains strength from the increased number of corrugations and utilizes “exposed” or “through” fastener applications?
 - Shingles
 - Standing seam
 - Roll formed/corrugated
 - Pressed panels
- Which metal roofing configuration has a thickness ranging from 24 up to 29 gauge and creates above sheathing ventilation that leads to improved energy efficiency?
 - Shingles
 - Standing seam
 - Roll formed/corrugated
 - Pressed panels
- Which metal roofing configuration typically utilizes a concealed fastener and only has vertical seams?
 - Shingles
 - Standing seam
 - Roll formed/corrugated
 - Pressed panels
- According to the course materials, roof decks must have the strength to do which of the following?
 - Hold constant loads, such as heavy snow
 - Safely resist impact loads from roof loading
 - Provide resistance to wind force
 - All of the above
- In High Velocity Hurricane Zones, a roof system must meet or exceed simulated peak winds of _____.
 - 120 mph
 - 140 mph
 - 150 mph
 - 170 mph
- Which of the following testing standards is applicable to metal roofing and wind uplift?
 - ASTM D523
 - UL 580
 - ASTM E84
 - ASTM D2247
- According to the course, when specifying an underlayment, is it critical to select one that has a similar _____ to the roof material.
 - Longevity
 - Color
 - Brand name
 - Water-resistance

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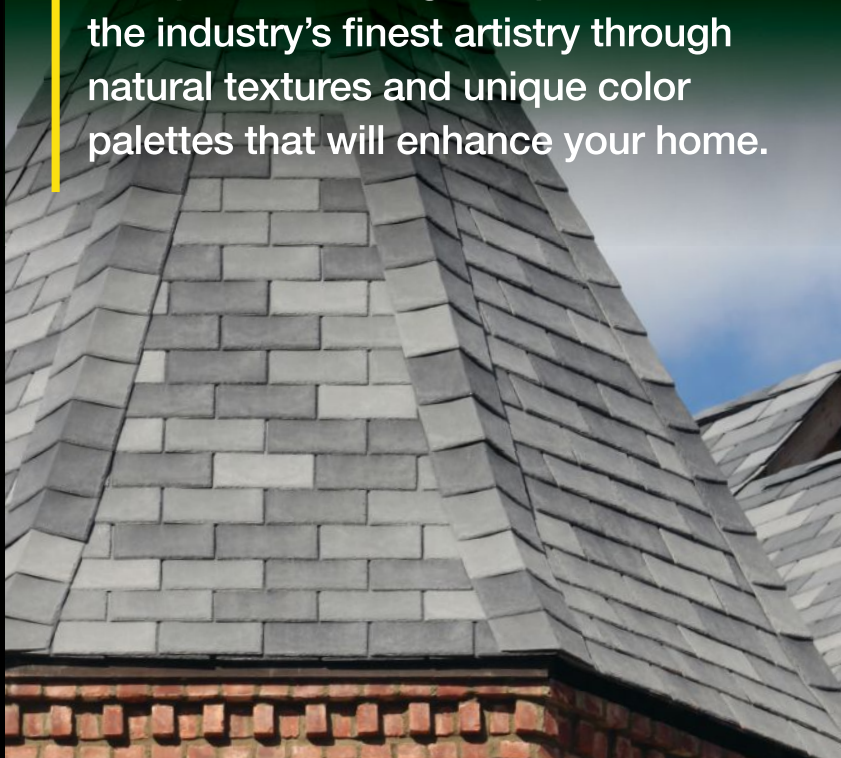
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and superior protection from the elements.



Exploring High-Performance Protective Coatings for Steel in Architectural Applications

Presented By:



Whether new construction or major renovation, polyurethane and polyaspartic coatings are specified for long term durability, especially in more challenging areas such as the exterior metal panels of this coastal location.

PROTECTIVE COATINGS PREVENT CORROSION IN THE BUILT ENVIRONMENT

High-performance coatings are used in a wide variety of industries to protect steel construction from corrosion. Corrosion protection coatings are an indispensable contribution to the long-term preservation of valuable capital investments worldwide. Choosing the best corrosion protection system for the intended application is the most important consideration to achieve long-term protection. The coatings industry is continually innovating with new technologies for primers, basecoats, and topcoats. There is a drive for such coatings in the architectural space as steel infrastructure ages in developed countries and infrastructure

booms in emerging economies. Increasing maintenance costs, which coincide with higher labor costs, further boost the demand for long-lasting, low-maintenance coatings to protect steel constructions.¹

Protective coatings have traditionally been used in the built environment on large steel infrastructure in high corrosion environments such as bridges, water towers, and water pipes. The protective coating specified must be based on the infrastructure's substrate and service environment. "In many instances, steelwork will be in a warm dry interior where it will not corrode, and the structural stability of the building will not be threatened during its design life (generally taken as 50 years). In such conditions, no

LEARNING OBJECTIVES

1. Examine how high-performance protective coatings prevent corrosion in the built environment and how they are increasingly being used for architectural applications.
2. Identify service considerations when selecting a coating system and review how steel is prepped for coating.
3. Understand high performance coating system components and technology options for primers, basecoats, and topcoats.
4. Explore six case studies where high-performance corrosion coatings were used in architectural applications.

CONTINUING EDUCATION

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corrosion coating is required. Examples include steelwork inside dry buildings with neutral atmospheres such as office buildings, schools, hotels, and residential buildings. However, when steelwork is exposed to moisture, corrosion will occur at a rate depending on the severity of the environment. In such cases, a coating system appropriate to the environment category should be provided."² The following are industrial coating segments where these protective coatings have demonstrated proven durability in demanding service environments.



One of the traditional uses for a 2K polyurethane coating is a weather, chemical, and color stable topcoat in a multi-coat system for bridge steel corrosion protection.

Transportation Infrastructure

For example, bridges are exposed to weather, solar radiation, air pollution, atmospheric salts, and de-icing salts. Typically, bridge steel is protected with a multi-layer coating system that includes primers, basecoats, and topcoats. The final coating system must often meet a State DOT's Qualified Products List (QPL). These types of coatings are typically applied by spraying and brushing and can last 30+ years. Challenges to traditional steel coatings for transportation infrastructure are corrosion resistance, site access, and edge retention, meaning high-exposure areas such as edges and welded pieces need additional protection.

Water Storage

Like transportation infrastructure, steel used for water storage is typically protected with a multi-layer coating system. These coatings will last 15+ years when applied to AAWA specifications, but are challenged by corrosion resistance, color stability, adhesion issues, and overspray containment. Water towers also experience wind-driven abrasion, sun, acid rain, and temperature fluctuations that put high-performance coatings to the test.



This municipal water tower was coated 26 years ago with an all-polyurethane coating system and has maintained excellent corrosion, color, and gloss properties.

Water Treatment

Water infrastructure such as tanks, pumps, and pipes are naturally a high moisture environment. Steel in water treatment plants coated with a multi-layer system to manufacturer specifications will last 10+

years, but will face extreme moisture during application, potentially causing adhesion issues and corrosion.

USING CORROSION PROTECTION COATINGS IN STEEL ARCHITECTURAL APPLICATIONS

Today, steel is increasingly being used as an aesthetic design element in architectural applications and, like industrial steel, must be coated to protect the longevity of the substrate. According to the American Institute of Steel Construction (AISC) *Code of Standard Practice* (ANSI/AISC 303-16), "Structural steel comprises elements that are required to support the design loads of a building and fit within the components of a structural frame." Architecturally Exposed Structural Steel (AESS) is a category of structural steel that is typically applied to "fabricated structural steel elements such as anchor rods, base plates, beams, bracing, canopy framing, columns, connection materials, crane stops, girders, lintels, posts, shear stud connectors, and trusses."³

Architecturally exposed structural steel provides striking visual impact in iconic structures such as airports, stadiums, and museums, but it is also being used in exterior facades, atriums, production spaces, restaurants, and other interior and exterior applications. Steel can be fabricated in a limitless range of shapes, curves, colors, and finishes. Maintaining the aesthetics, and the structural integrity, of steel building elements is accomplished through high-performance protective coatings.⁴

Airport Infrastructure

Airport terminals are a beacon for steel design, as it imparts a sleek, streamlined aesthetic that is often used to create soaring roofs, striking canopies, and light-filled atriums. Steel-framed structures allow designers to "incorporate skylights and ceiling windows to create an open space and interior filled with natural lighting. These aesthetic advantages can create a facility that will be soothing to anxious travelers and make the airport stand out architecturally."⁵ Airports are massive public/private projects that require an enormous amount of capital and rely on efficiency and order to be financially viable, so it's important that the structural integrity and

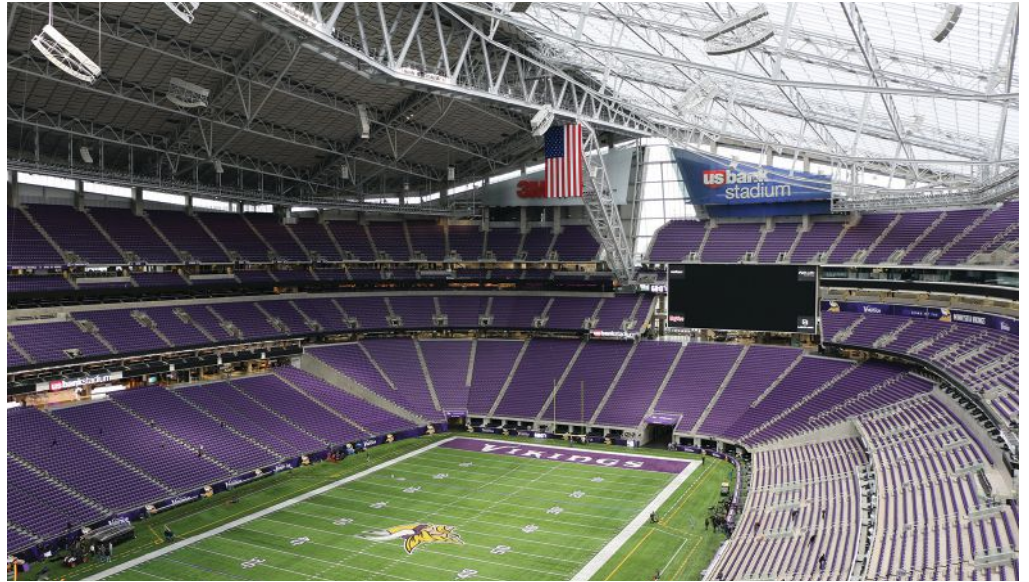


Although inside, exposed structural steel elements used in suspended roof designs can experience condensation as well as UV exposure from skylights and clerestory windows; they will benefit long term from a light stable protective polyurethane coating.

aesthetics of these buildings are preserved for decades. Additionally, as with many enclosed public spaces, a long term solution is desired since re-entering the area years later for maintenance or recoating is often very disruptive or infeasible due to the 24/7 nature of the venue.

Stadium and Museum Infrastructure

Exposed structural steel applications such as stadiums and museums demand corrosion resistance and excellent long-term aesthetics because they are often highly visible, iconic structures within an urban environment. They also require spacious open areas, so steel is often used for its light weight and ability to create “large, uninterrupted spaces cost effectively.”⁶ The roof structures on these types of buildings are often difficult to access, so architects typically specify an enhanced protective coating system to increase the length between maintenance periods.⁷ Steel in these structures can be protected with a multi-layer direct-to-metal (DTM) coating system to architectural specifications. It is applied by brush, roll, or spray and should be expected to last 20+ years. Challenges in this type of application include corrosion resistance, color/gloss retention, and adhesion.



Polyspartic topcoats are preferred as a DTM coating on structural steel for stadiums, such as here on U.S. Bank Stadium. The steel is often painted both in a fabrication shop as well as on-site so the fast cure and higher film build of polyspartic coatings facilitate the process.

GLOSSARY

Accelerated Weathering—Testing that requires a strict test standard to simulate real-world conditions in an abbreviated time period; it exposes test pieces to intense UV radiation and possibly moisture/heat cycles in order to mimic natural weather testing

Architecturally Exposed Structural Steel (AESS)—A category of structural steel that is typically applied to fabricated structural steel elements such as anchor rods, base plates, beams, bracing, canopy framing, columns, connection materials, crane stops, girders, lintels, posts, shear stud connectors, and trusses

Crosslinking—Entanglement and reaction of long polymer chains that increases physical strength and chemical resistance in 2K polyurethane coatings

NACE International/SSPC Joint Surface Preparation Standards—Help to standardize surface prep results, provide a template for meeting job specifications, and minimize surface prep costs while maximizing the coating life

Natural Weather Testing—A real-world test completed in a variety of different climate zones, such as Arizona and Florida that often includes intensity reflectors and water spraying cycles

Polyspartics—Coatings that enhance the use of conventional two-component aliphatic polyurethane technology by providing faster dry times and higher film builds, translating into a rapid return to service and high film build make it possible to reduce the number of coats in a paint system while maintaining the same overall thickness

Polyurethanes—Tried-and tested coating systems that provide lasting protection against corrosion, aggressive chemicals, salts, and solvents for all kinds of heavy steel constructions; these coating systems bring the additional benefits of good adhesion on steel, speedy and efficient application, a high degree of weathering and chalking resistance, and long-lasting color and gloss fastness

Society for Protective Coatings (SSPC)—The organization that publishes coating material standards that dictate requirements for how various types of coatings should perform when tested in accordance with industry-established laboratory and field standards; tests that establish coating performance will differ based on the coating and its intended application

SSPC Environmental Zone—Characterize the type of environment that the coated steel will be exposed to when in service; the environmental exposures are classified according to their severity and have been divided into environmental zones from non-corrosive dry interiors (Zone 0) to severe chemical or temperature exposures (Zones 3 and 4)

Two-Component Waterborne Polyurethane Coating—A water-based, breathable, aliphatic urethane coating that provides the performance characteristics of solvent-based systems with the ease of application and low odor associated with water-based systems

Indoor Swimming Complex

Natatoriums are often architecturally driven structures that must maintain their beauty in an aggressive environment with high humidity, high temperatures, and airborne chemicals such as chlorine and other high-acid gases that will corrode the steel. A high-performance coating system must be specified to provide durability to steel, which is often a feature of the roof system in these complexes.⁸ To mitigate the corrosive nature of the environment, double protection is often employed which consists of “a layer of hot dip galvanizing or zinc rich primer and 2 coats of epoxy, followed by an additional field applied layer of epoxy or acrylic urethane. This type of coating system can protect the steel structure for up to 50 years.⁹



This article continues on
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As an innovation leader in the development of high performance coating and sealant raw material technologies, Covestro, LLC enables architects, designers and building owners by providing real world solutions for built environment challenges. Covestro, LLC develops coating and sealant solutions for flooring, interior and exterior walls and trim, and roofing and waterproofing with high performance and sustainability in mind.

QUIZ

- Which of the following is driving the corrosion protection coating market?
 - Aging infrastructure in developed countries
 - Infrastructure being built in developing countries
 - Increasing maintenance and labor costs
 - All of the above
- The protective coating systems for steel are specified based on which of the following?
 - Substrate
 - Service environment
 - Both A and B
 - None of the above
- In which application is steel often protected with a multi-layer direct-to-metal (DTM) coating system to increase the length between maintenance periods because the roof structures on these types of buildings are often difficult to access?
 - Airports
 - Stadiums
 - Museums
 - Indoor swimming complexes
 - Both B and C
- Which SSPC Environmental Zone has a service environment characterized by extremely high temperatures ranging from 650 degrees and higher?
 - 0
 - 1A
 - 3E
 - 4A
- Because surface prep can account for up to _____ percent of a repainting project's budget, it's important to limit the time spent blasting and use the project's intended application to decide which level of surface prep to achieve.
 - 10
 - 20
 - 30
 - 40
- Conventional two-coat and three-coat polyurethane systems often feature a _____ primer.
 - Zinc-rich moisture cure urethane (MCU)
 - Solventborne acrylic polyurethane
 - Solventborne polyester polyurethane
 - Direct-to-metal
- Which steel surface prep standard uses abrasive blast media to clear all oil, grease, dirt, and dust from the surface when viewed without magnification?
 - SSPC-SP 1: Solvent Cleaning
 - SSPC-SP 5/NACE No. 1: White Metal Blast Cleaning
 - SSPC-SP 7/ NACE No. 4: Brush-Off Blast Cleaning
 - SSPC-SP 16: Brush-Off Blast Cleaning of Non-Ferrous Metals
- Which of the following is a benefit of polyaspartic coatings?
 - Eliminates a layer or two of coating
 - High film build
 - Fast drying and curing
 - All of the above
- _____ coating systems bring the benefits of good adhesion on steel, speedy and efficient application, a high degree of weathering and chalking resistance, and long-lasting color and gloss fastness.
 - Polyaspartic
 - Polyurethane
 - Direct-to-metal
 - MCU
- While the cost of _____ topcoats is generally higher than other common topcoats, productivity improvements made possible with this technology usually offset the higher raw material costs by reducing the labor costs and/or the number of layers of paint.
 - Polyaspartic
 - Polyurethane
 - Direct-to-metal
 - MCU

Defend Against the Ordinary

CREATING AN INNOVATION MINDSET IN COMMERCIAL AND RESIDENTIAL CONSTRUCTION AND DESIGN

Presented By:



Going into 2020, the construction industry was at a crossroads. New technologies, design and build practices, and a focus on sustainability and energy efficiency were already changing 'business as usual.' Most of this change was incremental. Then, the unexpected happened, and a novel Coronavirus (COVID-19) became a pandemic and disrupted every industry around the world.

In the past, the concept of innovation has been a desired state for most businesses; a want-to-have, but not a necessity to be profitable. Now, builders and design professionals need to be innovative to survive. COVID-19 has challenged almost every notion of 'business as usual' and forced industries to adapt to change in a

matter of weeks, not years. The ability to think outside the box and retool the old business model will mean the difference between sustainability and insolvency.

2020 TRENDS AFFECTING COMMERCIAL AND RESIDENTIAL CONSTRUCTION

2020 began with a positive outlook for the construction industry. Fears about an impending recession were minimal, and the industry was benefiting from a steady growth market not projected to go down anytime soon.

Overarching trends included:

- Slow but steady growth
- Shift to modular builds
- Sustainability
- Digital adoption

LEARNING OBJECTIVES

1. Understand current business trends affecting design professionals, builders, and contractors and how economic challenges of COVID-19 are forcing professionals to think outside the box.
2. Define innovation, learn the principles of innovation management and how to measure it, and discuss how to innovate during a crisis.
3. Assess how to measure innovation activities, source data, and implement innovation during a crisis, and understand the catalysts for change in the construction industry.
4. Examine innovations in green building practices and how standardization is driving innovation, as well as evaluate the potential impact of financial incentives to invest in innovative activities.

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Commercial construction started 2020 strong with first quarter growth. Despite bottom line pressure, overall revenue growth was still positive. A low profit margin of around 5.5 percent globally meant that there wouldn't be much room for uncertainties in project planning, but a steady shift toward pre-fabrication and modular assemblies were two viable solutions to cost constraints. Few commercial construction projects were utilizing digital tools effectively, yet tech investments were well-known to improve efficiencies and productivity.

Infrastructure upgrades and a shift to sustainability created an environment for dynamic opportunities in commercial design and construction. Urbanization continues to drive the need for more digital technology and sustainable building practices, and commercial builders and designers have a unique opportunity to fill a gap in the marketplace with their knowledge and expertise.¹

On the residential side, more homes were set to be built with an industrial design scheme, moving away from the traditional rustic farmhouse style that had been popular in recent years. Hallmarks of industrial style and design are marked by asymmetrical forms, mixing textures like metal and wood, and smooth, simple lines. The open floor plan was another trend expected to continue into 2020. Multi-function rooms where everyone can gather are preferred over closed off, separate spaces, although this also presents

concerns for noise levels. The irony of open space design is that while homeowners' desire open spaces, they also want quiet spaces. In this respect, homes with separate offices and rooms to work or for relaxation became in-demand.²

A major shift in residential home construction and design going into 2020 was the increased focus on outdoor living spaces. The industry saw more homeowners drawn to designing outdoor patios with indoor comforts, like full kitchens, entertainment areas, furniture, and fireplaces. More builders were starting to include outdoor living spaces in new build options, which not only increased homeowner satisfaction but also project value.

S&P Global's Industry Top Trends for 2020 noted that a quarter of North American homebuilders had a positive outlook due to improved debt leverage, and the majority at least had stable ratings with only about ten percent of builders reporting a negative outlook. Demand for new homes would continue as long as the economy continued to create jobs and boost wages. Revenue growth was supposed to be steady.³

CHALLENGES TO INNOVATION IN THE CONSTRUCTION INDUSTRY

Regardless of whether builders and designers are in commercial or residential construction, the industry has encountered some entrenched challenges to innovation. Macroeconomic factors such as labor

GLOSSARY

Closed Innovation: The concept that innovative ideas and innovation-relevant knowledge should stay within the organization, from idea generation to development and marketing.

Green Districts: Densely populated areas within a city that use technology and design to reduce resource use and pollution.

Innovation: According to ISO: "new or changed entity, realizing or redistributing value" and according to the Oslo Manual: "a new or improved product or process (or combination thereof) that differs significantly from the unit's previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process)."

Innovation Management: Includes all systematic activities to plan, govern and control internal and external resources for innovation, such as how resources for innovation are allocated, organization of responsibilities and decision-making among employees, management of collaboration with external partners, integration of external inputs into a firm's innovation activities, and activities to monitor the results of innovation and to support learning from experience (taken from Oslo Manual).

International Standards Organization (ISO): The International Standards Organization seeks to promote universal best practices in a variety of disciplines that international experts agree on.

Object Approach (to innovation measurement): A measurement framework that focuses on the phenomena of interest. For example, detailed survey questions about a single innovation to understand granular-level details.

Open Innovation: The concept that ideas and innovation-relevant knowledge should flow freely between external organizations, though it does not necessarily imply that knowledge is free or exempt from use restrictions.

Oslo Manual: An international standard of reference for theorizing and measuring innovation.

Productization: The process of taking a skill, service, or individual component and developing it into a standard, fully tested, packaged, and marketable product.

Subject approach (to innovation measurement): A measurement framework that focuses on the actors that are responsible for the phenomena. For example, general survey questions about strategies and innovation practices.



shortages and high cost of goods and supplies create tightened profitability for individual firms.

- Productivity
- Labor shortages
- Digital adoption
- High costs
- Slow growth

For about two decades, construction has averaged only about 1 percent productivity growth each year, compared to 3.6 percent for manufacturing. There are many factors affecting construction's productivity problem, and for at least a couple years industry leaders have been making incremental changes to move the needle faster.⁴ Without enough skilled labor, no amount of large-scale changes can be successful. Construction has struggled to attract and retain a workforce capable of getting the job done right, especially for specialized jobs.⁵

One of the bigger challenges that construction has faced is the risk associated with innovation. It is hard to fully embrace the unknown when profit margins do not allow much room for uncertainty. Though investments in technology and other tools are one way to maximize profitability, ultimately innovation itself holds the key to better profits. One way this has been changing is with drones, jobsite cameras, and AI.⁶

Historically, construction has been slow to adapt to changing technology, but that will need to change if firms expect to continue to compete. Not only can technology and digital tools enhance safety, communication, and project planning, but also customers and workers alike expect digital know-how.

In the short- to middle-term, growth will continue to be difficult. Associated Builders and Contractors reported that confidence among U.S. construction leaders continued

to decline as of July 2020, as sales and profit margin expectations were still below 50. Less than 30 percent of contractors expected increased profit margins over the next six months while almost half expect lower profits. The backlog of projects initially caused by coronavirus shutdowns is almost gone, leading many construction leaders to wonder about what comes next.⁷

The Impact of COVID-19

In the immediate aftermath of COVID-19, many states completely or partially shut down construction operations. While some states deemed construction essential, job sites still suffered due to lack of available employees and supply chain disruptions. Even now, several months into the pandemic, many more uncertainties remain. Jobs that were put on hold may have been cancelled entirely. Increased demands for worker and jobsite safety strained already reduced budgets and stretched productivity and efficiency margins more than usual. Moreover, lenders have been slow to finance new projects with the amount of anxiety in the market. Project financing is at risk, and builders and designers are being forced to rethink the way they do business.⁹

The upside to the pandemic is the push toward innovation for the sake of survival.

OPPORTUNITIES FOR INNOVATION

The future is still bright for construction. There are opportunities for innovation in sustainability, energy efficiency, productivity, digitization, and more. Though adopting an innovation mindset can seem risky and uncertain, there's never been a better time to invest in innovation. A 2018 GE Global Innovation Barometer concluded that "40 percent of innovations over the last five years have had a positive impact on [the] bottom line."¹⁰

COVID-19 is accelerating change that was already happening. According to McKinsey & Company, nine shifts will take place in the construction industry over the next five to ten years. These are:¹¹

- Product-based approach
- Specialization
- Value-chain control and integration with industrial-grade supply chains
- Consolidation

**EMBRACING TECHNOLOGY AND MEETING CUSTOMERS
WHERE THEY ARE: E-COMMERCE SOLUTIONS⁸**

As more business is conducted online, the construction industry must meet its customers where they are, wherever they are. Distributors and suppliers can't rely on in-person sales and meetings anymore. One manufacturer of residential and commercial outdoor products has moved to an online, e-commerce platform to better meet customer needs. This innovative strategy involved partnering with external stakeholders to offer a robust online inventory of products including ornamental steel fencing, residential aluminum fencing, PVC decking, composite decking, and matching fasteners. Says the Director of Channel Sales, Retail, and E-Commerce: "Our industry is changing in front of our eyes—we're seeing more and more buying decisions being made online. By operating in alignment with consumer purchasing habits, we're able to better serve our customers and jumpstart a new phase of company growth."



- Customer-centricity and branding
- Investment in technology and facilities
- Investment in human resources
- Internationalization
- Sustainability

To get there, construction builders and designers will need to adopt an innovation mindset.

WHAT IS INNOVATION?

One of the hurdles that businesses face is a common understanding of *innovation*. The International Standards Organization, or ISO, defines innovation as a “new or changed entity, realizing or redistributing value.” It is an outcome; a destination where the end point may continually be modified depending on market demands. Innovation is more than a process or activity.

ISO’s definition of innovation centers on two characteristics: value and novelty. Value is any kind of value: financial, social, experience, or well-being. ISO goes on to say that anything can be innovated, whether it is a product, service, process, model, or method and innovation can be incremental or radical.¹²

The Oslo Manual (2018), an international standard of reference for theorizing and measuring innovation, defines innovation as “a new or improved product or process (or combination thereof) that differs significantly from the unit’s previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process).”

Innovation is *not*:

- Routine changes or updates
- Capital replacement or extension
- Minor aesthetic changes
- Custom production for one-off items without substantially different attributes
- Advertised concept or product model that doesn’t exist yet
- Outputs of creative or professional services firms, such as reports, books, or films
- Actions taken to extend the range of products or services offered to customers
- Activities of newly created service firms
- Mergers and acquisitions
- Pulling a product, service, or process
- Pricing changes due to external factors
- New corporate or managerial strategy unless it is implemented

QUIZ

- According to the course materials, 2020 trends for the construction industry included all of the following except:

A. Rapid growth	B. Shift to modular builds
C. Sustainability	D. Digital adoption
- Construction has averaged about ____ percent productivity growth each year for about two decades.

A. 3.6	B. 1
C. 2.4	D. 3
- The ISO definition of innovation focuses on two characteristics: _____ and novelty.

A. Productivity	B. Efficiency
C. Profitability	D. Value
- As described in the course materials, examples of innovation do not include:

A. Routine changes or updates	B. Minor aesthetic changes
C. Pricing changes due to external factors	D. All of the above
- ____ percent of global executives say that innovation is extremely important, but ____ percent say they are dissatisfied with their innovation performance.

A. 84 / 94	B. 75 / 85
C. 90 / 95	D. 65 / 85
- This statement is an example of which one of ISO’s Innovation Management Principles? “Create future scenarios and determine the transformations they imply and the structures and resources needed.”

A. Managing Uncertainty	B. Exploit Insights
C. Adaptability	D. Strategic Direction
- According to the course materials, sources for innovation data include all of the following except:

A. Staff emails	B. Surveys
C. Company filings	D. Financial disclosures
- According to McKinsey’s Eight Essentials of Innovation, the first three fundamentals that should be prioritized in an economic downturn are (in order):

A. Evolve, Discover, Choose	B. Discover, Evolve, and Choose
C. Aspire, Accelerate, and Scale	D. Aspire, Discover, and Accelerate
- Green districts can reduce energy consumption by ____ percent.

A. 50–60	B. 45–55
C. 80–95	D. 20–40
- _____ buildings can result in a time savings of around 50 percent compared to other projects.

A. Multi-family	B. Small
C. Modular	D. Green



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DETAILING BARRIER CONTINUITY IN BUILDING ENCLOSURES

A continuing education preview sponsored by ZIP System® building enclosures

The role of the building enclosure is to provide proper separation between the building interior and the exterior. Beyond the structural enclosure, separation is accomplished through the use of four primary types of barriers: water-resistant barriers (WRBs), air barriers, thermal barriers and vapor retarders. All of them are intended to restrict or control the passage of a targeted item (water, air, heat or moisture) through a roof, wall or foundation system.

While this can seem straightforward along flat, continuous surfaces, it is the non-continuous conditions that present design and construction issues. These can include transitions from one material to another, penetrations, interruptions caused by planned openings such as windows and doors, or changes in surfaces such as roof/wall junctions or parapets.

The key to continuity in building enclosure systems is a careful and coordinated approach to consistent detailing. Understanding the choices and developing complete details as part of construction drawings is the best way to ensure continuity in the building's enclosure for an airtight, weather-resistant exterior that promotes energy efficiency and long-term durability.



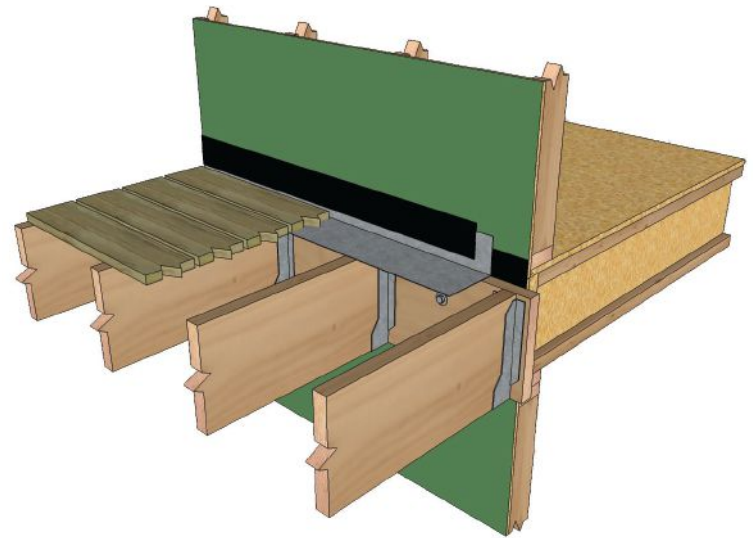
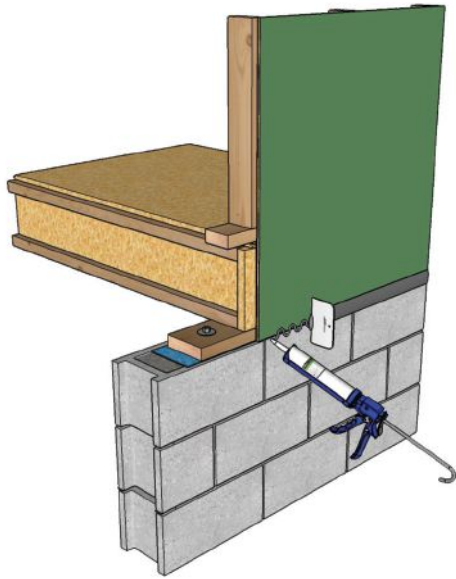
CHOICES IN BARRIER SYSTEMS

As with most design and construction systems, there are choices available for how to achieve each of the four barriers and their continuity on and around a structural framing system.

The conventional approach is to use a multiproduct, multilayer design in which

**PROPER DESIGN AND
SPECIFICATION DETAILS ARE
CRITICAL TO REDUCE THE
RISK OF COMPROMISING
THE FOUR PRIMARY
BARRIERS.**

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The joint where the wood framing meets the foundation wall needs attention to be sure that any wayward air or water does not penetrate. In this case, ZIP System™ liquid flash can be applied as a coating across the joint and ensures continuity.

For decks and balconies, once the ledger board is in place, the joint between it and the wall needs to be addressed to be sure that the barriers remain protected. Metal flashing that extends from the wall and under the decking or above balcony flooring should be covered at the top with ZIP System™ flashing tape for continuous protection.

each of the four barriers is specified and installed as a separate layer in an assembly. This requires specifying multiple products that need to be compatible. Each serves a single function and has individual installation requirements, often performed by different trades during construction, which can raise the risk of delay or incorrect installation, increasing the need for coordination. Further, to be sure that their installed performance will be satisfactory, the particular combination of products needs to have been tested to ensure they meet all of the water, air and thermal thresholds required for the assembly. There also needs to be proper detailing between the materials to ensure the total system will work as intended.

As an alternative, there are integrated sheathing product solutions that have become available. One of the most common transitions design and build teams is making is replacing the sheathing-plus-housewrap assembly with ZIP System® sheathing and tape, eliminating the need for housewrap. The newest addition to the ZIP System® brand of products is ZIP System® R-sheathing, which additionally incorporates built-in polyisocyanurate foam exterior insulation.

A revolutionary new approach to building enclosures, ZIP System sheathing and tape

products streamline the weatherization process with an integrated air and water-resistant barrier and advanced-acrylic tape for panel seams and flashing details that deliver moisture and air protection in one easy-to-install system.

This means that a single, high-performing engineered wood sheathing product can be specified, used as the basis of design and installed by a single trade to achieve water, air and thermal barriers. This online course will show detailed specifications for critical transitions in places like windows, doors and wood to masonry when specifying wall assemblies using ZIP System sheathing and tape with an integrated water-resistant barrier onto the surface of the engineered wood sheathing.

The 2015 IRC now includes prescriptive requirements for exterior continuous insulation in certain climate zones. ZIP System R-sheathing includes a thermal barrier of continuous insulation in a variety of thicknesses to help achieve the right R-value for your wall design. Installed with the exterior wood panel with the integrated weather-resistant barrier on the outside, it creates a solid, nailable, easy-to-flash base for exterior cladding systems and transitional areas. The preapplied continuous foam insulation is on

the back of the sheathing and is installed against studs using manufacturer-prescribed fastening schedule and screws, per ZIP System R-sheathing installation, to achieve necessary shear strength. To ensure the best continuity of air, water and thermal barriers with ZIP System® sheathing products, this course reviews how to detail areas such as joints, penetrations and openings using ZIP System™ flashing tape, ZIP System™ stretch tape and ZIP System™ liquid flash.

The full CEU course will explain in-depth the continuity issues of the four primary barriers and review a series of drawings and details that can help accomplish a continuous building enclosure system on critical transitions. Learn more about ZIP System sheathing and tape by visiting ZIPRevolution.com.



Continue this CEU course at <http://go.hw.net/Huber318>

Making the Business Case for Building with Insulated Concrete Forms: Energy, Safety, and Savings

Presented By:



Western State Colorado University Student Apartments. Photo: Design West Architects

INTRODUCTION

Developers live by two rules: minimize cost and minimize risk. There is a common misconception that building with concrete is more expensive than wood frame. But the reality is that concrete building systems such as insulated concrete forms (ICFs) have made concrete construction competitive on a first cost basis and more profitable in the long run because of energy cost savings, lower insurance costs, and reduced tenant turnover.

With softwood lumber prices rapidly increasing and concrete prices remaining stable, more developers are choosing to build with concrete. In addition, increased risk from structure fires, along with risks from natural disasters such as hurricanes, tornadoes, and

wildfires makes concrete the material of choice for life safety and reducing long term costs. This results in a long-term investment strategy for apartments, condos, hotels, dormitories, and long-term care facilities.

The Calvert Lancaster apartment building in East Harlem, New York City is an example of ICF being able to withstand a disaster, saving lives and protecting long-term investments. In 2014, a natural gas explosion in the neighborhood leveled two five-story apartment buildings and shattered the windows of structures in the surrounding block. Eight people were killed and seventy others injured.

Immediately next door to the explosion was the four-story Calvert Lancaster building.

LEARNING OBJECTIVES

1. Demonstrate the economic benefits of building multifamily projects with insulating concrete forms (ICFs), including first cost and long-term value.
2. Understand the basic design criteria and construction elements of structures built with ICFs for multifamily residential projects.
3. Assess when to use or consider using ICFs.
4. Evaluate the energy efficiency, disaster resilience, and noise mitigation properties of ICFs.

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Photo courtesy of Steve Bluestone

Despite being situated just inches from the blast, no one in the building was harmed, and all the occupants managed to evacuate safely.



Photo courtesy of Steve Bluestone

Curtis + Ginsberg Architects designed the building using ICF construction. The exterior walls were “formed by pouring concrete in a rigid foam form framed with steel rebar.” Curtis + Ginsberg partner Mark Ginsberg states, “there were only a few cracks in the concrete—remarkable, considering the impact of the explosion. The ICF facing those two buildings got a little charred but didn’t burn.”¹

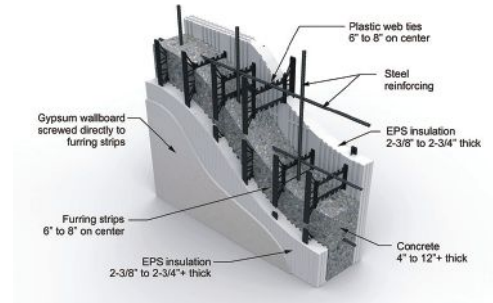
The 6 to 8 inches of concrete provided the building with a fire break, and the New

York Building Department informed owner Steve Bluestone that “amazingly, ‘there was no structural damage at all.’” There was also no damage to the cellar of the building where the boiler, hot water heater, laundry equipment, water booster pump, and fire pump were located.²

DEFINING INSULATED CONCRETE FORMS

ICFs combine two building products: reinforced concrete for strength and durability and expanded polystyrene (EPS) insulation for energy efficiency. ICF walls are made up of two layers of rigid insulation held together with plastic ties to form ICF units with a cavity in the center. The ICF units are stacked in the shape of the wall, reinforcing steel is added into the form cavity, and then concrete is placed into the form. The result is a reinforced concrete wall with a layer of insulation on each side. What makes ICFs different than traditional concrete construction is that the forms remain in place after the concrete is cured to provide thermal insulation. The combination of reinforced concrete and insulation provides an ideal load-bearing wall, thermal envelope, fire barrier, and sound barrier.

ICF wall systems have been used for bearing wall buildings ranging from single story to high-rise buildings over 20 stories tall and everything in between. In addition to ICF walls, there are also ICF floor and roof



Typical ICF wall detail. Image courtesy of Logix

systems. The concept is similar in that the ICF form is made with rigid insulation to function as a one-sided form at the bottom surface. The forms are installed to span between concrete walls, reinforcing steel is placed and then concrete is placed over the forms. The result is a reinforced concrete floor or roof with rigid insulation on the bottom.

There are examples of ICF buildings all over the U.S. and Canada including single-family residential, multifamily residential, hotels, dormitories, assisted living facilities, offices, healthcare facilities, manufacturing, and warehouse buildings. Schools built with ICF are popular due to low- or net-zero energy use. Theaters are also trending towards ICF construction for superior sound attenuation. Because apartments, dormitories, senior residences, and hotels and motels are typically revenue generating properties, ICFs are particularly well-suited for this type of construction.

What makes ICFs so attractive for multifamily construction is that they are cost-competitive with wood frame. A building owner gets a building that is more disaster resilient and energy-efficient at or nearly the same cost. Fire safety is a key element of multifamily construction since occupants sleep in these buildings and are often challenged to evacuate during a fire. Concrete walls and floors provide the fire resistance needed to not only allow occupants to evacuate but contain the fire within a single unit, imposing less risk on firefighters and property.

ICF Wall Systems

The efficient construction process is what sets ICF building systems apart from other building systems such as wood frame and

CASE STUDY

Western State Colorado University Student Apartments, Gunnison, Colorado (see cover image)

Sitting at 8,000 ft, this Colorado mountain campus had to be built to withstand life at high altitudes and a severe winter environment, which is why Design West Architects chose a four-story building design with ICF walls with masonry and stucco veneer. This design also provided Western State Colorado College with the best possible long-term value.



The strength is built-in with ICFs, and the floors are a composite steel joist and concrete floor deck system with metal framed interior walls with high impact finishes and light gauge metal roof trusses. All the rooms have a view in this building with almost 90,000 gs of apartment style suites. Campus apartments offer 2-, 3-, and 4-bedroom units, providing 228+ beds in single and double occupancy bedroom options.

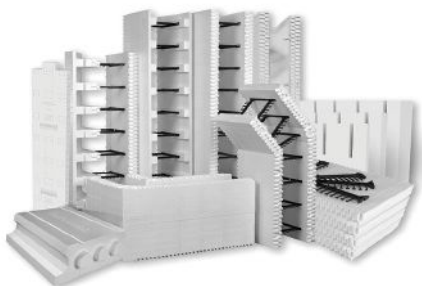
Other modern solutions, including innovative touches like roof coverings that are a combination of high impact concrete “S” tiles and standing seam metal roof panels, help keep students comfortable in snowy but sunny surroundings. This student housing project not only enhances the beautiful campus but will deliver decades of value to the university.

steel frame. ICF construction can help contain construction costs and reduce construction time because of the inherent efficiencies of the installed assembly, which serves nine functions:

1. Concrete form (that stays in place)
2. Thermal barrier
3. Air barrier
4. Moisture barrier
5. Fire barrier
6. Sound barrier
7. Substrate for running utilities
8. Substrate for attaching finish materials
9. Reinforced concrete structure

In other forms of construction, these functions are installed by several different trades, usually at a significant added cost. General contractors can realize a number of on-site efficiencies including fewer trades, reduced crew-size, and accelerated construction schedules. Because construction schedules are usually much shorter with ICF construction, the general contractor can finish on time and within budget. The building owner can put the building into service sooner, cutting short his financing costs and initiating a quicker revenue flow.

There are many different ICF manufacturers with similar ICF systems. The blocks range in size from 48 to 96 inches long and 12 to 24 inches high depending on the manufacturer. The most common configuration of an ICF unit is made up of two layers of 2-3/8-inch to 2-3/4-inch thick EPS insulation spaced 4, 6, 8, 10, or 12 inches apart depending on design requirements. The most common spacing is 6 inches or 8 inches for most low to mid-rise buildings, but for taller buildings, taller walls, or exceptionally large loadings, thicker walls are necessary. For simplicity, ICFs are generally called out by the width of the cavity,



ICF wall and floor components. Image courtesy of BuildBlock

CASE STUDY

West Village Student Housing at Texas Tech University, Lubbock, Texas

A design-build project with Whiting-Turner, BGK Architects, and Mackey Mitchell Architects, this 230,000-square-foot student West Village student housing complex at Texas Tech University implemented fast track construction methods to deliver the project within an incredibly compressed schedule—16 months for design and construction. This \$54.8 Million project contains 455 beds, community lounges, and conference rooms as well as designated study rooms. The complex was designed to meet LEED certification serving as a model for Texas Tech's newly adopted sustainability initiatives.

Expected to reduce energy consumption by at least 20% over a typical residence hall, West Village utilizes ICF walls and precast hollow core floors, which deliver a highly energy efficient, structurally solid, exceptionally fire-resistant, and acoustically sound dormitory.

Another key aspect of the project is indoor air quality. EPS is a stable and durable material ideal for construction. No chlorofluorocarbons (CFCs), hydrofluorocarbons (HFCs), or formaldehydes are used in the manufacturing process, and there is no off-gassing



West Village Student Housing. Photo courtesy of Mackey Mitchell Architects



West Village Student Housing Under Construction. Image courtesy of Fox Blocks

GLOSSARY

Capitalization Rate (Cap Rate)—a real estate valuation measure used to compare different real estate investments. Cap rate is calculated as the ratio between the net operating income produced by rental property and the original capital cost (the price paid to buy the asset) or its current market value. Generally, the higher the cap rate, the more valuable the property.

Continuous Insulation (CI)—defined by ASHRAE 90.1 as “insulation that is continuous across all structural members without thermal bridges other than fasteners and service openings”

Expanded Polystyrene (EPS) Insulation—closed-cell insulation made from polystyrene polymers

Insulated Concrete Forms (ICFs)—made from reinforced concrete and expanded polystyrene insulation (EPS); made up of two layers of rigid insulation held together with plastic ties, forming units with a cavity in the center; reinforcing steel is added to the cavity and then concrete is poured into it

Insulated Concrete Form (ICF) Blocks—range in

size from 48 to 96 inches long and 12 to 24 inches high depending on the manufacturer; most common configuration is made up of two layers of 2-3/8-inch to 2-3/4-inch thick EPS insulation spaced 4, 6, 8, 10, or 12 inches apart depending on design requirements

Mass Wall—provides energy efficiency; stores energy during the day and releases it at night; includes ICF, concrete, and concrete block

R-value—measures resistance to heat flow; the higher the R-value, the greater the resistance
Reinforced Concrete—steel is embedded into the concrete to resist stresses

Resilience—Resilience is the ability to reduce the magnitude and/or duration of disruptive events. The effectiveness of a resilient building depends upon its ability to anticipate, absorb, adapt to, and/or rapidly recover from a potentially disruptive event including natural and manmade events such as fire, wind, earthquakes and flooding.

Thermal Mass—a material's ability to absorb and store heat

hence an ICF with a 6-inch cavity is called a 6-inch ICF and an ICF with an 8-inch cavity is called an 8-inch ICF.

ICF manufacturers have a variety of ICF blocks to accommodate any design condition and offer thorough technical support including design manuals, design details, engineering support, and all the test reports needed for commercial construction including fire, energy, and noise. They have special components including straight blocks, corner blocks, brick ledge, angled block, curved blocks, and half-height units, minimizing the need for field modifications and further reducing construction time.

Another benefit of ICFs is that construction projects can continue through the coldest and hottest weather because of the insulating quality of the ICF forms. This means that concrete will continue to gain strength within the protective formwork despite freezing conditions and not overheat during extreme summer conditions.

SPONSOR INFORMATION



Build with Strength, a coalition of the National Ready Mixed Concrete Association (NRMCA), educates the building and design communities and policymakers on the benefits of ready mixed concrete, and encourages its use as the building material of choice. No other material can replicate concrete's advantages in terms of strength, durability, safety and ease of use.

NRMCA offers free concrete project design and technical assistance to help design and build with concrete. The Concrete Design Center can help specifiers do a cost comparison between building materials and offer a solution both in terms of first cost and long-term costs.

In short, the Concrete Design Center experts can help select the right concrete solution for a wide variety of projects from multi-family residential/mixed-use to industrial and health care facilities. Visit www.buildwithstrength.com/design-center.

QUIZ

- Typical Insulated Concrete Forms (ICFs) are comprised of what materials?
 - Wood and reinforced concrete
 - EPS insulation and reinforced concrete
 - Brick and mortar
 - All of the above
- ICFs are used to build which of the following?
 - Multifamily buildings
 - Commercial buildings
 - Schools
 - All of the above
- ICFs are best used for what type of structural application:
 - Moment resisting frame
 - Hybrid steel-shear wall buildings
 - Stick built
 - Bearing wall buildings
- ICFs are most often used in in which of the following situations?
 - The developer will build and hold the building
 - The building is a curtain wall building
 - The energy codes are outdated
 - The developer will build and sell the building
- What type of floor system can be used with ICF walls?
 - Wood or steel joists
 - Precast hollow-core plank
 - ICF floors
 - All of the above
- What does "NOI" stand for?
 - Noise Objection Index
 - Net Objective Income
 - Net Operating Income
 - Net Operating Index
- An ICF building can increase operating income for the owner in which of the following ways?
 - Reduce losses to vacancy
 - Reduce insurance premiums
 - Reduce energy bills
 - All of the above
- Typical whole wall ICF assemblies have an R-value between _____ depending on the exterior and interior finish materials.
 - R-11 and R-13
 - R-17 and R-19
 - R-24 and R-26
 - R-7 and R-9
- Using ICF can result in energy savings ranging from 20% to _____.
 - 50%
 - 45%
 - 40%
 - 30%
- The house in Mexico Beach, Florida, built with ICF construction and discussed in the introduction of the course, was able to withstand a category ____ hurricane where winds reached up to 156 mph.
 - 1
 - 2
 - 3
 - 4



This article continues on <http://go.hw.net/AR122020-4>. Go online to read the rest of the CEU course, complete the corresponding quiz for credit, and receive your certificate of completion.

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Backed by the National Ready Mixed Concrete Association, Build With Strength is a diverse coalition that educates the building and design communities on the benefits of concrete. **Join us at buildwithstrength.com.**



A COALITION OF THE NATIONAL READY MIXED CONCRETE ASSOCIATION



Kitchen Design for the Next Generation

SUSTAINABILITY, PLANNED DURABILITY, AND MINDFULNESS

Presented By:



Clients between the ages of 30 and 44 are more confident, connected, and open to change.

INTRODUCTION: THE IMPACT OF GENERATIONAL TRAITS ON DESIGN

Generations younger than Baby Boomers, particularly those between the ages of 30 and 44—a combination of older Millennials and young Gen Xers—are sometimes characterized as being “demanding, impatient, environmentally aware, social, and emotional.”¹ Another, perhaps more flattering description of this generational cross-section is “confident, connected, and open to change.”² To assess generational traits more deeply, however, one manufacturer continually studies the ways in which such generational traits can impact design.

Clients between the ages of 30 and 44:

- Want to be more/very involved in the design process
- Often believe they are experts in design (primarily due to the internet and home

renovation television shows)

- Would like guidance but are less receptive to designers’ ideas
- Want frequent communication
- Want things instantaneously, might be impatient or demanding
- Do a lot of research and ask, “What are my options? How long will it last? What are people saying about it? Am I getting the best price?”
- Are influenced by social media
- Find aesthetics critical
- Seek clean, sleek, simple, modern, uncluttered design
- Express concern for the environment
- Want to lead healthy, active lives
- Value corporate transparency
- Value experiences

By understanding what this sub-section of clients need, want, and expect, specifiers can

LEARNING OBJECTIVES

1. Understand the impact of generational traits of younger Gen Xers and older Millennials on homebuying, renovating, and design.
2. Evaluate suggestions for sustainable kitchen design, including IAQ (Indoor Air Quality), ventilation, cabinets, and lighting.
3. Assess how mindful design can positively impact wellbeing and sustainability, as well as cater to younger clients.
4. Appraise mindful kitchen appliances designed for “planned durability” and with wellness and the environment in mind.

CONTINUING EDUCATION

AIA CREDIT: 1 LU/HSW

IDCEC CREDIT: 0.1 CE/HSW



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more easily overcome design challenges while simultaneously better serving this up-and-coming customer base.

Homebuying Traits and the Power of Smaller Homes

Equally relevant to design professionals are the findings of The National Association of Home Builders (NAHB): Millennials are starting to dominate the housing market, and demands are increasing for entry-level homes. Specifically, the NAHB states that Millennials often seek to purchase homes with three bedrooms and two bathrooms that



Energy efficient windows, Energy Star-rated windows and appliances, and programmable thermostats matter most to younger homeowners.

also have outdoor space and multi-purpose interior spaces. Importantly, the NAHB claims that homeowner households increased by 1.5 million in 2017, and the number of renter households declined by 76,000. The NAHB has concluded that in order to become homeowners, Millennials are “willing to compromise on space.”³

Gen Xers, too, trend toward smaller homes, albeit slightly larger than those sought by Millennials. According to the NAHB, Gen Xers typically purchase three- to four-bedroom homes, and the size of the house, the features it comes with, and the lifestyle it supports are often more important than the surrounding community. Like Millennials, Gen Xers do a considerable amount of research before purchasing or renovating a home and have clear ideas of what they want before hiring a realtor, architect, or designer. Many Gen Xers also plan to live in their homes for more than ten years, not necessarily seeking larger houses, but valuing spaces that are flexible enough to support different stages of their lives.⁴

In an interview with the *Boston Globe*, architect and author of *The New Small House*, Katie Hutchison, notes that living in a smaller home can be “empowering

[because there is] less to maintain and less to worry about acquiring.” She further claims that living in compact spaces allows people to focus on purpose and not be “distract[ed...] from what matters.”⁵ When asking home builders and new home buyers “what mattered,” or what they were most likely to include in a home, the NAHB’s 2015 survey found that four of the top “asks” of younger generations had to do with energy efficiency: low-E windows, Energy Star-rated windows and appliances, and programmable thermostats. Millennials were even willing to pay 2–3% more for energy efficiency as long as lower electricity bills reflected that expenditure.⁶ Gen Xers, too, are noted for being “practical about their homes” and not wanting to “waste energy and space.”⁷

Renovation Trends

Many in this cross-generational group of older Millennials and younger Gen Xers are more likely to renovate their existing homes rather than sell and move. In part, this is because people of the ages between 30 and 44 “had to compromise on the size and condition of their starter homes—with many purchasing homes in need of repair just to be able to afford homeownership.”⁸

GLOSSARY

Millennial—A generation of people with specific traits identified by the Pew Research Center generally as having been born between 1981 and 1996.

Baby Boomer—A generation of people with specific traits identified generally as being born between 1946 and 1964.

Generation X—This generation was roughly born between the 1960s and early 1980s.

Upcycle—To reuse materials in a way that creates a better or higher quality product than the original.

Volatile Organic Compounds (VOCs)—Group of chemicals found in many products in a home that “off-gas,” negatively affecting indoor air quality.

Medium Density Fiberboard (MDF)—An engineered wood product containing high levels of VOCs.

Forest Stewardship Council (FSC)

Certification—Ensures that natural wood products come from forests that are responsibly managed and also provide environmental, social, and economic benefits.

Indoor Air Quality (IAQ)—The quality of air within a structure; affects occupant health and wellbeing.

Internet of Things (IoT)—In short, everyday objects communicate with one another by sending and receiving data.

Planned Obsolescence—A product quickly needs to be replaced and repurchased either due to changes in design, lack of replacement parts, or the use of inferior materials.

In terms of existing homeowners, a recent “State of Home Spending” Home Advisor report indicates that Millennials “are more likely than any other generation to remodel any part of their home—and take on the highest number of projects.”⁹ While Millennials are driven by a desire to increase the value of their homes, and “improve aesthetics and design,” Gen Xers tend to remodel to “modernize” their homes. Both groups remodel to increase their own happiness or the happiness of their families. When renovating, both groups trend towards updating kitchens and bathrooms, prioritizing new appliances and hardwood refinishing. Other popular areas of renovation are exterior painting and replacing cabinets and countertops. Both groups conducted significant research prior to beginning renovations, with 77% of Millennials and 70% of Gen Xers searching the internet to do so.¹⁰



Both Millennials and Gen Xers renovate to increase their happiness and tend to focus on kitchens and bathrooms, prioritizing new appliances and hardwood refinishing.



Energy-efficiency/Energy Star ratings, durability/longevity, and induction cooking are all popular areas of consideration when upgrading appliances

Home Advisor also notes that while bathrooms remain the most popular area of remodel in any generation, the “preference gap” between bathroom and kitchen renovation shrinks with younger clients. In other words, Millennials and Gen Xers are more likely to renovate their kitchens than older generations. This is primarily “attributable to the dominance of the kitchen as the entertainment hub of the home, a resurgence of interest in cooking among Millennials thanks to social media, the generation’s interest in health, and the Millennial need for a high return on investment.” Home Advisor further notes, “Minor kitchen remodels provide a better ROI than any bathroom remodel.”¹¹

Overall, the 30 to 44-year-old demographic of older Millennials and younger Gen Xers trends towards buying and renovating smaller homes. They are more affordable, easier to maintain, and more environmentally friendly. In other words, rather than square footage, this age group wants smarter, more efficient homes that are flexible enough to support various stages of life. By understanding the wants, needs, and trends of the age group most likely to build, buy, and renovate, design professionals can more smoothly interact and engage with their clients, overcoming challenges as well as making relevant design recommendations. This course will specifically examine the ways in which generational traits encourage

sustainable kitchen design and renovation, as well as the roles of mindfulness, functionality, and durability when designing or specifying appliances for younger generations.

KITCHEN RENOVATION AND DESIGN: SUSTAINABLE SUGGESTIONS FOR ECO-CONSCIOUS GENERATIONS

A recent Gallup poll determined that 67% of people aged 18 to 29 and 49% of those aged 30 to 49 consider global warming a serious threat and that “climate-focused corporate social responsibility” is “meaningful to younger generations.” Seventy-three percent of Millennials, who make up \$1 trillion in consumer spending, also “say they’d spend more for sustainable products.”¹²

In terms of the kitchen, sustainable design is initially concerned with appliances and their attributes, which is also consistent with the renovation preferences of 30–44-year-olds reflected in Home Advisor’s “State of Home Spending” report. Energy-efficiency/Energy Star ratings, durability/longevity, and induction cooking are all popular areas of consideration when upgrading appliances and will be discussed in greater detail in an upcoming section.

Homeowners and design professionals should also consider the materials from which appliances, cabinets, flooring, and countertops are constructed. For example, when choosing a new countertop, designers can help homeowners assess how it was

manufactured, including the energy and resources consumed during production as well as the countertop’s carbon footprint. Beyond aesthetics, specifiers can help homeowners make informed choices regarding kitchen renovation and design that better reflect sustainability goals, environmental ideals, and wellness.

Purposeful Renovations

For architects and designers working with homeowners looking to renovate their kitchens sustainably, it is worth assessing how much of the original kitchen can be used. For instance, do walls really need to be knocked down, or is the existing layout good? Do kitchen cabinets need to be fully replaced, or can they be updated by simply replacing doors and drawers? Some designers, such as Sam Rowlands at Altereco Design, maintain that “doing nothing—keeping [an] existing kitchen—is better for the environment than putting in a new one. [...] But if it has to go [...] recycle and repurpose whatever you can. You might be able to find a new home for the kitchen online or use it for storage in a shed.”

When performing kitchen renovations or attracting new clients, particularly those of younger generations interested in sustainability and repurposing, it is helpful to note that different companies upcycle kitchens and kitchen components. The company will come to the client’s home; remove existing cabinets, appliances, countertops, lighting, and other

materials; and repurpose/resell them to other homeowners. The homeowners who repurpose their former kitchens will receive tax benefits, save on disposal fees, and have the knowledge that their kitchens were upcycled rather than contributed to landfills. The homeowners purchasing the upcycled kitchens can ultimately save considerable amounts of money while knowing that their “new” kitchens positively benefitted the environment.¹³

Material Selection: Cabinets and Lighting

Specifiers should generally consider—for renovations and new builds alike—what materials are made from and whether they are renewable; how far products need to be transported; whether the materials are durable and what their expected lifespan is; and finally, whether the materials can be reused, recycled, or repurposed at the end of their lifespans. Eco-friendly suggestions for replacements for more common materials when renovating kitchens include:

- Benchtops made from natural or manufactured stone (the latter pending the manufacturer’s cutting process).



This article continues on
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SPONSOR INFORMATION



Sub-Zero, Wolf, and Cove appliances are finely crafted with premium materials, beautifully designed, and tested to perform for over 20 years of daily use. We are dedicated to fulfilling the highest kitchen aspirations of our customers, as well as supporting our trade community with tools that make it easier to specify, configure, and install our products.

QUIZ

- Which of the following describes a trait of clients between the ages of 30 and 44?
 - Want to be more/very involved in the design process
 - Find aesthetics critical
 - Want things instantaneously
 - All of the above
- The NAHB states that _____ often seek to purchase homes with three bedrooms and two bathrooms that also have outdoor space and multi-purpose interior spaces.
 - Millennials
 - Gen Xers
 - Baby Boomers
 - Gen Z
- Millennials were even willing to pay _____ more for energy efficiency as long as lower electricity bills reflected that expenditure.
 - 1-2%
 - 2-3%
 - 5%
 - 10%
- A study conducted by the World Wildlife Fund determined that up to _____ of exotic hardwoods are harvested illegally.
 - 10%
 - 25%
 - 50%
 - 75%
- The National Center for Healthy Housing (NCHH) recommends filters with MERV ratings between _____.
 - 1-2
 - 4-3
 - 5-6
 - 6-8
- To contribute to high-quality IAQ, which of the following are an appliance that can be specified for good spot ventilation?
 - Wall hoods and island hoods
 - Downdrafts and under-cabinet hood inserts
 - Hood liners and ceiling hoods
 - All of the above
- Which of the following can be said to facilitate air exchange between the indoors and outdoors, by drawing fresh air into the home to replace exhausted air, as well as help to avoid negative pressure conditions within the home?
 - Island hood
 - Under cabinet hood insert
 - Make-up air (MUA) damper
 - Hood liners
- According to the course materials, Ram’s first Principle of Good Design is that “Good design is _____.”
 - Useful
 - Honest
 - Innovative
 - Aesthetic
- According to the course materials, induction cooktops are _____ more efficient than gas or electric.
 - 10%
 - 25%
 - 40%
 - 75%
- The course materials discuss planned obsolescence as an idea that could potentially point back to around _____.
 - 1910
 - 1924
 - 1915
 - 1900

Settling In

SUSTAINABLE STRATEGIES FOR DESIGNING AFFORDABLE MULTIFAMILY HOUSING PROJECTS

Presented By:



LEARNING OBJECTIVES

1. Trace the history of building codes in the U.S., understand basic code differences between residential and multifamily housing, and recognize major changes to the 2018 IBC regarding multifamily housing.
2. Recognize zoning distinctions and analyze the ways in which zoning might be leveraged to provide affordable multifamily housing, including upzoning and the missing middle.
3. Assess sustainable, affordable design strategies for multifamily housing in urban areas.
4. Examine how to specify budget-conscious, aesthetically pleasing, durable materials for affordable multifamily housing projects.

CONTINUING EDUCATION

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INTRODUCTION

Building codes in the U.S. today have their roots in urban development, multifamily housing, and a fear of fire. In 1630, for instance, concern for fire safety led the city of Boston to outlaw thatch roof coverings and chimneys made of wood. Within a few centuries, increasing populations and “unsanitary” conditions led to protests, model codes, and wider adoption of code.¹ Early building regulations are not entirely dissimilar from modern code in that both seek to protect property from harm and prioritize life safety.

Today, code provides a foundation for responsible design and is also a starting point for considering sustainability, wellness,

and connectedness in multifamily housing projects. After distinguishing basic differences between residential and multifamily housing code, this course will examine zoning laws, which also seek to protect businesses and residents, and the ways in which zoning can be leveraged to develop and design affordable multifamily housing. From there, the course will consider various strategies that enable specifiers to design multifamily housing projects that pursue “equity, sustainability, resiliency, and healthy living”² while remaining budget conscious. Finally, material durability and selection will be discussed, as well as the potential for affordable multifamily housing projects to achieve Living Building Challenge certification.

CODE DISTINCTIONS BETWEEN SINGLE AND MULTIFAMILY HOUSING

The International Code Council (ICC) strives for openness, transparency, balance of interest, and due process throughout its code development process, and the International Building Code (IBC) ultimately seeks to make buildings safer for occupants while avoiding “catastrophic consequences of building-construction failures.”¹⁰

Chapter 3 of the 2018 IBC discusses occupancy classification and use, defining occupancy classification as “fundamental in the setting of features of construction; occupant safety requirements, especially building limitations; means of egress; fire protection systems; and interior finishes.”¹¹ Section 310

covers residential occupancy, which is divided into Groups R-1, R-2, R-3, and R-4.

Residential Group R-2

Any residential structure used for sleeping that is not regulated by the International Residential Code (IRC) is classified under Group R of the IBC. The IRC addresses “the design and construction of one- and two-family dwellings and townhouses not more than three stories above grade.”¹² Therefore, the IRC applies to some multifamily projects. Where multifamily projects are outside of the scope of the IRC, they are classified in Group R of the IBC. Multifamily dwellings, or “apartment houses” as they are termed

by the IBC, are classified under Residential Group R-2.

The National Multifamily Housing Council (NMHC) has identified changes between the 2015 and 2018 IBC, categorizing those changes as either “Revision,” “Clarification,” “New Exception,” “Revised Definition,” “New Option,” “Update,” or “Major Change.” The NMHC then determined whether the changes were favorable or unfavorable actions for multifamily housing, simply items of interest, or issues related to fires in apartments. Some of the major code changes identified by the NMHC are as follows:

- In terms of Fire Wall Framing, IBC 706.2 Structural Stability, the NMHC notes, “Light

frame construction practices have required fire walls to be designed to avoid damage to or structural failure of the fire wall, in the event that the structure on either side of the fire wall should collapse. Fire walls have been required to be anchored to wall framing on either side with break away fasteners and be independent of the structure framing. This new exception allows for double framed firewalls with limited continuous sheathing from one structure to the other, provided the framing complies with NFPA 221 and the sheathing does not exceed 3/4 inch in thickness.”

- Another relevant major change is to IBC 503.1.4 Occupied Roofs: “This is a major

A BRIEF HISTORY OF CODE

Several factors influenced current U.S. building code. A research article from *Cityscape: A Journal of Policy Development and Research*, identifies “four foundations” supported by “three buttresses.” The foundations are identified as

1. The insurance industry
2. The tenement and housing movements
3. The engineering profession
4. The construction industry³

Foundations

The Insurance Industry

Beginning in the 19th century, insurance companies regulated fire and electrical safety in buildings. Organizations such as Underwriters Laboratories (UL) and the National Fire Protection Association (NFPA) originated within this system out of concern for property risk and the risk of fire spread from one property to another, and the first model building code was published in 1905. Life safety was not “articulated and institutionalized” until 1913.⁴

The Tenement and Housing Movements

Also at the end of the 19th century, tenement and housing laws developed in response to national outcry over unsanitary and unhealthy housing conditions. By 1900, numerous charities banded together to form the National Housing Association to lobby for housing reform. This led to the inclusion of health and sanitation regulations alongside early fire codes, and the New York Tenement House Act of 1901 became the model legislation for cities across the U.S.⁵

The Engineering Profession

The American Society of Civil Engineers (ASCE) and the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) evolved from civil and structural engineering groups that “provided the foundation for the structural requirements of building regulations.” In the second half of the 19th century, “structural analysis and design methods had been developed for various structural materials.” ASCE and ASHRAE currently provide consensus standards for structural design, mechanical codes and standards, and plumbing codes and standards.⁶

The Construction Industry

Credited with strongly influencing plumbing codes, the U.S. construction industry’s earliest known plumbing code was developed in 1870 in Washington, D.C.; many early plumbing codes varied according to local practices. The National Association of Master Plumbers (now the PHCC) published a model plumbing code in 1933. The National Association of Home Builders (NAHB), founded in the early 1940s, also has a vested interest in code and prioritizes safe and affordable housing.⁷

The four foundations mentioned above are in turn buttressed by

- The federal government
- The model code groups
- The voluntary consensus standards organizations⁸

Supports

The Federal Government

The federal government often provides technical advice or expertise and helps to create national policies. Organizations like the U.S. Department of Housing and Urban Development (HUD), the Consumer Product Safety Commission, the U.S. Department of Energy (DoE), Federal Emergency Management Agency (FEMA) have all contributed in various ways to different code provisions or standards.

Model Code Groups

In 1994, the three major regional model code groups, the ICBO, SBCCI, and BOCA, joined together to create the International Code Council (ICC). The ICC now publishes and updates (every three years) model codes on building, plumbing, fire prevention, mechanical requirements, housing, and more.⁹

The Voluntary Consensus Standards Organizations

ASCE, ASHRAE, ASTM, and the NFPA form committees to develop, maintain, and update standards, striving to achieve balance between stakeholders throughout the process.

change for defining and classifying the appropriate use of an occupied roof. These provisions outline the occupant loads, acceptable use groups for occupying roofs or portions thereof, establish the allowable height limitations, provide specific language and guidelines for when the occupied roof qualifies as a story. This change will create a uniform understanding for designers and code

officials across the country for occupied roofs and provide the needed guidance for the determining the appropriate level of life safety for allowing the use of the roof as an occupied space.”

- IBC 406.3 Private Garages and Carports also underwent significant change where “Previously, the code required a 1,000 square foot limitation on all private garages and for each garage to be

separated by 1 hour rated assemblies. Under this new provision, private garages can be built using the same provisions allowed for open parking garages when the garage is used for the private use of a tenant or occupant.”¹³

These changes are considered favorable actions for multifamily construction and can help specifiers with material selection and aid with designing for density and sustainability. For the full list of all major and minor changes, revisions, and updates, please view the NMHC’s document “Important Changes to the 2018 IBC for R-2 (Apartments).”

LEVERAGING ZONING LAWS

Having a basic understanding of existing zoning laws can enable specifiers to identify sites where “upzoning” and “missing middle” multifamily housing opportunities might be possible, further helping to resolve the affordable housing crisis and design sustainable multifamily housing.

The Development of Zoning: A Brief Overview

Prior to the implementation of zoning laws, people could take one another to court if they disapproved of how their neighbors were using their own property. Zoning laws in the U.S. began developing in the early 1900s, around the same time that building code agencies were becoming more organized and codes more widely adopted. Los Angeles



GLOSSARY

Durability—“the ability of a material, product, or building to maintain its intended function for its intended life-expectancy with intended levels of maintenance in intended conditions of use”; must strike a balance between the needs of different stakeholders as well as upfront and long-term cost-effectiveness.

Functional Zoning—comprised of zones for each type of land use, for example, commercial, administrative, residential, industrial, and green spaces. Each type of land use is then subject to different regulations as to what “activities” can be built.

Form-based Zoning—defines the physical characteristics of urban spaces as downtown, uptown, east/west side, historical districts, and manufacturing districts. This type of zoning relates to population.

Human-powered Living—reliance on bikes, public transportation, car sharing, or alternatively fueled vehicles.

Intensity Zoning—“defines land use by the level of permitted intensity, such as the number of residential units per acre of surface.” This zoning allows developers to choose which type of development to build in a space as long as it adheres to density limitations, such as high density, average density, low density, or no development.

Incentive Zoning—provides “rewards for development in defined areas” and can be categorized simply as granting “incentives” or “no incentives.” Incentives include tax abatement and infrastructure, such as roads and/or public transport services, and are often given in revitalization projects. Other restrictions, like density limitations, can also be lowered if the developer agrees to provide park areas or create other infrastructure.

Living Building Challenge Certification—detailed sustainability certificate that outlines goals in seven performance areas, termed “petals”: energy, equity, health, beauty, materials, site, and water.

Missing Middle—duplexes, fourplexes, cottage courts, courtyard buildings, [and multiplexes] that provide diverse housing options and support locally-serving retail and public transportation options; sit in the middle of a spectrum between detached single-family homes and mid-rise to high-rise apartment buildings, in terms of form and scale, as well as number of units and often, affordability.

Rezoning—not only allows for larger construction but for changes of land use.

Upzoning—changing the zoning code to allow taller and/or denser buildings; increases the buildable capacity of land, creating the opportunity to increase supply.

is credited with enacting one of the earliest zoning laws—a municipal zoning ordinance in 1906 preventing laundries from operating in residential districts; in 1908, the city then categorized land as either “residential” or “industrial.”

However, it was ultimately the construction of the 42-story Equitable Building in 1915 in New York City that created demand for formal zoning laws. The Equitable Building “cast a 7-acre shadow over the neighboring, smaller buildings diminishing house value and causing public outcry,” leading New York City to adopt the first comprehensive zoning code in the U.S. in 1916.¹⁴ Intertwined with zoning laws was the recognition that many urban areas were “unhealthy and dirty” as light and air struggled to filter into densely populated urban districts.¹⁵

Today, zoning laws are used “to encourage the most appropriate use of land” and to protect existing residents and businesses.¹⁶



This article continues on

<http://go.hw.net/AR112020-3>.

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QUIZ

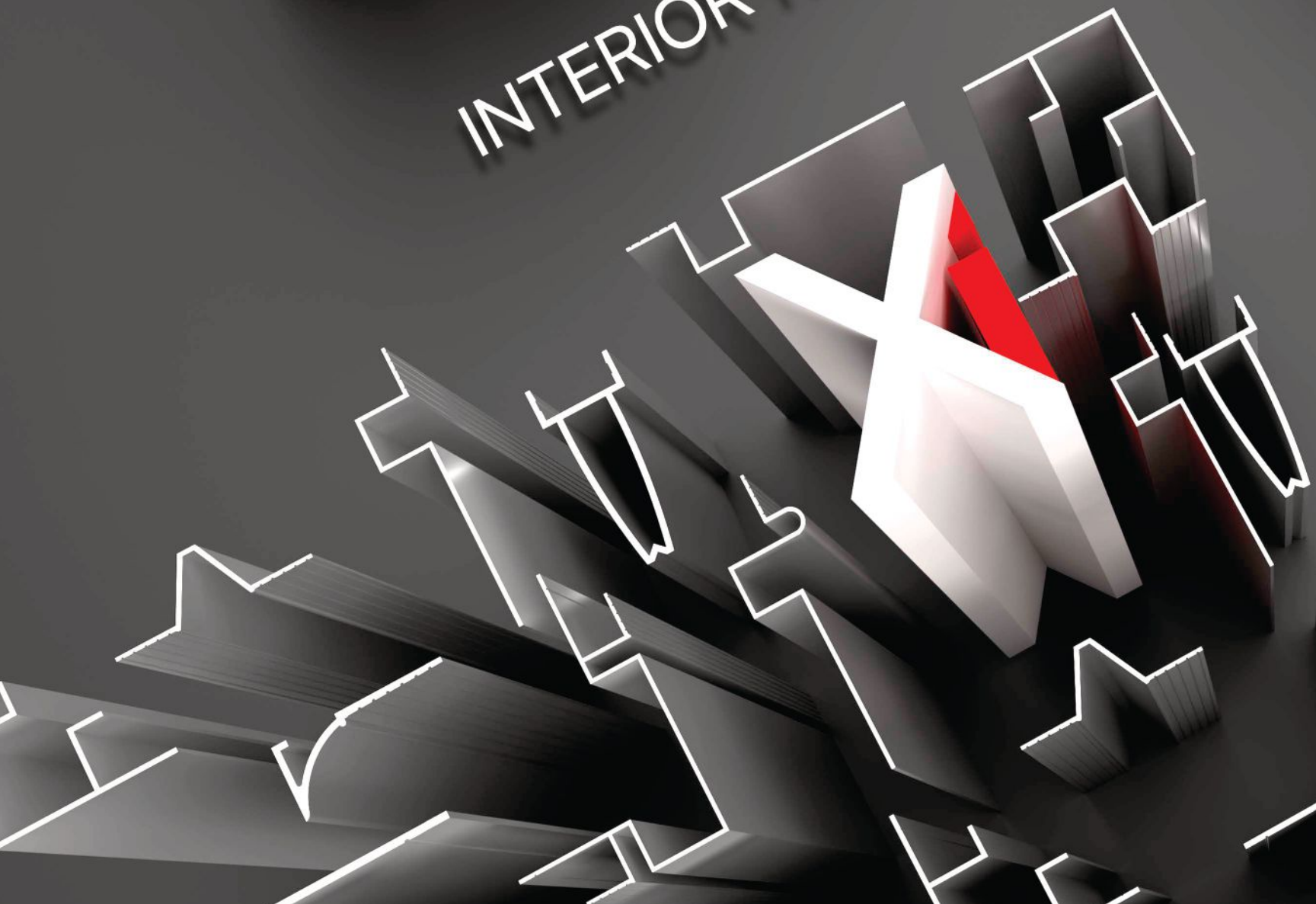
- Which of the following is not considered a “foundation” of current U.S. building code?
 - The insurance industry
 - The engineering profession
 - The federal government
 - The construction industry
- Which of the following is not considered a “buttress” or support of modern U.S. building code?
 - The federal government
 - The voluntary consensus standards organizations
 - Model code groups
 - The insurance industry
- Multifamily dwellings, or “apartment houses” as they are termed by the IBC, are classified under Residential Group _____.
 - R-1
 - R-2
 - R-3
 - R-4
- Which of the following can be defined as “changing the zoning code to allow taller and/or denser buildings; increases the buildable capacity of land, creating the opportunity to increase supply”?
 - Upzoning
 - Functional zoning
 - Incentive zoning
 - Form-based zoning
- Which of the following building types is considered part of the “Missing Middle”?
 - Duplexes, fourplexes, and multiplexes
 - Cottage courts
 - Courtyard buildings
 - All of the above
- “Prominent view corridors and physical intersections” applies to which design category discussed in the course?
 - Site planning
 - Massing
 - Materiality
 - Façade
- “At corner or full block developments, concentrating bulk adjacent to existing buildings with height, integrating lower heights adjacent to open spaces and pedestrian thoroughfares” applies to which design category discussed in the course?
 - Site planning
 - Massing
 - Materiality
 - Façade
- “Plantings or other unique design elements can buffer the street wall” applies to which design strategy discussed in the course?
 - Ground floor condition
 - Circulation
 - Façade
 - Windows and doors
- According to the course materials, which of the following statements is true regarding extruded aluminum trim?
 - Has either a clear anodized or primed finish
 - Can be painted
 - Can be custom-color matched
 - All of the above
- Extruded aluminum trim is made from 75% to _____ post-industrial and post-consumer scrap.
 - 85%
 - 90%
 - 95%
 - 100%

A 3D architectural rendering of various exterior trim profiles. The profiles are shown in a dark grey color with white outlines, set against a dark background. The profiles are arranged in a cluster, with some overlapping. The text "EXTERIOR TRIMS" is written in a white, sans-serif font, slanted upwards from left to right, positioned above the profiles.

EXTERIOR TRIMS

A 3D architectural rendering of various interior trim profiles. The profiles are shown in a dark grey color with white outlines, set against a dark background. The profiles are arranged in a cluster, with some overlapping. The text "INTERIOR TRIMS" is written in a white, sans-serif font, slanted upwards from left to right, positioned above the profiles.

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A Return to Natural

DESIGNING WITH WESTERN RED CEDAR

Presented By:



Project: High Desert Residence
Architect: Hacker
Photographer: Jeremy Bittermann

A RETURN TO NATURE

Wood is one of the oldest building materials known to man, but in modern times has often been replaced with competitor's materials. Thankfully, wood is seeing a renaissance due to current design trends and a global push for sustainability. One prominent trend in design is a return to natural products. In a recent Architectural Digest article, designer Gemma Riverti, head of interiors at WGSN Lifestyle & Interiors, points to our response to societal chaos as an even greater push toward a calm, pared-back, warm minimalism that was already taking hold. She says, "Humans are feeling a greater need to be connected to nature and you will see elements of the 'great outdoors' infusing interior design. The cozy Scandinavian influence will endure with

organic shapes and natural tones as key design elements."

Organic materials such as natural wood, undyed yarn, recycled textiles, naturally occurring fabrics such as wool, cotton, linen, and leather, and warm earthenware will increasingly be used in design to create a sense of harmony within ourselves and the environment.¹ "It seems our collective yearning for getting back to nature will extend to home accents. Think botanical prints, lush greens, and *replications of wood grains* and stone veining for pillows, rugs, and upholstery, along with delicate wild flora and fauna motifs in homewares," experts say.

BIOPHILIA

Biophilia literally means "love of life" in Greek, or an affinity for living things and the natural

LEARNING OBJECTIVES

1. Understand design trends that are incorporating more natural wood products, including biophilia and sustainability.
2. Examine both exterior and interior uses for Western Red Cedar, as well as new products that have entered the market.
3. Review options for designing with Western Red Cedar, including grades, profiles, and finishes.
4. Explore a case study where Western Red Cedar was used for its sustainable beauty in a Massachusetts residence.

CONTINUING EDUCATION

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Use the learning objectives to focus your study as you read this article. To earn credit and obtain a certificate of completion, visit <http://go.hw.net/ART12020-2> to view the entire CEU and complete the quiz. If you are new to Hanley Wood University, CEU courses are free of charge once you create a new learner account; returning users log in as usual.

world. The "biophilia effect" describes the positive impact humans feel when they have a sensory experience with nature through sight, sound, smell, or feel. In architecture, the biophilia effect can be cued when people respond to daylighting, views of nature, use of patterns, and use of natural materials, such as wood products where the grain is visible.²

Aneka Kerlin of Aneka Interiors says, "Biophilia is the belief that humankind has an innate need for nature and the greater sense of connection that nature brings to human existence. Biophilia in design is easily achieved through daylight, plant life, and natural materials such as stone and wood.



Project: High Desert Residence
Architect: Hacker
Photographer: Jeremy Bittermann

In architecture, the biophilia effect can be cued when people respond to daylighting, views of nature, use of patterns, and use of natural materials, such as wood products.

By bringing the outdoors into a space, occupants feel a greater sense of belonging and serenity.”³ Bill Browning, environmental strategist and founding partner of Terrapin Bright Green notes in a recent interview, “There is a growing body of research that shows the spaces we inhabit have distinct physiological and psychological impacts on us. Spaces with elements of biophilic design are more attractive and have been found to increase use of the space. Biophilic experiences can reduce stress, improve cognitive function, and enhance mood and creativity.”⁴

SUSTAINABILITY AND THE MOVE TOWARD HEALTH AND WELLNESS

Sustainability should be top of mind as well, as it’s no longer just a trend or an added feature in a project. Rather, it’s a demand from consumers in all markets who expect sustainability to be integral in all aspects of design. An offshoot of the sustainability movement is the growth of health and wellness, which is also becoming integrated into products, society, and corporate initiatives. In her article, *From Health and Wellness to Sustainability in Brands*, Iryna Lozynska notes, “The relationship between



Project: Bridge House
Architect: Dan Brunn Architecture
Photographer: Brandon Shigeta

Wood is increasingly being used in residential and commercial buildings, for both low-rise and mid-rise structures. Not only is wood beautiful, but innovations in engineered wood products and building systems are allowing for longer spans and taller walls, and the product is competing with steel and concrete as the primary construction material in some buildings.

health and wellness and sustainability is shaping up to be not a correlation, but rather complex causation evolving into a symbiosis. Understanding the relationship between sustainability and health and wellness is essential when navigating the world of storytelling and brand-building, made ever more complex by the savvy consumer, increasingly commanding an elevated, premium experience.” Indeed, we can see that a return to natural products, increased desire for a connection to nature, and demand for sustainable goods can form a symbiotic relationship in design.

WOOD’S RISE

Designers would be wise to incorporate materials into their designs that check all the boxes:

- ✔ Connection to nature
- ✔ Biophilia
- ✔ Sustainability
- ✔ Health and Wellness

In fact, using wood products does just this. A 2006 Canadian study, *Appearance Wood Products and Psychological Well-Being* (Rice et al, 2006), mapped out people’s perceptions of wood used in interior applications. The

research found that, “People’s response to wood is, for the most part, extremely positive, with subjects generally showing a strong preference for rooms containing many wood details. There also appears to be a strong belief that the use of wood can help to create healthful environments, and commonly-evoked descriptors for wood rooms include ‘warm,’ ‘comfortable,’ ‘relaxing,’ ‘natural,’ and ‘inviting.’”⁵

Wood is increasingly being used in residential and commercial buildings, for both low-rise and mid-rise structures. Not only is wood beautiful, but innovations in engineered wood products and building systems are allowing for longer spans and taller walls, and the product is competing with steel and concrete as the primary construction material in some buildings. Some examples of engineered wood products being used in tall wood buildings are cross-laminated timber, nail-laminated timber, dowel-laminated timber, and glue-laminated timber wood panels.

Cross-laminated timber (CLT) is a wood panel system formed by stacking and gluing together successive perpendicular layers of wood, which are then pressed in large hydraulic or vacuum presses to form an interlocked panel. The panel is sized and shaped with

a CNC machine into a fully construction-ready component, which may have door and window openings, and routings for electrical and mechanical systems. The material's high strength, dimensional stability, and rigidity allow it to be used in mid- and high-rise construction.

Nail-laminated timber (NLT or nail-lam) is a traditional construction method that is now found in new projects of all sizes. NLT is created from dimensional lumber stacked on edge—2x4, 2x6, 2x8, 2x10, or 2x12 at 1-1/2" on center—and fastened together with nails. Plywood sheathing is often added to one top side to provide a structural diaphragm, which also allows it to be used as a wall panel. The panels can be used for floor, wall, and roof systems as a viable substitute for concrete slabs and steel decking in residential, commercial, and institutional buildings.⁶

Dowel-laminated timber (DLT) is the first all wood mass timber panel in North America, with no nails, glue, or metal fasteners. DLT is similar to nail-laminated timber but instead of nails or screws, DLT uses wood dowels to join laminations.⁷

Another engineered wood product that was recently introduced to the market is laminated veneer lumber, or LVL, which is often used for headers, beams, and rafters. Laminated veneer lumber is a type of structural composite lumber that is produced by bonding thin layers of veneer with moisture-resistant adhesives. The grain of all veneers is parallel to the long direction of the lumber. LVL has high allowable stress and is less likely to warp, twist, bow, or shrink than conventional lumber. Up to four LVLs may be connected together to create a larger beam or header.⁸

Glue-laminated timber (glulam) is a structural engineered wood element commonly used for beams and columns in residential and commercial applications. Glulam is a highly visible form of mass timber in contemporary projects, with long spans framing signature designs that have been left exposed to take advantage of wood's natural aesthetic.⁹

High-profile projects in the United States and Canada that have utilized these wood systems include:



- Carbon 12 in Portland
 - T3 in Minneapolis
 - Brock Commons Tallwood House in Vancouver
 - The Origine Building in Quebec
- Later in the course we'll discuss engineered wood products made with Western Red Cedar and how to incorporate them into building design.

ENVIRONMENTAL BENEFITS OF USING WOOD

There are also environmental benefits of using wood vs. steel and concrete, the materials typically used to construct taller buildings. Wood is an excellent thermal insulator, which helps keep buildings cool in the summer, and interiors warm in cold weather, ultimately improving comfort and reducing heating and cooling costs. Wood has 400 times better insulation (R-value) than steel, 2,000 times that of aluminum, and 8 times that of concrete.¹⁰

Wood is durable, allowing it to last a very long time, which reduces material consumption. Man-made materials—including brick, cement, and composite products—don't break down like wood does once it's discarded and are more difficult to recycle. Wood is also the only major building material that's renewable, which is why Canada's forest base is still abundant after 150 years of harvesting. For every tree that's harvested, at least 3 (and up to 8) are planted.¹¹

Wood also reduces energy consumption. According to an independent study that compared how much energy is needed to obtain, manufacture, transport, and install building materials for identical wood frame, steel frame, and concrete houses, wood products require much less energy to produce

GLOSSARY

Bevel Siding—the most widely-used cedar siding type that is produced by re-sawing lumber at an angle to produce two pieces thicker on one edge than the other; one face is saw textured while the other face is smooth or saw textured depending on the grade and customer preference

Bleaching—weathering products designed to provide the weathered look of cedar sooner and more evenly than natural exposure to sunlight; they are lightly tinted with either gray or brown pigments, which mute the natural coloration and accelerate the weathering process

Board and Batten—a vertical design created using wide clear or knotty cedar boards spaced apart with narrower boards (battens) covering the joints

Clear Grades—Western Red Cedar products that are visually clean and free from defects and usually graded for smooth face exposure; there are only a few, if any, characteristics, which could include an occasional knot or minor imperfections

Knotty Grades—Western Red Cedar products graded to allow more inclusions, meaning there will be knots and other characteristics; they have a more casual, rustic appearance than clear cedar grades

Rough Boards—the rough sawn texture from either circular or band saws is present on all four sides

Shiplap—a versatile siding that can be installed vertically, horizontally, or diagonally; the profile of each board partially overlaps that of the board next to it or below it, creating a recessed channel that gives shadow line effects, provides excellent weather protection, and allows for dimensional movement

Surfaced One Side, Two Edges (S1S2E)—a surfacing process that results in a rough sawn face and a smooth back that provides uniform width and thickness tolerances; typically graded from the rough face, it may in some instances be reversible to the smooth back

Surfaced Four Sides (S4S OR PAR, D4S)—a smooth surface on all four sides that presents a uniformly sized product with a quality appearance; this surface finish is most commonly found on clear grades

Tongue & Groove—Western Red Cedar siding furnished kiln-dried, manufactured in clear grades, and available with one rough or smooth face; in standard patterns, these are usually reversible

than concrete or steel. Wood products make up 47 percent of all raw material manufactured in the United States, but their share of manufacturing energy consumption is only 4 percent. Steel requires 21 times the energy to produce and releases more than 15 times sulfur dioxide when compared to wood.¹²

ENTER WESTERN RED CEDAR

One wood product that has been around for millennia, and is increasingly being used in both commercial and residential buildings, is Western Red Cedar. It is nature's most beautiful and versatile building material. Its dimensional stability, longevity, ability to accept a wide range of finishes, resistance to decay, and natural good looks make it the only sensible choice for siding, paneling, corner boards, fascia, skirting, soffit, and window and door trim.

Many materials such as vinyl and composites try to replicate the look of real cedar, but it is difficult to achieve the wood grain, color, and feel of Real Cedar. Wood trim on the exterior of residential, commercial, or industrial buildings perfectly complements any architectural style and is compatible with all contemporary cladding materials.



This article continues on

<http://go.hw.net/AR112020-2>.

Go online to read the rest of the CEU course, complete the corresponding quiz for credit, and receive your certificate of completion.

SPONSOR INFORMATION



The Western Red Cedar Lumber Association represents quality "Real Cedar" producers, distributors and retailers throughout North America. Founded in 1954 and known as "the voice of the cedar industry," WRCLA offers extensive resources to assist with selection, specification and quality standards. For more information, visit RealCedar.com

QUIZ

- Which of the following describes the positive impact humans feel when they have a sensory experience with nature through sight, sound, smell, or feel?
 - Green sense
 - Natural response
 - Biophilia
 - Organic sensory overload
- In architecture, the biophilia effect can be cued when people respond to which of the following?
 - Daylighting
 - Views of nature
 - Use of patterns
 - Use of natural materials
 - All of the above
- Which of the following is an environmental benefit of wood?
 - Excellent thermal insulator
 - Only major building material that is a renewable resource
 - Durability reduces material consumption
 - Reduces energy consumption in manufacturing
 - All of the above
- Which product has been approved for soffit applications in Wildland Urban Interface (WUI) areas in California, Oregon, and other places that require fire-resistive construction?
 - Cedar tongue and groove with clear veneer overlay
 - Engineered knotty cedar
 - Western Red Cedar trim
 - Dowel-laminated timber
- Which product is assembled out of smaller pieces of wood into long length material that can be nailed, sanded, and sawn just like solid stock?
 - Cross-laminated timber
 - Glue-laminated timber
 - Engineered knotty Western Red Cedar
 - Clear solid Western Red Cedar
- _____ is the highest grade of Western Red Cedar.
 - A Clear
 - Clear Heart
 - Select Knotty
 - Architect Knotty
- Which Western Red Cedar product contains no open characteristics or through defects and allows the use of adhesives on the reverse side to secure knots?
 - Clear V.G. Heart
 - B Clear
 - Select Knotty
 - Architect Knotty
- Which Western Red Cedar surface finish presents a smooth surface on all four sides and is most commonly found on clear grades?
 - Rough Boards
 - Surfaced One Side, Two Edges (S1S2E)
 - Surfaced Four Sides (S4S OR PAR, D4S)
 - Matte
- Which Western Red Cedar siding is the most widely-used cedar siding type and is produced by re-sawing lumber at an angle to produce two pieces thicker on one edge than the other?
 - Bevel siding
 - Tongue and groove
 - Board and batten
 - Shiplap
- Which finish produces the natural weathered look of Western Red Cedar faster than waiting for nature to take its course?
 - Noir stains
 - Natural gray
 - Bleaching
 - Transparent stain

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in the year _____
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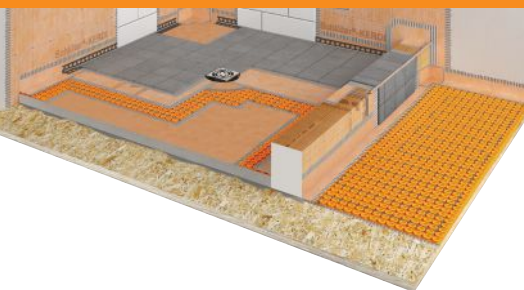
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Sonoma Strong

How a California architect helped rebuild his community in the wake of a traumatic fire.

Aaron Jobson, AIA, a principal at Quattrochi Kowk Architects, usually designs schools. But when wildfires struck Sonoma County in the summer of 2017, he felt compelled to use his skills to help rebuild his community. He called on local experts and collaborators, including designers, architects, and community leaders, ultimately founding an organization to assist those who had lost their housing in the blaze. Today, Homes for Sonoma builds affordable modular housing that, according to its mission statement, “keep[s] Sonoma County diverse and inclusive.”

As told to Katherine Flynn

The fires started on a Sunday. It was such a traumatic thing to have happen in our community. Everyone knew somebody who had lost their home that night—I had a coworker who lost his. Nearly 3,000 homes were destroyed in four hours in Santa Rosa alone. We thought, “Where are these people all going to live?”

Sonoma County is a balance between an agricultural community; a suburb of the Bay Area, in a way; and a resort. Would something like this mean that the community became less affordable? A lot of people who were on the margins and in an extremely unaffordable housing situation anyway—people who didn’t own their homes—they were going to possibly end up being pushed out of them. We had extremely low vacancy and high rental rates already, and we lost something like 5% of the housing in Santa Rosa that night.

We held a planning meeting with a lot of different stakeholders, including Burbank Housing. It has been a big partner of ours all along the way. We moved pretty quickly to, “Could we develop a modular prefab dwelling that could be used as temporary housing, and then eventually repurposed into accessory dwelling units?” That would serve both short- and long-term needs.

The initial idea was to build communities of these small residential

units, and then have them serve as temporary housing for displaced individuals for three to five years during the rebuild. When things stabilized, we would relocate and repurpose the units as accessory dwelling units in people’s backyards to help increase the amount of affordable housing in our community, long term. In the end, we were able to build seven homes on two sites, which are still serving fire survivors and will be relocated in the next few years. We were able to raise almost \$2 million to fund the projects from a variety of people and organizations that wanted to help.

Before the fires, affordable housing was probably the top issue in our community. What does the future of this community look like? The number one barrier to its growth and success is affordable housing. Businesses can’t grow if it’s too expensive for workers to live here. It’s a real drag on people’s quality of life if they can’t find a place to live. **AIA**



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Moving the Needle on AIA Policy Priorities in 2021: A Bipartisan Conversation



By Jocelyn Rogers

It's been an election year like no other, with traditional campaigning transformed by the same disruptions the COVID-19 pandemic has brought to American homes, businesses, and schools. In a political environment already marked by toxic polarization and relentless norm-breaking, the coronavirus made a volatile campaign even more unpredictable.

Although 2020 may feel especially fraught, volatility is nothing new in politics—an arena in which it seems the only constant is change. In the midterm elections alone, you have to go back decades to find one that didn't shift party control in one or both chambers of Congress. Accordingly, AIA's Policy Platform is designed as a unifying, bipartisan set of proposals, with a central message that aims to move the needle on the profession's policy priorities.

But the platform is just one step: To achieve policy wins in the new Congress and administration, citizen architects must share our ideas with federal, state, and local officials on both sides of the aisle.

To help do that, AIA brought in two long-time allies and experts from both sides of the political spectrum.

In a recent webinar for AIA members, Republican John Feehery, a partner at lobbying firm EFB Advocacy, and former Democratic Congressman Jim Turner

(Texas) of law firm Hance Scarborough, analyzed the Policy Platform plank-by-plank, sharing their viewpoints on AIA priorities like school safety, student debt, affordable housing, infrastructure investment, and climate change.

Both have deep professional experience in the political process. Feehery served as a senior communications aide for multiple members of Republican leadership, and was the longest-serving spokesman for the Speaker of the House, serving under Dennis J. Hastert, in history. He is a columnist for *The Hill* and appears frequently on programs like CNN's "The Situation Room," MSNBC's "Hardball," and HBO's "Real Time with Bill Maher." During his tenure in Congress, Congressman Turner served as the senior Democratic lawmaker on multiple House committees—including the House Armed Services Committee and the House Government Reform and Oversight Committee. He was also the Deputy Whip in the Democratic Caucus.

Both of these political experts see significant potential for architects to have an impact and make progress in the new Congress—even on climate issues, where the parties seem hopelessly divided. It's up to architecture and design professionals to make the case for policies that will affect the health and prosperity of American

communities for generations to come. Architects can stay engaged through aia.org/advocacy, which provides the latest information on legislative issues and provides the opportunity to sign up for Architect Action Alerts.

A condensed version of Feehery and Turner's conversation follows.

AIA Platform Tenet: *Fund best practices for school design to promote healthy, safe learning environments, including updated guidance dedicated to design strategies that minimize threats of violence, foster a stronger sense of community, and promote positive learning environments.*

Feehery: I don't think that school safety is going to necessarily get separated from the issue of gun control, which is unfortunate because we all want to make schools safer. But there's an opportunity to make schools safer and better able to handle things like COVID-19, and there should be opportunities in the design space for architects to impact that discussion. And I think there will be. And when we do go back to schools, there will be a whole effort to modernize them, make them more secure but also healthier places for kids to learn. I don't think that either party will focus on it first; first they will focus on getting kids back to school.

Turner: There's a sharp contrast in [the two parties'] approach to school safety. It's been evident for some time that the Republican party is not going to want to deal with stronger gun control laws, and I don't know what it will take for that to change. [The Democratic platform] includes a stronger emphasis on gun laws: stronger background checks, red flag laws, and other things that may enable gun violence to be curbed.

AIA Platform Tenet: *Increase STEAM investment and student debt relief to strengthen a diverse talent pipeline.*

Feehery: COVID-19 has put the issue of the value of the college experience back in the spotlight. Parents and kids are paying boatloads of money for online learning, and that's not what they paid for. So this will put the idea back in the spotlight, and I think that will put the whole idea of college student debt back in the spotlight. I think there's a real opportunity. Bernie Sanders promised free college tuition for everybody. Democrats want to push in that direction, while the Republican focus is more on how to cut the cost of college in the first place.

Turner: Our architects who graduated recently from college and architecture school know how expensive it is, and there's no question that it is a barrier to young people for securing an education—particularly a graduate education. The Democratic platform calls for free tuition for families earning less than \$125,000 per year, increased PELL grants, and relief for student debt. There are also provisions in the platform that call for a limit on the amount of payment on your debt based on your income level, so that paying off college debt doesn't become an impossible, unobtainable objective. It's important to look at the issue, but most of those issues are determined at the state level—particularly for public colleges and universities.

AIA Platform Tenet: *Catalyze accessible and affordable housing; confront the legacy of discriminatory zoning and housing policies on communities; promote equitable development, including mass transit-oriented development, multimodal streets, and reformed "opportunity zones."*

Turner: Democrats have a strong platform plank on increasing affordable housing, including a \$100 billion affordable housing program to upgrade housing and a \$5 billion

tax credit to ensure no family that's eligible for subsidies has to spend more than 30% of their household income on rent. These are the kinds of things that Democrats have always been for, and they will continue to promote them. However, ambitious efforts to address the country's problems will run headlong into fiscal realities.

Feehery: Expanded use of "opportunity zones" could help to revive inner cities and help end homelessness there.

AIA Platform Tenet: *Buildings must consume less energy, use only renewable sources, and contribute power back to the energy grid. AIA urges federal officials to rejoin the Paris climate accord; create federal incentives for the adoption of net-zero carbon energy codes, and actively address the disproportionate impact of climate change and environmental degradation on communities of color.*

Turner: Democrats and Republicans have a completely different worldview on climate change. More and more Republicans are beginning to accept the reality of climate change, but it's slow. Democrats have a strong agenda encouraging strengthening of laws and regulations that will get us back on track. They call for rejoining the Paris accords and [reversing] the deregulation of climate matters that has been a hallmark of the Trump administration. When you look at the AIA platform, it's strong on issues that will encourage the country to deal with climate change—issues of resiliency, sustainability, carbon-neutral approach to building. All these issues are at the core of what architects believe in, and it pretty well aligns with what the Democrats believe, as well.

Feehery: With both COVID-19 and climate change, Republicans are focused on economic security, energy security, and jobs. So it makes sense to stress to Republicans that, to get to a healthier economy, you need to do something about both COVID and climate. You need to stress that there's a common-sense approach to both issues. We can improve the health of small businesses by giving them a tax credit designed to make workplaces better. From a Republican standpoint, you need to figure out a way to help small businesses grow the economy, and how can we present [solutions] to incorporate into their ideas that will build the economy as it protects us against climate, builds a more energy secure future, but also creates safer workplaces. By and large, architects are small business

owners who need a growing economy to be able to work. So emphasize that being responsible stewards of the environment through better design is consistent with a growing economy.

AIA Platform Tenet: *Utilize tax incentives to spark resilient, sustainable, and equitable development; hasten the adoption of updated building codes and standards, so the emerging built environment is resilient to future natural disasters and better equipped to shelter-in-place.*

Feehery: While resilience has not been a priority in the Trump administration, that doesn't mean it isn't a priority in Congress. We can debate climate change, but if you live on a coast, you know that you've got to do something to deal with rising sea waters. And there are plenty of Republicans who feel that way. So there is an opportunity to create a bipartisan discussion about resiliency. This is also a huge issue with the insurance companies. I think there is a coalition to be had here if we put a greater emphasis on resilience as we have discussions about flood insurance and other big insurance programs that Congress deals with. [We expect both parties] will try to take up an infrastructure package early in the year. Smarter design through infrastructure is one of the things we can stress to both Republicans and Democrats.

Turner: Democrats are clearly in favor of a strong infrastructure bill, and they will continue to be. Resilience is one issue on which we can bring Republicans and Democrats together in Congress, for many reasons. If you look at the increased number and intensity of storms hitting the Gulf Coast, if you look at the threat of hurricanes and wildfires, there are so many different members of Congress who are affected by all of this. I believe when you talk about bipartisan cooperation, this is an area where we should be able to do some good. Resilience is something that will save money for the federal government. The other helpful angle is there are a lot of special interest groups—including builders and providers of building products—who are innovating and producing more resilient products for buildings, [which increases potential support for] tax incentives to incorporate those products. Lots of players have an interest, financial and otherwise, in trying to make America more resilient to climate threats. I think we can do some good, and architects can see some wins in this area. **AIA**



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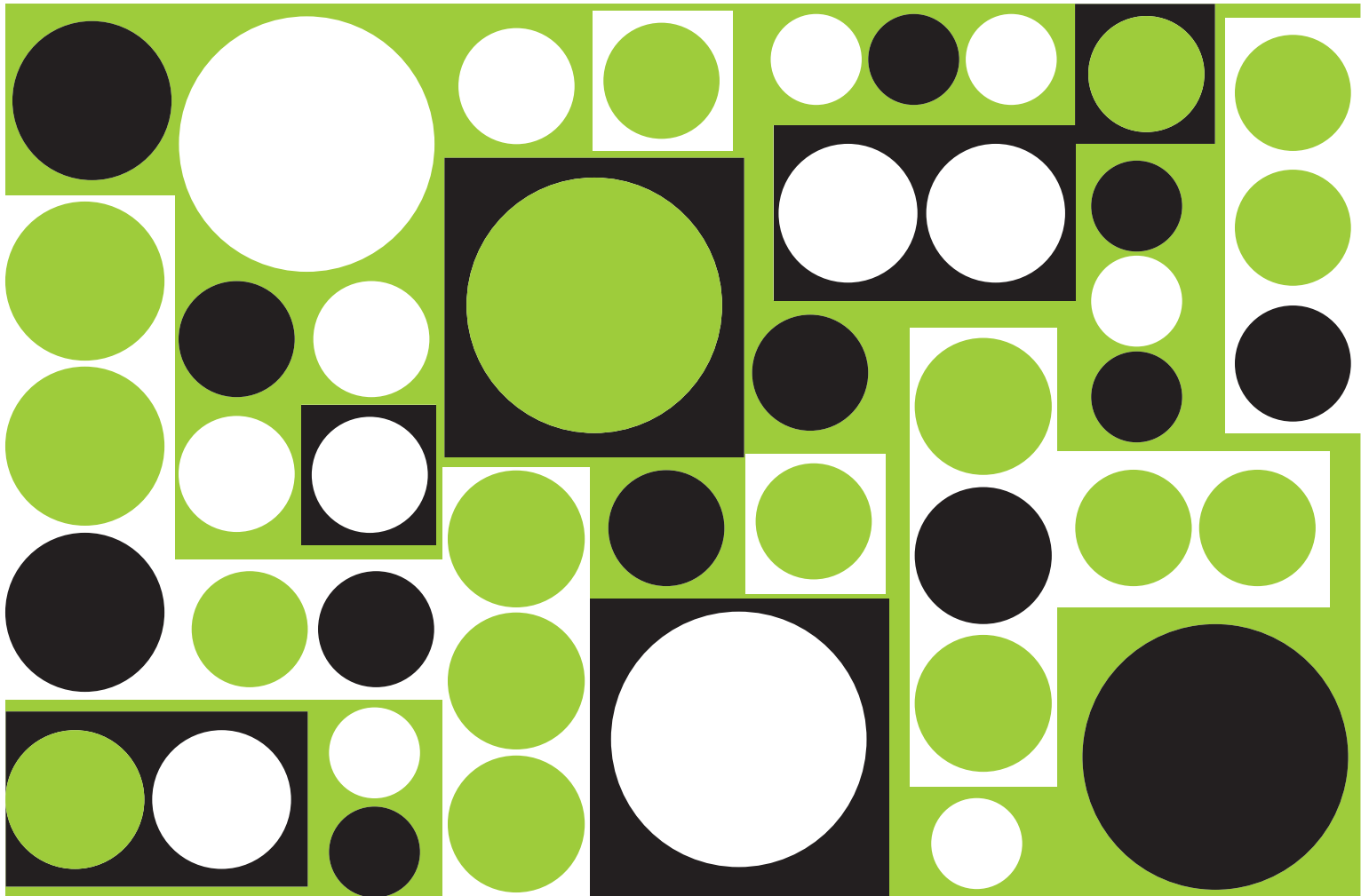
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Net Zero Carbon
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Improving Racial Equity Through Greener Design



Climate change affects us all, but doesn't impact us all equally. This article is part of a new series, Building Equity, that explores how architects are working with communities and civic leaders to develop creative, innovative design solutions that fight climate change, systemic racism, and inequities in the built environment.

It's time to show the world what design can do.

How a better built environment enhances health, economies, and access to essential services for all.

By Stayton Bonner

For decades, Black Americans have disproportionately lived in unhealthy conditions, due in large measure to unjust policies, inequitable planning, disinvestment, and underinvestment in the built environment. Starting in the 1930s, banks and mortgage lenders marked certain neighborhoods—often Black and Latino—on maps as being uncreditworthy. Known as redlining, this process led to financial firms and real estate agents refusing loans, mortgages, and other investments to residents and prospective home buyers in these areas. As a result, Black communities often remained financially stagnant, pushed into industrial zones with poor access to public transportation and inadequate grocery stores, schools, and public buildings.

Once backed by the federal government, redlining was initially struck down by the Supreme Court in the 1948 case *Shelley v. Kraemer*, which ruled that courts could not enforce racially restrictive practices. But redlining would not be fully outlawed by the federal courts until the 1968 Fair Housing Act banned racial discrimination

in housing; this was followed by the 1975 Home Mortgage Disclosure Act, which required lending institutions to report public loan data, and the 1977 Community Reinvestment Act, which required the Federal Reserve to encourage financial institutions to make loans to neighborhoods of all income levels.

Yet despite these laws, the damage by redlining was done—and persists today.

According to a 2018 report by the National Center for Environmental Assessment at the Environmental Protection Agency, Black people in the United States are 1.54 times more likely to live near facilities that pollute, causing them to breathe dirtier air than white people and to develop health problems like heart and lung disease. According to a 2017 report by the Baltimore City Health Department, a nearly 20-year gap in life expectancy exists between residents of Black and white neighborhoods in the Maryland capital; cities like Philadelphia and Chicago have reported similar numbers.

This discrepancy in life expectancy is tied to poverty perpetuated by

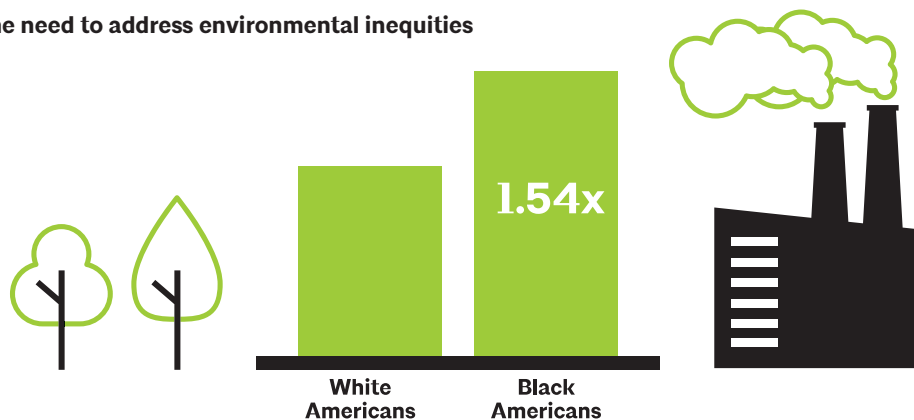
disinvestment in the built environment. According to a 2020 report by the Brookings Institution, the median net worth of a white family in the United States is \$171,000. By comparison, the median net worth of a Black family is \$17,150—nearly 10 times less.

To address these chronic inequities, architects are designing buildings and communities that are resilient and sustainable, and that reduce carbon dioxide emissions in historically neglected Black neighborhoods, enhancing the lives and health of residents while helping to fight climate change. Below, three architects share how they are working with communities to improve environmental and social sustainability by protecting neighborhoods from gentrification, installing parks and public art exhibits in urban centers, and creating state-of-the-art libraries in financially challenged neighborhoods—inspiring future generations to improve racial equity in the United States.

Representing Communities

Seattle's Midtown neighborhood is one of the most historic Black communities in the United States. Home to the first Black-owned bank west of the Mississippi River, the neighborhood once housed 71% of the city's Black population. A vital economic and cultural center, it was the only area of the city unaffected by redlining. Yet in recent years, growth of corporate offices in downtown Seattle has spurred investment in the area, raising the cost of living and displacing longtime residents. According to the U.S. Census Bureau, the Black population of the Central District—of which Midtown is the heart—dropped from over 70% in the early 1970s to 18% in 2014.

The need to address environmental inequities





The site map of Destination Crenshaw, a 1.3-mile stretch of parks and art installations celebrating Black Los Angeles. The art and culture experience runs along Crenshaw Boulevard from 48th to 60th Streets.

So when a new mixed-use development was proposed at 23rd Avenue and E. Union Street, the historic center of the community, residents banded together to block it. Developers had already built two complexes in the area with little resistance. But Midtown, with its deep significance for the community, was different. To design a development in collaboration with the community, the developers brought in architect Rico Quirindongo, AIA, a principal at DLR Group. “The developer had been buying up property in a traditionally African American neighborhood without much resistance,” Quirindongo says. “Then they picked this site, and the community was not happy about it at all, blocking their ability to get permits. I was brought in to join the development team and bridge the gap.”

Reaching out to local residents through surveys, open houses, and meetings, Quirindongo made the community an active partner in the design. The community wanted the space—which would occupy a former strip mall—to create a healthier, greener environment that would reflect their culture and values. So Quirindongo worked with the developers to design an open-air, privately managed public square, inspired by markets in Africa, in the center of the mixed-use development.

Featuring art installations, trees, portraits of residents, and retail space for locally owned businesses, the Midtown Public Square is a mixed-income residential development with 428 units—30% of which will be zoned affordable—that aims to honor the neighborhood while ensuring that the community has a foothold for the future. By working with civic leaders, politicians, and groups like the Africatown Community Land Trust, Quirindongo was able to help the developers make best use of local policy. In addition to a land use policy which requires developer engagement of

communities through the design review process, the Seattle City Council recently adopted a new policy, called community preference, which allows nonprofit developers to offer a portion of their affordable units to people with ties to the neighborhood being developed—especially area residents at high risk of displacement.

“Architects have created checklists for environmental sustainability, but we’re only now beginning to discuss social sustainability,” Quirindongo says. “Environmental and social sustainability and gentrification are all entwined. This is particularly true in communities of color, which have been forced to accept the brunt of negative health impacts from the built environment, like bad air quality, bad soil, and contamination. One solution is to facilitate a collaborative design process, in which you have developers, designers, and communities working on common solutions with common benefits.”

Continuing Culture

In Los Angeles, the Crenshaw neighborhood is the historic heart of the Black community. After federal fair-lending enforcement began in 1977 with the Community Reinvestment Act, the neighborhood opened to large numbers of Black citizens and Japanese Americans, creating a multicultural hub in the city. Yet in recent years, as economic development along the Crenshaw/LAX light-rail line has led to growth that threatens to displace longtime residents in neighborhoods like Leimert Park, residents of Crenshaw have become concerned about their future. So, they banded together to create a new vision for their neighborhood: the 1.3-mile Destination Crenshaw park with permanent and rotating art installations along Crenshaw Boulevard from 48th to 60th streets.

“Destination Crenshaw is an outdoor art and cultural experience that was built in response to the extension of the light rail here at-grade,” says Gabrielle Bullock, FAIA, a principal and the director of global diversity at Perkins and Will in Los Angeles. “The city built this section of track at-grade in the Black community, whereas it went below-grade in most every other major commercial area in LA. The community’s response was to make lemonade out of lemons by creating a local destination out of it.”

Bullock knows plenty about overcoming obstacles. Born in Harlem, N.Y., she was inspired to become an architect after seeing family and friends living in public housing projects with cinder-block walls and small, barred windows. Knowing the importance of pride of place, for Destination Crenshaw, Bullock assembled a representative team of architects at her firm—some of whom lived in the neighborhood—to engage with the community and understand their vision. To ensure the project benefited locals, Bullock and her team studied developments like the High Line in New York, the BeltLine in Atlanta, and similar projects in Harlem to understand the potential for displacement caused by community improvement. “Locals told me that property prices have skyrocketed along both the High Line and the BeltLine, which are walkable and support restaurants and other businesses but have displaced residents,” Bullock says. “Harlem, however, has made improvements while also retaining the character and legacy of the community. That’s what we wanted for Crenshaw.”

To compensate for a train that runs above ground, which makes the boulevard less pedestrian-friendly, Bullock and her team designed a series of outdoor parks and art installations featuring work by



Midtown Public Square in Seattle is a mixed-income residential development of 428 units, 30% of which will be zoned affordable.

Black artists, creating a green and inspiring refuge amid the concrete. In addition, the project was designed to bolster the community living there, with spaces for local businesses.

“The biggest goal is to build the current economy,” Bullock says. “The oldest soul food restaurant in Los Angeles is on this boulevard. The oldest Black-owned gym is on it, too. We want to enhance access and opportunities for these businesses while providing outdoor places for play, building both environmental and cultural sustainability.”

Addressing Inequities

In Houston, the Third Ward is arguably the city’s oldest Black neighborhood. Centered on Emancipation Park—a 10-acre site bought by former enslaved people

in 1872 to annually celebrate the end of slavery in Texas—the neighborhood has been a vibrant community since the 1930s. Yet while the neighborhood’s proximity to downtown has spurred investment in recent years, with median home values increasing 176% from 2000 to 2013, half of the respondents in a 2019 Rice University survey stated that they earn less than \$10,000 a year—due, in part, to redlining and community disinvestment by the city for decades.

“People are just now talking about food deserts, which are often Black neighborhoods that don’t even have a grocery store,” says Antoine Bryant, ASSOC. AIA, project manager and business developer at the Houston office of Moody Nolan. “But this is a term that we’ve been talking about for 30 years. Environmental racism—how you only have chemical

plants and smelting and those kinds of things in communities of color—has been happening for decades. Additionally, Robert Moses and many other urban planners throughout the 1930s and ’40s built highways through communities of color, subdividing them and leading to many sustainability concerns that we’re only now starting to address.”

To inspire and instill confidence in the next generation of Third Ward residents, Jonathan Moody, AIA, CEO of Moody Nolan, led the design for a cutting-edge library at Texas Southern University—one of the largest historically Black public universities in the United States—and Bryant worked with him to reach out to the community. Bryant was born in public housing in Brooklyn, and the unhealthy environment inspired him to become an architect. When he was 10 years old, a family friend who was a Black architect exposed him to the field as a career opportunity—spurring a lifelong commitment to mentoring others. “Growing up, I remember not having a college or library nearby,” Bryant says. “I was so excited to help the young kids in this neighborhood—where I also live—and facilitate the creation of a new library they can see and access on a daily basis.”

Working with the design team at Moody Nolan—the country’s largest Black-owned architecture firm—Wardell Ross, AIA, senior associate and director of Houston operations, engaged with TSU staff, faculty, and students, as well as the local community, holding workshops and learning what residents wanted for their future. The university’s existing library was built in the 1950s and was essentially a windowless bunker with books. For the new library, both the students and residents from the broader neighborhood wanted a space where they could read, access digital tools, and feel a sense of community.

Incorporating that feedback, Moody Nolan designed a new 137,000-square-foot Library Learning Center with public computers, a gallery of African art, community meeting spaces of various sizes, and leading sustainable and resilient features that are accessible to the entire Third Ward. Including green features like electrochromic glazing to reduce energy use, high-albedo white and cool-roofing membranes to reflect heat, and proximity to mass transit, the library is an accessible beacon for both sustainable practices and education, and is meant to inspire the local community to be healthy and successful. “Students and residents can enjoy a community space with natural light,” Ross says. “It’s sustainable, a healthier space,



Seattle’s Midtown Public Square incorporated the input of local residents to ensure that the community was an active part of the design.

and, more importantly, it brings a state-of-the-art facility to a community that historically didn't have access to that. It makes them feel like they're in the game, which is a big thing."

Bryant agrees. "As architects, we need to be active in the communities where we work," he says. "We go to local schools and explain what architects do, and 90% of the students don't know what [an architect]

is, or have never seen one who is Black. So projects like this library give us an opportunity to help design the future of our community—developing our world for the next generation." **AIA**

A I A P E R S P E C T I V E

Building the Future

Architects have answered this year's challenges with leadership and action.

By Jane Frederick, FAIA, 2020 AIA President

This has been a transformational year that has left no aspect of our lives untouched. Work, school, family time, economic security, travel, politics—it's all been upended by the COVID-19 pandemic.

We all long to return to normal. At the same time, the historic events of 2020 have demonstrated, in vivid and urgent ways, that we can and must do better than "normal." For too many, the status quo means discrimination and injustice. For African American, Hispanic, Indigenous, and other historically marginalized communities, we can no longer deny that "normal" isn't safe. It isn't healthy. It isn't fair.

When it comes to the climate, normal has meant ever-increasing greenhouse gas emissions, rising temperatures and sea levels, and escalating severe weather threats. Devastating wildfires on the West Coast and a record-breaking hurricane season on the Gulf Coast illustrate the urgency of the crisis.

It's time for a new normal. As a profession that literally builds the future, it is up to all of us to ensure that the new normal is more healthy, equitable, sustainable, and resilient for everyone, everywhere.

In 2019, we voted to do that by marshalling all our resources toward tackling climate change. In 2020, moved by the outcry for justice after the killing of George Floyd, we pledged to pursue racial equity—in our association, in our profession, and in the communities we build—with the same urgency.

This pledge to take action on these critical issues is a natural extension of our professional responsibility to secure public health, safety, and welfare. It's also a groundbreaking shift.

When I was inaugurated last December as AIA president, I quoted climate activist Rebecca Solnit's inspiring words: "Don't ask what will happen. Be what happens."

I couldn't be prouder of the way AIA members have exemplified that axiom, answering this year's challenges with leadership and action.

From the early days of the pandemic, firms contributed resources and 3D printing technology to produce protective masks. Special AIA task forces took action to coordinate with public officials on safely adapting existing buildings into health facilities—issuing expert guidance that was distributed by the State Department.

Through our Re-opening America initiative, AIA members have continued to contribute—developing design strategies to protect frontline workers and residents of senior living facilities and high-density housing, and giving guidance for safely reopening public spaces like businesses and schools when it's safe to do so.

With its disproportionate impact on communities of color, the COVID-19 pandemic has demonstrated, yet again, the fundamental inequity pervading our society—an untenable reality that demands action.

In close consultation with our colleagues in the National Organization of Minority Architects, AIA is pursuing progress on a number of fronts: participating in the NAACP 2020 Opportunity & Diversity Report Card to hold ourselves accountable; reevaluating our Honors & Awards programs to identify unintentional biases and eliminate barriers to recognition; redoubling efforts to support students at historically Black colleges and universities, and encourage future architects from K-12 students to emerging professionals; and providing the leadership necessary to build more healthy, just, and equitable communities.

Despite this year's challenges, our urgent climate work has continued—and achieved important milestones. We released a new Climate Action Plan, revamped the

Framework for Design Excellence, and adopted a new AIA Materials Pledge. AIA's 2030 Commitment recorded its best year ever—with a record number of signatories achieving record reduction in predicted energy use intensity.

Our Blueprint for Better campaign, launched in October, ties it all together—providing architects with the tools and resources to build communities that are more sustainable, equitable, healthy, and just. Through this campaign and others, we're inviting the public, civic leaders, and allies to join us. It's all backed by a visionary strategic plan that underlines AIA's commitment and maps out a path to progress.

This is the kind of meaningful work that prompted the American Society of Association Executives to name AIA among the "100 Associations That Will Save the World" in 2020.

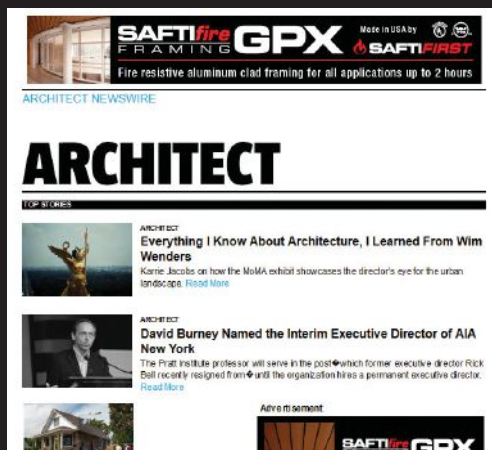
The world has certainly changed this year. And it's safe to say some of those changes will be lasting. Will they be for the better? It's up to all of us to ensure that they are. As a profession, we've never been more focused and equipped to do our part. **AIA**



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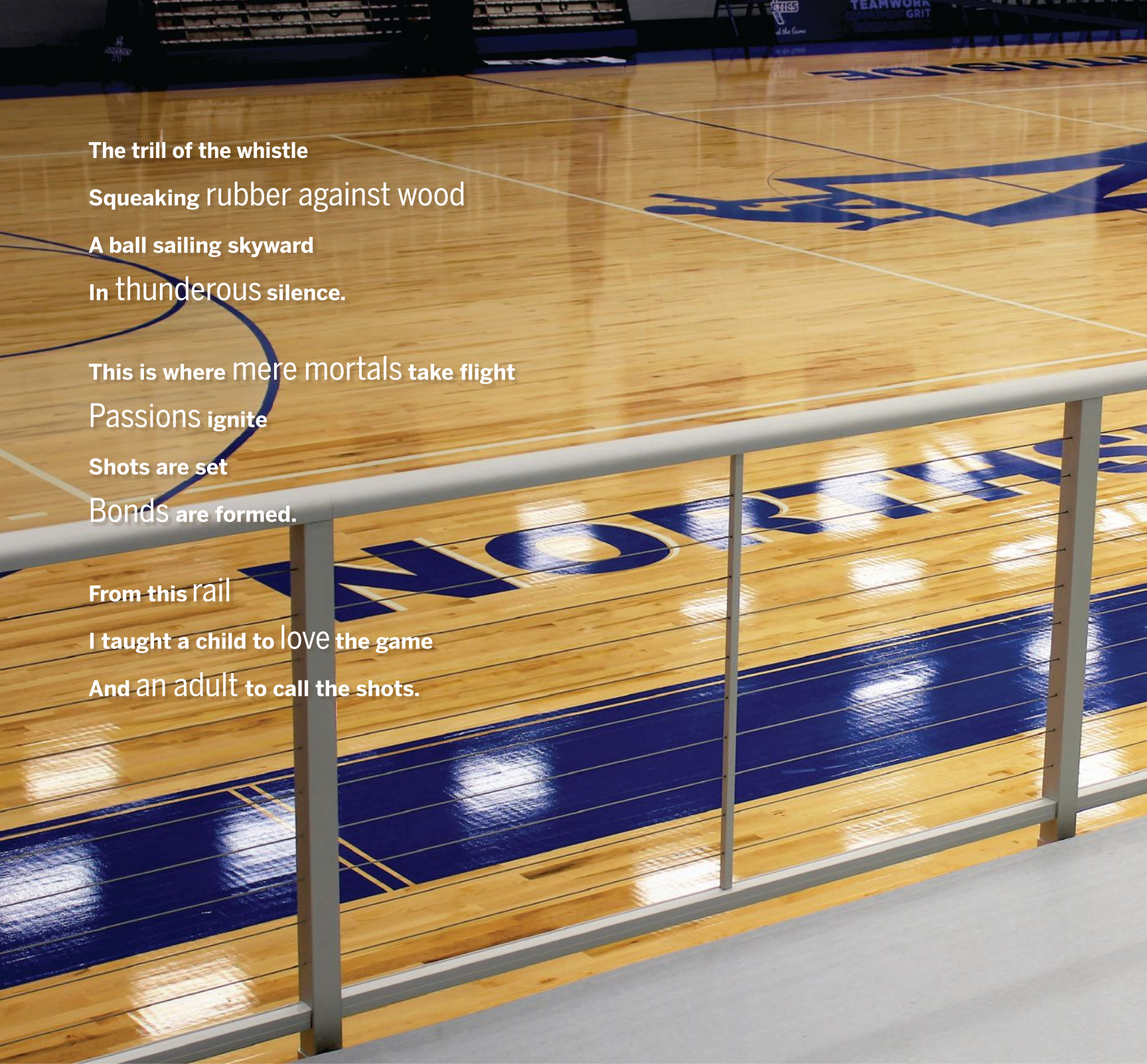
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“Jefferson rationalized the Negro belonged at the back end of the forces that would advance American civilization, just as he designed their spaces of servitude to occur below ground.”

While visiting Richmond, Va., in 1796, newly immigrated British architect Benjamin Henry Latrobe painted two watercolors of the state's new capitol building. In translucent hues, one of the watercolors depicted the stately white temple in the distance, sitting nobly atop Shockoe Hill, overlooking the town's sparsely populated pastoral landscape. One of the earliest examples of American civic architecture, the capitol building, which had been completed in 1788, was designed by statesman, architect, planter, and slave owner Thomas Jefferson and modeled in part on the *Maison Carrée*, a first-century Roman temple in Nîmès, France.

In 1776, 20 years before Latrobe's visit, Virginia had drafted and ratified its state constitution, of which Jefferson had been a key author; the document established a separation of powers that would go on to become a model for the organization of the federal government. The new building Jefferson envisioned to house Virginia's governmental functions needed both to symbolize and to enable the power of "the people"



One of Benjamin Henry Latrobe's paintings of Virginia's Capitol building

to govern and adjudicate the laws of the new state. The self-trained architect also intended the Neoclassical state capitol to serve as a model for civic architecture throughout the 13 states, as well as in the yet-to-be determined seat of the federal government.

It is critical that we understand how "the people" of Virginia—and by extension "the people" of the United States of America—were identified and defined during this period of revolutionary action and postrevolutionary planning; it is important to trace the various rationales conceived to identify who made up "the people" of Virginia, and by extension "the people" of the United States of America. In other words, who were Virginians or American citizens, endowed with constitutional rights, and who were not? A survey of

the population of the port town of Richmond reveals the racial contours of this division. The city's white residents, who were America's newly minted citizenry, staffed and served in its government seat; patronized its taverns, shops, stables, and inns; profited from its docks along the James River and from its warehouses trading in tobacco and slaves; and lived in the wood-framed houses shown in the foreground of Latrobe's watercolor.

Among the several thousand white Americans living in Virginia in the late 18th century labored an almost equally numerous population of noncitizens—free and enslaved African men, women, and children. The enslaved served their masters and mistresses to produce the region's great wealth. Chattel slavery—believed by some to be a necessary evil—buttressed America's civilized values of freedom, liberty, and equality. Enslaved Black people, humans classified as property, also built several of the nation's most important civic buildings: the Virginia State Capitol, the White House, and the U.S. Capitol. Designed by white architects, these edifices stand as the Enlightenment's monuments to the power of reason and the virtues of equality, justice, and freedom.

Scholars who have written about Jefferson's designs for the Virginia Capitol—including the architectural historians Fiske Kimball and Frederick D. Nichols—have failed to examine, in depth, chattel slavery's connection to the building's conception, construction, or context. Slavery was not simply an odious institution rooted in the remote confines of southern backwoods plantations. In truth it was integral to the formation of the economy, government, and national character of the United States. To be sure, many people recognized the enslavement of "Negroes," to use a term common during the period, to be undeniably contrary to the nation's founding creed: the "self-evident" truth that "all men are created equal." That equality originated in nature and was necessary for liberty were moral principles Jefferson enshrined in the Declaration of Independence. There is, however, an inherent contradiction—some might argue a disavowal—in how the founding fathers constituted a new nation that ensured liberalism's "unalienable rights" to "Life, Liberty and the pursuit of Happiness," while continuing to violently enslave other human beings for personal gain.

Born into the wealthy European planter class of colonial Virginia, Jefferson was a slave owner who also epitomized the consummate humanist polymath. Because his oeuvre encompasses the aesthetic and technical domain of architecture, the political realm of government, and the rational sphere of natural philosophy and history, his works offer an ideal lens through which to understand the intersections of the emerging discourses of architecture, nationalism, and racial difference as they coalesced in the late 18th century.

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Analyzing Jefferson's architecture and his writings, together with documents from this period, broadens our understanding of the social, economic, cultural, and political context in which the first work of American civic architecture—the Virginia State Capitol—was conceived and realized.

A Perfect Morsel of Good Taste

In 1776, Jefferson proposed a bill to the Virginia House of Delegates to move its state capital from Williamsburg, the colonial seat since 1699, to Richmond, a fledgling settlement farther up the James River. The bill was passed by the House of Delegates in 1779, shortly before Jefferson became governor of Virginia, a post he held for two years. Richmond would be more centrally accessible to the state's citizens and representatives, safe from enemy incursion, and navigable by waterway.

Jefferson drew up the first designs for the Virginia State Capitol in 1776, and then revised them from 1779 to 1780. In his estimation, to adequately house Virginia's growing white constituency and government, construction practices needed to evolve beyond the production of the crude, ugly wooden structures and awkwardly proportioned brick buildings that were found in Williamsburg. "Architecture," he lamented, "seems to have shed its maledictions over this land." Brick and stone were proper materials for building because of their longevity, he rationalized. But Virginia lacked craftsmen and workmen trained to draw and execute correctly the Classical orders of entablatures, pediments, and columns—perhaps an outcome of the fact that one segment of the construction workforce was enslaved. Literacy, especially the ability to write, was discouraged among the enslaved in order to maintain subjugation and suppress revolt.

All the components of the new republic—executive, legislative, judicial—were accounted for in Jefferson's bill and in his initial drawings of the state capitol that placed each branch in its own building on Shockoe Hill. Jefferson possessed several key folios of Palladio and other volumes on Greek and Roman antiquities. He had experimented with Palladian Neoclassicism at Monticello, his plantation house under construction in the Piedmont, and in unbuilt designs for his alma mater, the College of William and Mary. For the state capitol, Jefferson placed the House of Delegates and other offices on the lower level. The senate chambers, associated clerks, and other legislative functions were located on the upper level. Astutely aware of architecture's ability to project the longevity and stability of the state, Jefferson believed that the new capitol and courthouse buildings should be "built in a handsome manner with walls of Brick, or stone and Porticos." A Neoclassical exterior that echoed

the architecture and ideals of Roman republicanism and Athenian democracy would best speak to the new country's values of liberty and justice.

In 1784, Jefferson succeeded Benjamin Franklin as the minister plenipotentiary to France, a post he held for five years. During his diplomatic assignment in Paris, where he lived with his two daughters, along with several enslaved persons he had brought along to tend to their needs, Jefferson was charged with completing the plans for the capitol once the land had been claimed by eminent domain. In summer of 1785, two of Virginia's directors of public buildings—James Buchanan and William Hay—sent revised plans of the capitol's foundations to Jefferson to review as a means of quelling discontent in the state legislature over the choice of the site. Buchanan and Hay's pragmatic scheme—a series of rooms divided by a long central hallway—lacked the aesthetic vision of Jefferson's skillful plans.

Later that summer, Governor Patrick Henry wrote to Jefferson that a cornerstone had been laid and that foundations of brick, their construction overseen by Hay and Buchanan, were out of the ground, based on Jefferson's earlier drawings. Jefferson now needed to complete his design, and to assist with the preparation of drawings and a model, he recruited French architect Charles-Louis Clérisseau, a skilled draftsman and archaeologist. Jefferson had reviewed drawings of the perfectly preserved Maison Carrée in books and greatly admired Clérisseau's publication *Antiquités de la France, Première Parti: Monuments de Nîmes* (1778), which he eventually purchased from Clérisseau while in Paris. Clérisseau's meticulous orthographic documentation of the temple's details, proportions, and layout suited Jefferson, who possessed not only the eye of an architect, but also the fastidious gaze of a naturalist.

Because the legislators desired to conduct all of the state's business in one structure, Jefferson, with Clérisseau, revised the earlier plans and placed the General Court on the first floor, across from the House of Delegates. An elegantly proportioned two-story atrium connected the two chambers with other functions in the building. The second floor housed the senate chambers and auxiliary spaces for clerks. The new design took advantage of the basilica form, so that the protocols of assembly, deliberation, and adjudication, adapted from the colonial government, would operate smoothly in the space.

In a letter to James Madison, Jefferson expressed his desire that Virginia's new capitol would become a model of architecture worth emulating throughout the new nation: "How is a taste in this beautiful art to be formed in our countrymen, unless we avail ourselves of every occasion when public buildings are to be erected, of presenting to them models for their study



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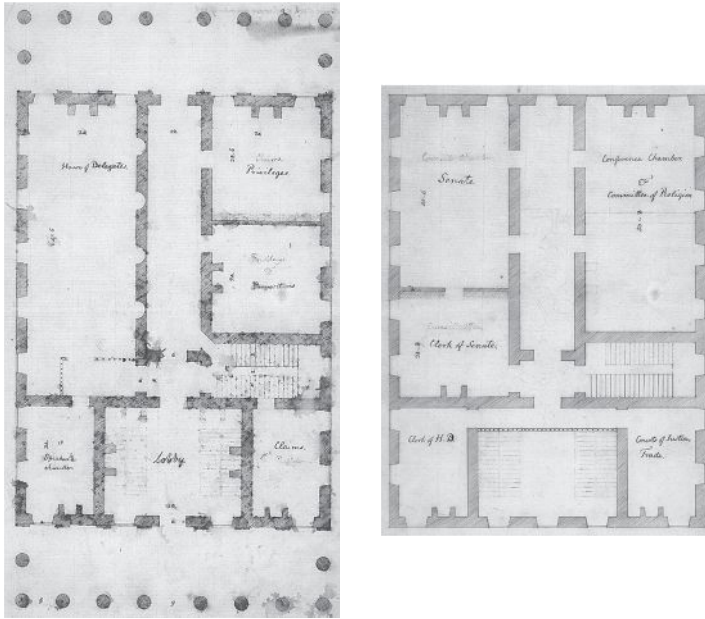


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Floor plans, drawn by Thomas Jefferson, of his 1780 scheme for the Virginia State Capitol Building

and imitation?” Jefferson apprised his friend that for many people the Maison Carrée was “one of the most beautiful, if not the most beautiful and precious morsel of architecture left us by antiquity.” The monuments of antiquity offered Americans perfectly preserved examples of Greco-Roman Classicism, an architecture emblematic of truth, justice, and democracy, one that for Jefferson had not been corrupted by capricious flourishes of the late Baroque’s Rococo period that suited the tastes of the French aristocracy.

He commissioned model maker Jean-Pierre Fouquet to complete a plaster maquette of the design, and in June 1786 shipped it along with Clérisseau’s drawings to Hay and Buchanan in Richmond. The didactic purpose of this novel design for the capitol building, Jefferson wrote to Madison, was heuristic: “Its object is to improve the taste of my countrymen, to increase their reputation, to reconcile to them the respect of the world and procure them it’s [sic] praise.” In return for erecting a beautiful work of civic architecture, Americans would gain the regard of the world, which for Jefferson meant the new nation would win the admiration of Europeans.

His rationale for replicating historical buildings held in high regard was that the design for such buildings was “very simple, but it is noble beyond expression, and would have done honour to our country as presenting to travellers a morsel of taste in our infancy promising much for our maturer age.” What Jefferson feared most was the prospect of erecting a tasteless “monument to our Barbarism.” He hoped that the new capitol would be a transformative exercise that would seed a new culture and society in the New World, yielding a ripe American civilization. His designs would

offer an invaluable primer on how architecture could represent the virtues of durability, utility, and beauty.

One challenge faced by Virginians—and the new union of 13 states—was how to cultivate the character of its new political subjects, “the people.” In 18th-century Europe and its colonies, refined taste in art, dress, architecture, and food (fueled by the growing appetite for sugar, coffee, and tobacco) became a marker of elevated intellectual and economic status. But this “culture of taste,” writes Simon Gikandi in his 2011 book *Slavery and the Culture of Taste* (Princeton University Press), also harbored “repressive tendencies—namely, the attempt to use culture to conceal the intimate connection between modern subjectivity and the political economy of slavery.” This interdependence between the formation of a new white American culture, one that included the arts of building, and the enslavement of African peoples, justified by their presumed innate mental and physical inferiority, can be found in *Notes on the State of Virginia*, which Jefferson first published in 1785.

The book originated as a report Jefferson prepared in response to 23 queries sent to him in 1780 by a French diplomat, François Barbé-Marbois, who had created the survey to gain a better understanding of the geographic and historic character of the newly formed nation. Jefferson provided evidence in philosophy, war, government, oratory, painting, and the plastic arts to show that “America, though but a child of yesterday, has already given hopeful proofs of genius.” He was confident the U.S. would evolve to rival if not surpass Europe, if the minds and tastes of its white citizenry were properly nurtured, for instance, by exposure to tasteful, aesthetically pleasing architecture of the kind exemplified by the Virginia capitol building.

Even though he sought to sever ties with what he believed to be a calcifying European aristocratic culture, Jefferson nonetheless preserved its aesthetic values as a visible register of white American culture. For Jefferson, Negroes, because of their naturally inferior faculties, could not be incorporated into the new nation state as citizens. In his response to Query 14, “The Administration of Justice and the Description of the Laws,” Jefferson sought a political solution to the problem of what to do with the Negro population living in Virginia, the majority of which was enslaved. On several occasions in state legislation and in early drafts of the Declaration of Independence, Jefferson had proposed language that terminated the importation of slaves into Virginia and the new nation. (During his presidency he would succeed in 1808 in abolishing the international slave trade, but not its lucrative domestic market.) Along with political concerns, Jefferson held “physical and moral objections” to Negroes based on



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a lifetime of observations of what he considered to be their comportment and character. Because universal reason relied upon experimentation and observation for the validation of truth, Jefferson's conceptualization of the racial paradigm of human difference found one promising register in skin color. He rationalized that what counted as beautiful could be applied to the breeding of animals and therefore also to the human species—where variations in physiognomy, hair texture, and skin color were visible. Of all these markers, skin color was the most obvious indicator of racial difference.

The origins of the skin's coloration for Jefferson, however, could not be discerned by dissection of the epidermal layers or a chemical analysis of blood or bile. He determined skin color as "fixed in nature," and therefore of divine causation. The aesthetics of Blackness was part of a rationalization of the variations in the human species that divided peoples living in Europe, Asia, Africa, and the Americas, and affirmed the superiority of Europeans and their whiteness. Under Jefferson's probing gaze, the features of the Black body were seen as less beautiful in comparison to the symmetry and flowing hair of white physiognomy. The overall lack of beauty in Blackness visually and viscerally appalled Jefferson. He verified this by suggesting that even Native Americans found whites preferable, just as "the preference of the Oranootan [sic] [is] for the Black women [sic] over those of his own species." To posit Black women as subhuman, closer to primates, was based on a theory of polygenesis in natural history, which maintained that each race was a different species.

Blackness signified the Negro's sub-humanity and validated her ruthless exploitation. The Negroes' supposed inability to appreciate beauty, except in the most sensual manner, or to create works of true aesthetic value, except out of mimicry, also provided Jefferson with evidence of their natural mental inferiority. In Query 14, he surmised that in their ability to remember, Blacks were equal to whites, but in their ability to reason and to comprehend mathematics and sciences, they were certainly inferior: "In their imagination," he wrote, Blacks were "dull, tasteless, and anomalous."

"Deep Rooted Prejudices"

Did the Negro, whether enslaved or freed, have a place in America? Jefferson put forward an emancipation scheme in his response to Query 14. He proposed that enslaved children "should continue with their parents to a certain age, then be brought up, at the public expence [sic], to tillage, arts or sciences, according to their geniusses [sic]." Once adults, women age 18 and men age 23 should be colonized to African, Caribbean, or western U.S. territories and supported until they grew in strength.

To replace the now-absent labor Jefferson proposed to send "vessels at the same time to other parts of the world for an equal number of white inhabitants."

Pragmatically, Jefferson believed that Virginia's history of chattel slavery would prevent Black and white races from living together peacefully in the same place, citing those "deep rooted prejudices entertained by whites; ten thousand recollections, by the Blacks, of the injuries they sustained." Emancipation and citizenship for freed Blacks could only result in "convulsions which will probably never end but in the extermination of one or the other race." American civilization, therefore, could not thrive with a free Black population. The undesirability of Blackness, the "unfortunate difference of color, and perhaps faculty, is a powerful obstacle to emancipation of their people," argued Jefferson. Once enslaved Blacks were freed, he required them to be "removed beyond the reach of mixture." Thus not only did revenge by Blacks pose a threat to the new nation in Jefferson's eyes, but he also feared miscegenation.

While emancipation might have been desirable for political and moral reasons, the economic realities of how chattel slavery fueled the wealth and maintained the well-being of white Americans made it difficult to terminate the two-century-long reliance on it. The enlightened white men who "liberated" the nation espoused the humanistic values of natural rights, of Lockean "life and liberty," yet many were unwilling to part with their human property. Some of Jefferson's generation did manumit their slaves during their lifetime or upon death, as did George Washington and his heirs. But Jefferson, who owned up to 200 slaves at one time, and more than 600 over his lifetime, freed only seven—two during his lifetime and five upon his death.

The Role of Enslaved Labor

In 1785, Jefferson wrote to Hay and Buchanan that given the scarcity of talented craftsmen in Virginia it might be wise to hire European craftsmen well versed in wood-, stone-, and plaster-construction. Securing the services of a skillful stonemason, for example, was desirable, because, according to Jefferson, "under his direction, negroes who never saw a tool, will be able to prepare the work for him to finish." Once construction of the capitol was under way, enslaved laborers joined the teams of workers that cleared the land, dug foundations, hauled wood, cut lumber, molded and fired bricks, transported stone, painted walls and trim, and removed waste.

While members of Virginia's planter class like Jefferson possessed hundreds of slaves to work their agricultural holdings and small-scale industries such as nail manufacturing, it was also common for free white Virginians engaged in business and trade, including construction, to possess a small number of enslaved



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Africans. William Hay, for example, owned six slaves over the age of 16 (tax records only make note of those who were taxable, so there could have been others under age 12). Samuel Dobie, a skilled Richmond builder who executed Jefferson's Neoclassical designs, though not always faithfully to the statesman's intent, owned two adult slaves during the time of construction. Many of the tradesmen—plasterers, plumbers, and painters—who worked on the capitol owned several slaves. Edward Voss of Culpeper, Va., a subcontractor and supplier of 400,000 bricks for the foundations, owned seven slaves.

In October 1788 Voss sent an invoice to the directors to pay Robert Goode “the sum of ten pounds 20 shillings for the hire of Negroes to oblige.” To perform numerous rough carpentry and woodworking tasks for several years through 1795, Dobie subcontracted Dabney Minor, who lived on a farm in Woodlawn, in nearby Orange, Va., where he owned seven slaves; Minor kept 10 slaves in Richmond. During the busy year of 1789, Minor's workers erected the interior framing of the courtroom and doorways, laid tongue-and-groove flooring in the courtroom, mounted scaffolding for workers to install pediments and cornices, moved bricks, and cut the wooden templates Voss used to erect the exterior columns—all part of a long list of tasks for which Minor was paid £154 (in 1788 he earned £1,004 for work on the site). An advertisement he placed in Richmond and Hanover newspapers in 1794 explained that runaway slave Lewis or Lewy had been “employed at the whip-saw, and in rough plaining [sic],” which shows how Minor deployed enslaved workers in the various facets of his construction business.

Because Richmond was a port town, freed Black men also worked on the capitol building. A laborer named Fortune, who was known to Hay and Dobie, worked on the construction site for several months in 1788. His tasks included clearing away timber, planks, and rubbish from the yard. Fortune was paid directly, indicating that he might have been either a freedman or an enslaved laborer who had some modicum of control over his time. It is unclear from records whether enslaved Africans were rented for long periods of time and lived onsite. But given that Richmond was already a busy port town, the enslaved population, including women and children, provided a range of services from cooking to laundering to stabling. Enslaved Blacks provided a significant portion of the labor necessary to erect Jefferson's monument to American civic life.

“Immovable Veil of Black”

The second of Latrobe's watercolors of the Virginia State Capitol depicts the civic temple dominating the rustic landscape, much in the way that Jefferson's Monticello and the University of Virginia, which he also designed,



An 1865 photograph of the Virginia State Capitol building

commanded their respective sites. In these two other designs, the high ground, both natural and man-made, provided Jefferson the opportunity to architecturally reconcile the paradox between freedom and slavery by placing some of the slave dependencies beneath the main living spaces in rooms and passages hidden from view. This way, the white-columned Neoclassical buildings appeared to visitors as idyllic beacons of democratic values overlooking sublime nature unsullied by the presence of those spaces in which unsightly slaves toiled to make the land fertile and the lives of white citizens comfortable. Blackness was a sublime “eternal monotony,” an “immovable veil of black which covers all the emotions of the other race,” wrote Jefferson in his response to Query 14.

Black bodies and Blackness for Jefferson and for others of his era proved an impenetrable threshold to reason. They were distasteful. Wielding the tools of enlightenment, Jefferson rationalized the Negro belonged at the back end of the social and political forces that would advance American civilization, in the same manner he designed their spaces of interminable servitude to occur below ground. While all men were born equal, as natural rights proponents advocated, to Jefferson, the Negro possessed neither the aptitude to reason nor faculties to appreciate beauty or liberty. “The people” did not include Negroes. The prospect of a free Black American was both unreasonable and unimaginable to the sage of Monticello.

This essay was adapted from the one published in Race and Modern Architecture: A Critical History from the Enlightenment to the Present, edited by Irene Cheng, Charles L. Davis II, and Mabel O. Wilson (2020). Reprinted by permission of the University of Pittsburgh Press.



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3 Benefits of Working with Engineered Railing Systems

Today's commercial designs are all about open, organic concepts, which means glass elements are in high demand. From sports arenas and shopping malls to hotels and healthcare settings, savvy specifiers are increasingly looking to incorporate glass into their designs. But specifying glass can be tricky, especially when it comes to railing systems. Working with an "engineered" system can take the guesswork and gamble out of the process and result in greater control, confidence and even cost savings.

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When specifying a railing system, there are myriad variables to consider – from concepts and site conditions to code compliance. Engaging an engineering team that understands the nuances of glass railing applications can foster smoother communication and afford access to advanced technologies that enhance control. For instance, Trex Commercial Products utilizes High Definition Surveying (HDS), which offers tremendous benefits for architects and their clients. In the near-term, it provides precise measurements for use in project designs. In the long-term, the survey information can aid in future maintenance or reconfiguration.

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Commercial rail installations nearly always require detailed documentation of code compliance. In many cases, this responsibility lies with the architect. However, a high-performance glass railing system requires specialized engineering that may fall outside their comfort zone. This is where an engineered system delivers its greatest benefits.

These systems are rigorously engineered by a team of specialists that will have taken into consideration everything from wind and seismic loads to the attachment substrate – factors that can vary considerably depending on location and building type. Technical information is captured and clearly presented in a comprehensive report, including calculations and testing data signed and sealed by the engineering team and ready for submittal to building authorities.



Using 3-D laser scanning, Trex Commercial Products precisely engineered the custom stainless and glass railing system for this stunning spiral staircase at Colorado State University Health and Medical Center. Photo credit: Trex Commercial Products

With an engineered system, support continues throughout the installation process as technical questions arise and site conditions require alterations. A reliable, technically capable partner can help avoid costly project delays and free up architects to focus on other things.

Cost Savings

With regard to costs, it's important to look at the whole picture when working with an engineered system. Along with getting a code-compliant solution, specifiers gain access to a collaborative team of specialized consultants and engineers. This helps to streamline communication, resulting in fewer surprises and lower administrative costs.

Engineered systems also allow contractors to work faster and accomplish more at the job site. With a Trex Commercial Products railing system, for instance, pre-engineered materials are packaged together with components labeled to correspond with setup drawings. This translates to a more efficient installation process, which yields time

savings and lower labor costs. Engineered systems also tend to see fewer change orders and callbacks, which can add considerable costs to a project.

From design to delivery, a knowledgeable systems fabricator can be an invaluable resource, fostering greater communication, assuring code compliance and delivering peace of mind. Particularly when glass railings are being considered, architects should enlist the help and expertise of a specialized supplier at the onset of design planning to best understand what's possible and what's required for an optimal outcome.

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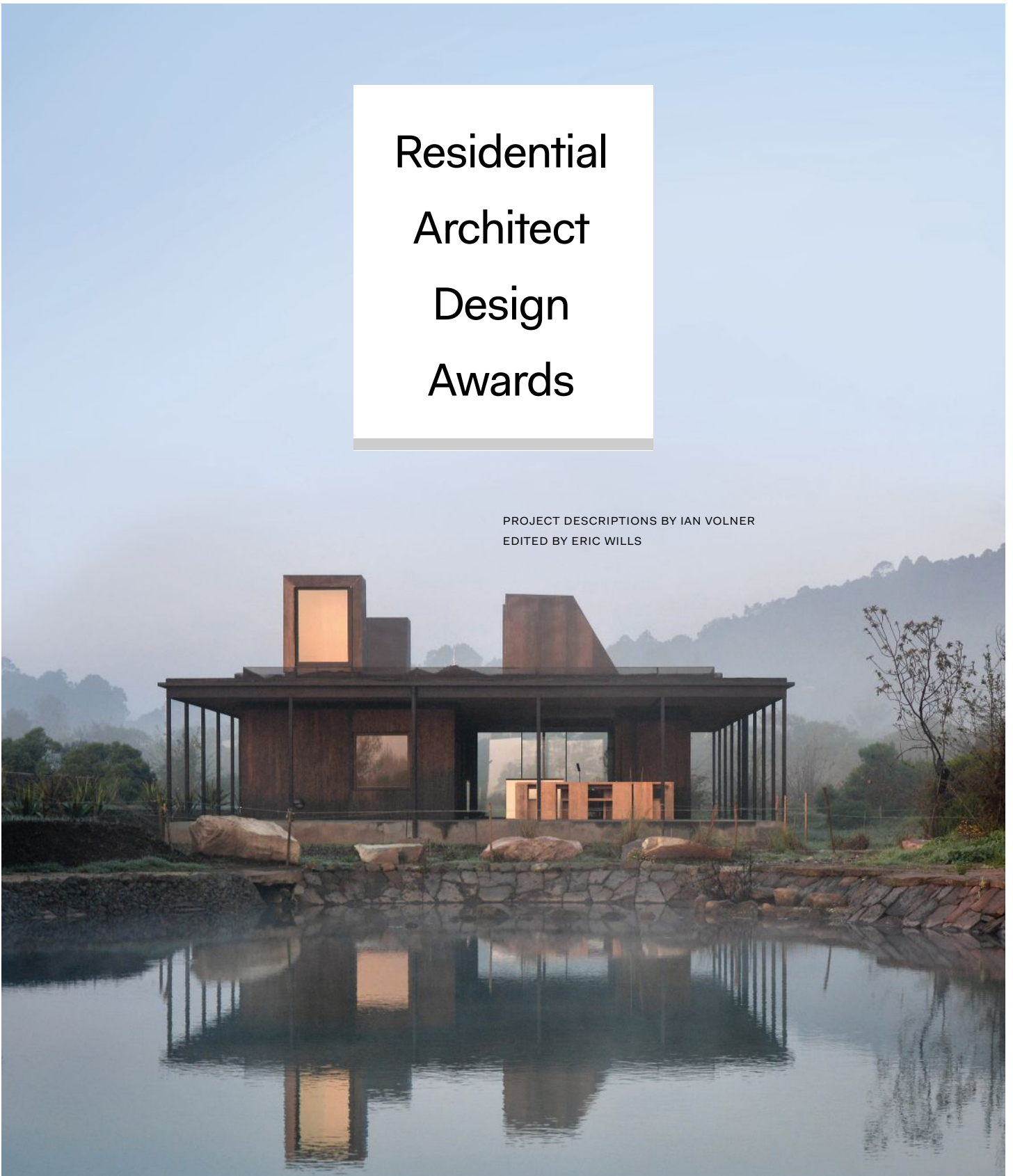


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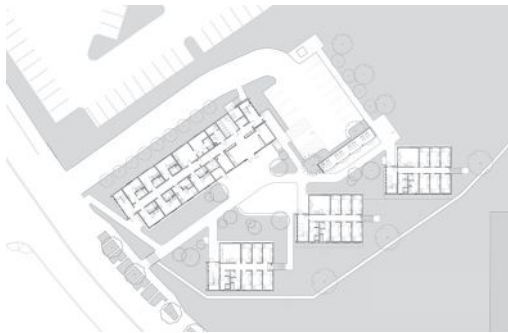




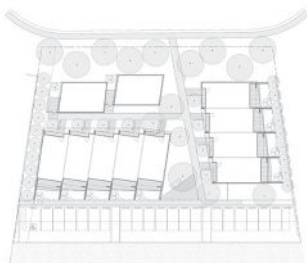
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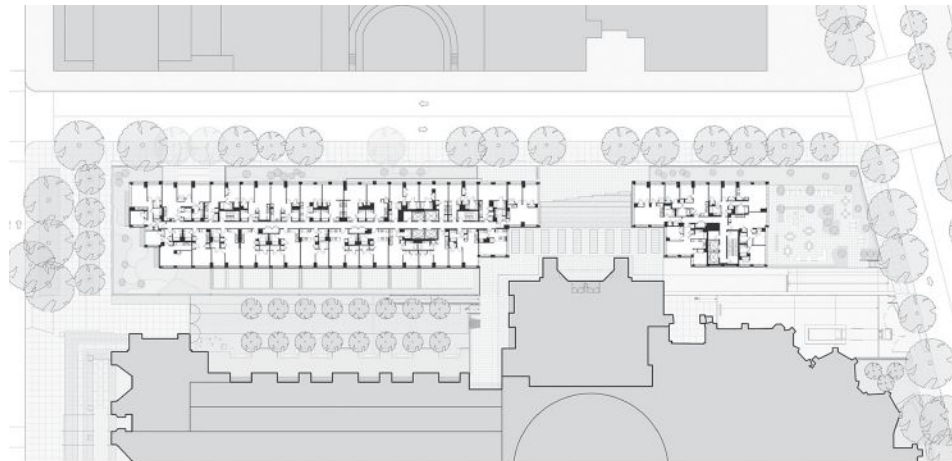
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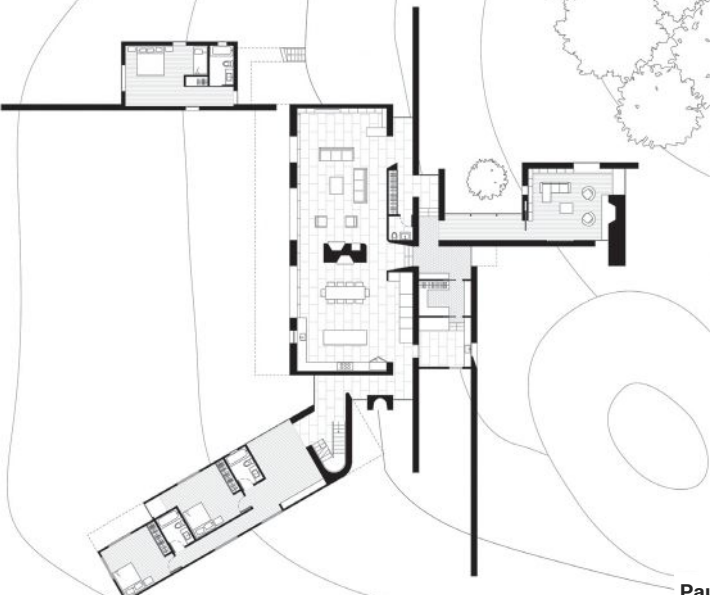


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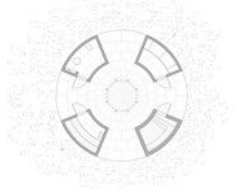
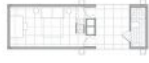
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BKL Architecture,
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Amy Yang,
Dash Marshall, Brooklyn,
N.Y. and Detroit

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More Than 3,000 Square Feet
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Custom House
Less Than 3,000 Square Feet
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If the winners of this year's Residential Architect Design Awards share something in common, it's a rejection of showy displays of design bravado in favor of a quieter architecture. With the quiet comes meaningful investigation into the serious issues of the day, be it pursuing environmental sustainability, responding to the affordable housing crisis, heralding the possibilities of adaptive reuse, engaging with a landmark neighbor, or even some combination of these pursuits in a single project. Which is not to say that there aren't some eye-catching moves—just in the service of some greater good. Taken together, this year's winners illustrate ways in which residential design can respond to the challenges of today and begin to take on those of tomorrow.

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Custom House
More Than 3,000 Square Feet
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“It’s easy to love the landscape of the site because it is so beautiful. But the siting of the buildings actually enhances it. I appreciated the materiality of the design—the simplicity of the natural woods within the context of the landscape. The project also did a good job of using the environment, particularly the solar aspect and the collection of rainwater.”

—Danielle Tillman



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“It is a well-thought-out plan, and I appreciate the simplicity of the design. There are some interesting moves; the shifting of the planes of the façade was really nice. With multifamily, the challenge is always how to make something a little more distinctive when you do multiple units, and I thought they did a good job of differentiating the spaces.”

—Danielle Tillman

Rain Harvest Home
Temascaltepec, Mexico
Robert Hutchison Architecture

A couple of hours removed from Mexico City—whose explosive growth has taxed the region’s fragile ecosystem—Seattle-based firm Robert Hutchison Architecture (in collaboration with local firm JSa) has created a paean to the Mexican highlands that promises to help maintain their natural beauty for years to come. Located in the mountain community of Temascaltepec, and bristling with energy-efficient and waste-reducing features, Rain Harvest Home comprises three free-standing structures—a small art studio, bathhouse, and the residence itself—all connected to each other via pathways that wind through a lush landscape. In tune with the rustic surroundings, each of the volumes sports a burnt-wood exterior giving way to spare interiors accented by volcanic stone, with a wraparound porch on the main house providing ample space for outdoor dining and lounging. The bathhouse, perhaps the most compelling element of the scheme, is a circular volume that serves as a hot bath and steam shower; with its central rooftop aperture, it seems almost like a small temple dedicated to water—which, in a sense, it is. A complex network of infrastructure provides for all of the project’s water needs, channeling rainfall into an on-site reservoir that, in tandem with a nonpolluting water treatment system, will keep residents cool and hydrated even during Temascaltepec’s dry season. Complemented by a full battery of solar panels, the project shows a way forward for sustainable construction in Mexico’s interior.

The Hollyhock
Phoenix
Studio Ma

With the Hollyhock, an 11-unit development in Phoenix, local firm Studio Ma sought to bring the spirit of the Sonoran Desert to a low-cost housing scheme with an ecologically sensitive, community-focused design. The firm turned a seemingly straightforward brief into a model for urban living in a region where suburban sprawl has long been a pervasive problem. The townhouse-style buildings (nine are two stories and two are one story) are set back from the street in a gardenlike setting planted with palm and sage, with each building allotted its own pebble-strewn front yard and private terrace in the rear. To mitigate another regional challenge—an overreliance on air conditioning—Studio Ma opted for ultra-insulating walls, keeping the buildings cooler in the day and warmer during the surprisingly brisk desert evenings. The design’s green features go further still, with electric-vehicle charging available in the adjacent parking area and high-efficiency water systems throughout. It’s all carried off with suitable aesthetic finesse, thanks to a regionally-inspired material palette of faded wood, faux stucco, and weathered metal, with creamy all-white fixtures and finishes inside. Even more remarkable, because of the architect’s budgetary pragmatism, the entire complex came in at a gross construction cost of scarcely \$3 million, allowing the savings to be passed on to residents. The Hollyhock offers a glowing example of what sophisticated, high-density housing can look like.

Argyle Gardens
Portland, Ore.
Holst Architecture

To one of the pressing questions confronting residential architects today—How do you make affordable housing that doesn't look like affordable housing?—Portland-based Holst Architecture has responded with a project that transforms economical materials and ease of construction into opportunities for aesthetic exploration. Argyle Gardens, located in the city's Kenton neighborhood, is sited on a curious loop of public land that is wedged tightly between low-rise office buildings and commercial warehouses. The project consists of four simple brightly colored and gabled volumes that look enchantingly cartoonlike. On closer inspection, the broad face of each "house" is revealed to be its short end, a pseudo-façade split down the middle with one side recessed and clad in composite panels, and the other side protruding and featuring plastic glazing. The primary entrances are tucked into the cleft between the two sides of each façade, effectively hiding them from the street. All this visual gamesmanship unfolds around 72 units, including studio apartments (located in the one stand-alone building) and communal co-living suites (in the three opposite structures) that will house single workers, the recently homeless, or low-income families. Playful as the buildings are, their decidedly domestic appearance and village-like arrangement serve an important purpose: creating a warm, communal atmosphere while making the most of a marginalized site.

Enclave at the Cathedral
New York City
Handel Architects

Into a daunting site in New York's Morningside neighborhood, alongside the north flank of the hulking Neo-Gothic church St. John the Divine, Handel Architects has designed an apartment building that somehow manages to be equal parts eye-catching and self-effacing. Enclave at the Cathedral is a 430-unit apartment house that is 15 stories tall and scarcely a quarter block wide. To thread this challenging urban needle, the designers created a lateral façade, composed largely of vertical concrete piers, that ensures the focus remains on St. John's stunning westwork. Meanwhile, to the north and south, the architects devised a dramatic ribbed exterior that plainly references the muscular structural systems of the church's Gothic Revival architecture. This air of deference extends to Enclave's silhouette, which steps down slightly as it approaches its neighbor. And rather than plunk down a single bulky structure, Handel divided the project into two buildings to leave the church's north transept exposed. But none of this modesty diminishes an ambitious program that includes a sweeping lobby, an on-site art exhibition space, and gracious landscaping that connects the greenspace surrounding the cathedral to the neighborhood. Seen from the bottom of the hill to the east, Enclave's wedgelike taper looks very much like a dislodged fragment of the cathedral, a flying buttress that has taken up residence alongside its historic neighbor.

Argyle Gardens



“The architects did something fun and unexpected with this project, and they managed to do a lot with a little in terms of the cost. Opening the stairs up to the light creates a nice inside-outside relationship.”

—Paulett Taggart



PAVEL BENDOV

“When you’re designing these large multifamily buildings, you’re always trying to find a way to differentiate them. The architects created a dynamic façade that is really successful, especially in the way it relates to the church.”

—Danielle Tillman



COREY GAFFER



"It's a strong, clear concept that is well carried out. The building has a certain elegance: the lightness of the glazed part of the structure, the thinness of all the verticals—their regularity. They all come together into one whole. It's really beautiful."

—Paulett Taggart

Isla Intersections



“The project creates a community and yet it is all of a piece. It doesn’t try to be separate buildings. Rather, it breaks down the scale in a way that doesn’t feel gratuitous but that feels true to itself.”

—Paulett Taggart

X House
Marquette, Mich.
Snow Kreilich Architects

How can you create a sense of comfort and ease in the heart of nature, even when nature is at its most hostile? This was the dilemma faced by Minneapolis-based Snow Kreilich Architects with its commission for a vacation home on Michigan's Upper Peninsula. Surrounded by towering pines, the site—a rocky stretch of Lake Superior shoreline—has stunning waterfront views, but its postcard location is also its chief liability. Subject to upwards of 250 inches of snow each year, the regional climate takes a toll on buildings—especially country retreats with big windows and free-span interiors. X House satisfies this brief by combining structural rigor, exquisite detailing, and the ingenious layout that gives the project its name. In plan, the house is divided into two intersecting bars, one containing the living room, kitchen, and garage, and the other the bedrooms and bathrooms. Both sit on a single floor and can be easily navigated by aging occupants (the clients are a multi-generational family). The configuration takes advantage of the site: Perched on an outcropping, the structure projects over the bluff while offering views of the beachy cove below. With a rugged steel-and-concrete frame and despite its glazed exterior, X House should endure amid the UP's harsh winters.

Isla Intersections
Los Angeles
Lorcan O'Herlihy Architects

As on-the-boards projects go, Isla Intersections from Los Angeles-based Lorcan O'Herlihy Architects is animated by a clever and innovative idea. Located on a marginal site in South L.A., a stone's throw from the juncture of two major highways, this speculative scheme calls for a below-market residential development of more than 50 units housed within irregularly stacked steel containers, all connected by aerial catwalks and surrounded by landscaping and public amenities. Container-based design schemes may be commonplace, but this one distinguishes itself both through its sensitivity—softening the visual effect of the metal boxes with broad windows and rooftop gardens—as well as its practicality: Conventional construction would be challenging on the narrow, less than 20,000-square-foot lot, one of thousands of seemingly unusable parcels the city government is now seeking to dedicate to affordable housing. A resourceful approach like LOHA's not only puts that goal within reach but also enriches civic life for everyone. Subtle interventions include a curving "paseo"-style roadway complete with shops that encourages pedestrian traffic along La Isla's western flank, and a mixed massing of both mid- and low-rise stacks that step down to meet the scale of the adjacent neighborhood. Just as importantly, the residences themselves don't sacrifice quality for cost: Each nearly 500-square-foot unit includes all the modern conveniences as well as views of the surrounding greenspace.

Sagg Farm
Sagaponack, N.Y.
Bates Masi + Architects

Sagg Farm—a two-story country house in the Hamptons designed by Bates Masi + Architects—has claimed a special prize for architectural detail, in recognition of its innovative and eye-catching exterior cladding system. The cedar façade that attracted the jury's notice chimes conceptually and aesthetically with the house as a whole: Natural timber finishes line the interior, from the built-in children's bunk beds, to the woodblock ceiling over the airy dining room, to the movable timber louvers (each bracing a strip of sound-buffering fabric) that flank the all-wood staircase. Organic design is the keynote of Bates Masi's approach, and it also informs the plan of this house: Divided into three north-south bays, the layout is intended to recall the traditional planting patterns of the region's agricultural past. The same earthy logic dictated the choice of exterior cedar, which was freshly milled before being installed, and remains untreated by weathering chemicals or stain. The lateral strips, all positioned within surrounding frames, are affixed in the center with two screws, but left free at the ends. As the wood ages and bends, slight irregularities will result—each rib will assume a slightly different angle, creating a beguiling visual effect. Seen from the yard, the façade creates a pleasingly offbeat rhythm that softens the building's almost Louis Kahn-like monumentality—as though the old master had traded in his cement trowel for a carpenter's saw. And from the other side, the ribs filter dappled, dancing light into the interior spaces.





COURTESY BATES + MASI ARCHITECTS

“The materiality of the cedar rainscreen on the exterior is beautiful and really highlights the structure. It is different, it is well detailed, and where it meets the other materials on the façade is really well thought out.”

—Danielle Tillman



“It’s a well-laid-out plan that fits well within the context of the site. The architects weren’t trying to mimic the older buildings on campus, but the materiality of the buildings and the windows—the depth and shadow they create—fits with the overall context.”

—Danielle Tillman



**PPR Residence Hall
Swarthmore, Pa.
Digsau**

Palmer, Pittenger, and Roberts Residence Hall (PPR for short), a new dormitory at Swarthmore College, represents a major achievement in campus design for Philadelphia-based Digsau. Sited just opposite a century-old collection of student housing, the project weaves the existing residential quad into the broader life of the college: The architects not only appropriated the fence from an adjacent baseball diamond into the building itself, but they added an outdoor terrace as a spectator space. The move highlights a bustling and engaging program that includes kitchen facilities, community gathering spaces, in-suite bike storage, and ecologically sensitive waste-disposal systems. Special care is given to energy efficiency throughout, creating teachable moments for the 128 students who live there. Students washing their clothes, for example, will draw on water heated by a rooftop solar array; will have their water use monitored by sensors that inform them of their environmental impact; and can hang their completed wash on built-in retractable clotheslines in their dorm rooms, reducing the need for drying machines. Innovative as it may be, Digsau's design doesn't stand apart from Swarthmore's historic campus. Textural stone exteriors reference the nearby historic dormitories, and the glassy walkways that connect the project's three blocks open it up to the surrounding greenspace.

**Wabaunsee County Homestead
Alma, Kan.
El Dorado**

Straddling the romantic and the functional, the cosmopolitan and the local, El Dorado's design for the Wabaunsee County Homestead demonstrates the possibilities of adaptive reuse. The Kansas City, Mo.-based firm started the project (for one of the firm principals and his family) with a promising yet challenging site—an 1893 homestead just east of Manhattan, Kan., in the middle of one of the last remaining patches of the tallgrass prairie ecosystem that once dominated the region. El Dorado preserved and restored the two-story masonry house, using the space for an oversized master bedroom with a lofted ceiling that runs clear to the former second floor, its height accentuated by a stovepipe from the floor-mounted heating unit. An interstitial glazed foyer connects the older volume to a newly constructed secondary building that runs parallel to its neighbor and contains the residence's living room, kitchen, and master bath. The contemporary wing is as true to the spirit of the place as its 19th-century counterpart, with its envelope of corrugated steel, rough wooden interior finishes, and stone-hewn patio all exuding a rough-and-ready, pioneer spirit. In a seemingly endless expanse of flatland, the house is especially laudable for its spatial economy, clocking in at 1,500 square feet but still feeling, thanks to its broad windows and clean lines, as wide open as the prairie itself.

**Three Chimney House
Charlottesville, Va.
T.W. Ryan Architecture**

Refined yet cozy, urbane yet unpretentious, the Three Chimney House from T.W. Ryan Architecture is a reinterpretation of America's rural vernacular that's full of surprises. Located only a few miles from Thomas Jefferson's Monticello, and perched on the lip of a steep slope, the house appears at first as a simple agglomeration of familiar forms, with its rough brick perimeter walls and pitched rooflines punctuated by a trio of chimneys. But upon closer inspection, anomalies begin to emerge: A recessed aperture is set into the wall, and once inside, a visitor discovers a vestibule with portal skylights. The interior unfolds as a composition of striking planar complexity that is vaguely pinwheel in shape, with the sleeping quarters, a guest lodge, and service elements all projecting outwards from the central axis of the main living space. In contrast to the blank front seen on approach, the house offers a more striking tableau from the opposite side, the wings clad dramatically in black and white and opening up around a central lawn and patio. The chimneys serve multiple purposes, both helping to organize interior spaces and acting almost as flags—unmistakable markers that jut out of the landscape. With references that range from Monticello to Mies, the house is a seductive fusion of disparate elements, executed with consummate assurance.



MIKE SINCLAIR

"I liked the modest decisions the architects made for the new structure. They did a nice job creating an addition that complements the original and doesn't take away from it."

—Amy Yang

Three Chimney House



“I think the siting is really beautiful—the idea of the historical reference to the chimneys, and how that is a marker for homes in the landscape. The architects worked with the existing vernacular well, but in a modern way.”

—Amy Yang



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THE STUDIO PRIZE

EDITED BY KATIE GERFEN

STUDIO DESCRIPTIONS BY EDWARD KEEGAN, AIA

The 2019–2020 academic year was a tale of two proximities—it started with the familiar in-person, intensive studios that are the hallmark of architectural education, and ended up, as did so many things in 2020, on Zoom, as COVID-19 forced schools to shift to remote instruction. Remarkably, as demonstrated by the 2020 Studio Prize—the winning students will share a \$25,000 prize purse generously furnished by our sponsor, Sloan—the level of investigation, inquiry, and exploration did not falter. Whether in-person or remote, these studios encouraged students to think critically about the role of architecture, and about how to better engage—more equitably, sustainably, and creatively—with the communities they serve. With that approach as a foundation, this next generation of architects will be poised to create a better built environment for all.

JURY

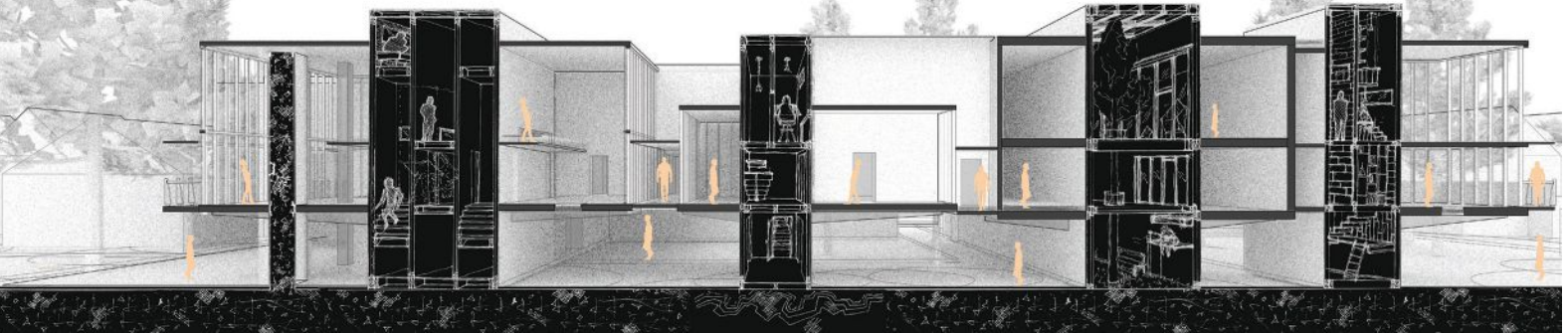
Victor Body-Lawson, AIA, Body Lawson Associates Architects & Planners, New York
Weihan Vivian Lee, AIA, LAMAS, Toronto
Jonathan Tate, OJT, New Orleans

The Studio Prize awards program
is proudly sponsored by Sloan.

SLOAN

TOWARDS AN ARCHAEOLOGY OF THE FUTURE

THE PINE STREET AFRICAN
BURIAL GROUND



CITY COLLEGE OF NEW YORK,
THE BERNARD AND ANNE
SPITZER SCHOOL OF
ARCHITECTURE

STUDIO BRIEF

The rediscovered Pine Street African Burial Ground in Kingston, N.Y., prompted exploration into what the brief calls “time-released architecture within a very different spatial context.” Students worked with the Kingston Land Trust and community coalition Harambee, which are leading an effort to memorialize the erased history of the site and to reimagine it as a community hub. Student designs supported this process of restorative justice through architecture.

INVESTIGATION

“Is our discipline primarily interested in the heroic composition of a building, or are our tools also in service of other cultural questions, other architectures?” asks Jerome Haferd, an adjunct associate professor at CCNY. He argues that defining architecture as a cultural project requires learning to speak the languages of culture, history, law, punishment, and property ownership, among others. “You can’t ethically or

conceptually do the work without touching on those other discourses,” he says.

Prior to engaging the project, the class analyzed speculative fiction, reading work by Black, feminist, and Indigenous writers. Looking to science fiction and new forms of Black historiography prepared students to engage these discourses in their own investigations.

The Pine Street African Burial Ground is nestled in the backyards of a residential area of a regional town center in the Hudson Valley. Students not only engaged with the ongoing community design process, but they also used proposed alternative models of ownership, care, and stewardship of the site provided by the Kingston Land Trust as points of departure for their own speculative projects.

At its core, this studio asks about the role of an architect. “The imaginative nature is paramount to world building and speculation,” Haferd says. “It is a skill that is underdiscussed.”

The jury appreciated how students used Sci-Fi and historiography as lenses through which to consider architecture and history and project the future. “The students were really engaged and took wholesale the brief, which was so imaginative,” Juror Weihan Vivian Lee said. Victor Body-Lawson appreciated the studio’s effort to “work on the memory of the site and to reclaim the images that were erased,” adding that “the fact that it was a mid-block project that tried to tie-in the community made it powerful.”

STUDIO CREDITS

Course: An Archaeology of the Future: The Pine Street African Burial Ground
School: City College of New York, The Bernard and Anne Spitzer School of Architecture
Level: Vertical advanced studio (fourth- and fifth-year B.Arch.; first-, second-, and third-year M.Arch.)
Duration: Spring 2020 semester
Instructor: Jerome Haferd (adjunct associate professor)
Students: Johnoy Gordon, Kari Kleinmann, Nicolas Losi (submitted work); Agustin Mendez, Fernando Aparicio, Christina Chun, Kauser Dahegamia, Melek Kilinc, Moises Quintero, Joaquim Rodrigues, Aprellia Stanley, Jenny Tan, and Vickie Yuen

<p>→ HOW IT CAME ABOUT</p>	<p>Kari Kleinmann's project is a series of drawings that reflect a "personal account of my family's role in the gradual unraveling of what came to be described as the social death of the African Diaspora" as well as what W.E.B. DuBois described as the "phenomenon of the [Black] double-consciousness," according to the project description.</p>
<p>← DEFINING EPISTEMOLOGICAL FUGITIVE IDEAS</p>	<p>Johnoy Gordon's proposal sets out to re-examine the word fugitive, in the context of both the burial ground and the larger community. Gordon examines the most fundamental element of architecture—the wall—through the lens of artists and authors such as Ursula LeGuin, and explores expanding wall conditions to create occupiable space. These "inhabited non-walls" become fugitive objects—and a new way to understand relationships between the space and visitors.</p>
<p>↓ AND PREVIOUS SPREAD</p>	<p>A SOVEREIGN ARCHIVE</p> <p>Nicolas Losi recognizes the Pine Street African Burial Ground as a microcosm of the systemic marginalization and erasure of a Black archive, and proposes the gradual acquisition of additional land by the community, and its conversion to sovereign territory to host a sovereign archive. Collectively produced architecture on the site would become part of the archive itself—what the project description calls "a piece of infrastructure for individual and collective agency."</p>



WEIGHTED TRANSPARENCY

LITERAL AND PHENOMENAL
STUDIES IN GLASS

CORNELL UNIVERSITY, COLLEGE OF ARCHITECTURE, ART, AND PLANNING

STUDIO BRIEF

An in-depth—and hands-on—investigation into the properties and making of glass informed this studio's approach to the design process. The initial material experiments were extrapolated to generate speculative design interventions to reanimate Buffalo, N.Y.'s famous grain silos, now dormant icons of post-industrial Brutalism.

INVESTIGATION

Visiting associate professor Naomi Frangos began this Spring 2020 studio at Cornell University's College of Architecture, Art, and Planning by asking: "How many of you are control obsessed when it comes to design?" Not surprisingly, every student raised their hand. Frangos's studio was structured as a course in experiential learning where participants could discover unexpected results as creative invention. "They didn't trust the process at the beginning," she says.

Rudimentary experiments based on Frei Otto's work had students using soap bubbles and weighted cloth to study surface behavior under dynamic forces of air and gravity. They then moved to the nearby Corning Museum of

Glass, which sponsored workshops in which each student created their own glass objects. This facilitated error and chance in the making process.

The first-year M.Arch. studio had to transform itself mid-stream due to the remote learning requirements brought on by COVID-19, which limited further experience in hands-on glassmaking. But Frangos was able to use this to their benefit. "They couldn't try to perfect their object," she says. "They had to deal with imperfections and couldn't idealize it."

For the final project, which involved the reimagination of Buffalo's iconic grain silos, the studio considered Reyner Banham's appraisal of these structures in *A Concrete Atlantis* (The MIT Press, 1986). Although these icons gained international attention through Le Corbusier's aesthetic consideration in the 1920s, "Banham was interested in the building as technologies and systems," Frangos says. "He wasn't about the metaphorical, but about the technology."

Students used film and photography of their early, in-person studies to move forward in developing their designs. "They got to toggle between qualitative and quantitative data," Frangos says. "It's a lesson in paying attention to the subtleties and phenomena in front of you."

"The projects demonstrate the effect of the early explorations of glasswork," juror Weihan Vivian Lee said. "It is such a hands-on way of teaching materiality." Similarly, Jonathan Tate appreciated "the energy that went into engaging a material that we all see in the abstract."

STUDIO CREDITS

Course: Weighted Transparency: Literal and Phenomenal
School: Cornell University, College of Architecture, Art, and Planning, Ithaca, N.Y.
Level: B.Arch., M.Arch. vertical option studio
Duration: Spring 2020 semester
Instructor: Naomi Frangos (visiting associate professor)
Students: Ami Mehta, Yueer Niu, Michael Paraszczak (submitted work); Lang (Judy) Dong, Auri Ford, Caroline MacNeille, Maria Teresa Moreno Arriola, Max Piersol, Elizabeth Reeves



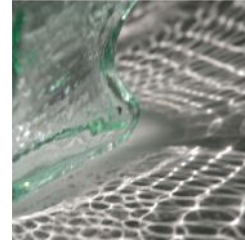
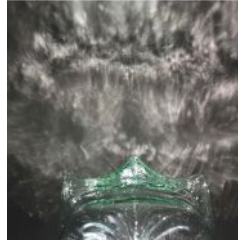
← THROUGH THE LOOKING GLASS

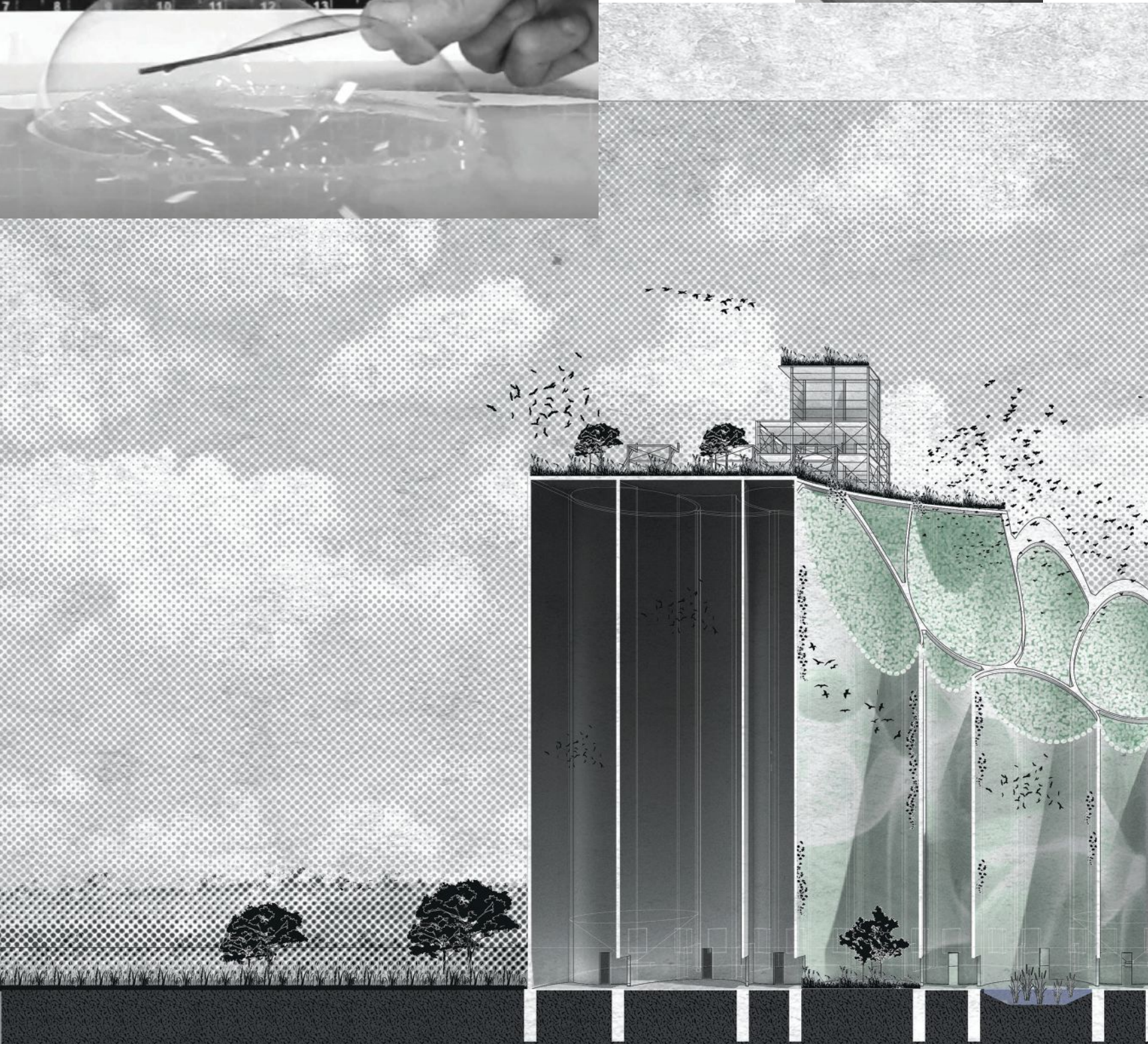
Yueer Niu's proposal enlivens Buffalo's Perot Grain Elevator with a kaleidoscopic overlay to its concrete landscape. A grid of silo tower tops are remade using semi-cylindrical glass surfaces in various finishes, becoming an immersive field of light, while an interplay of convex and concave glass exaggerates reflected imagery and diffuses light, lending warm atmospheric glow to the iconic structure.

↓ VITAL PRESSURE

Ami Mehta,

on the other hand, envisions the Perot Elevator as a secret forest, with green glass vessels suspended from the silo tops acting as both skylights and an inverted treescape. Uprturned metal hopper funnels set beneath each vessel create an interior topography, while a glass wall formed from smaller vessels admits even more green light to the dark interior.





BEING-WITH : COEXISTENCE AT A PLANETARY SCALE

COLUMBIA UNIVERSITY, GRADUATE SCHOOL OF ARCHITECTURE, PLANNING AND PRESERVATION

STUDIO BRIEF

As part of the “Public Works for a Green New Deal” initiative at Columbia University’s Graduate School of Architecture, Planning and Preservation in New York, this studio speculates on a carbon-free future for coastal Louisiana at divergent scales—architecture, infrastructure, and the “planetary scale,” which is defined as 10,000 times larger than the smallest project.

INVESTIGATION

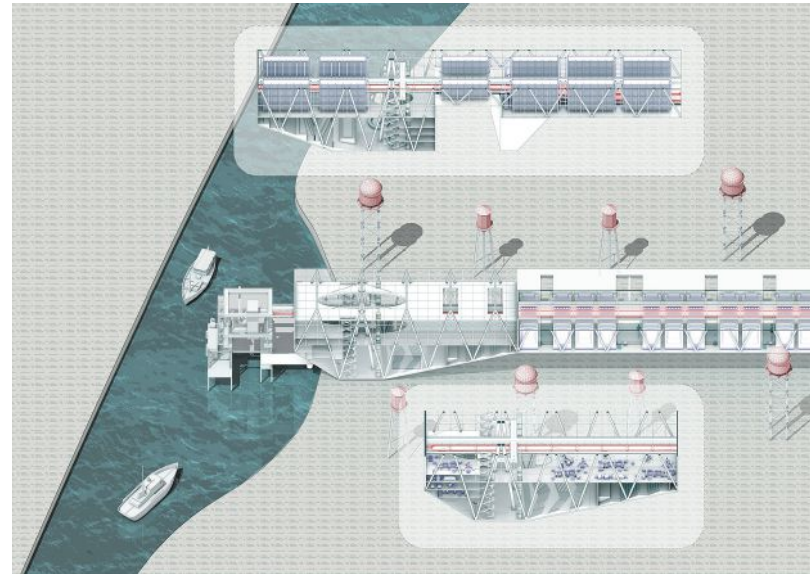
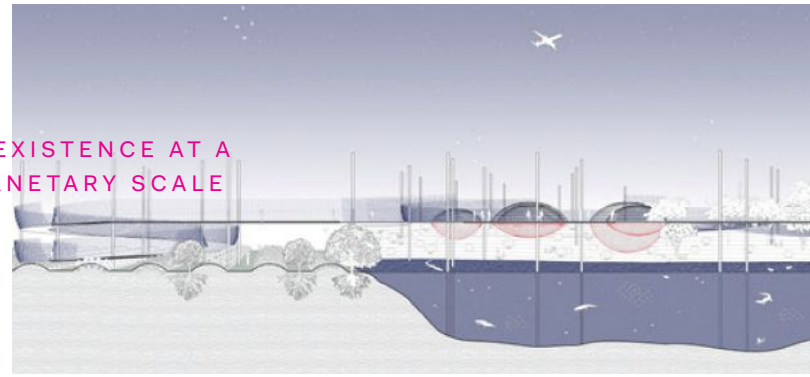
Twelve third-year Columbia University graduate students visited coastal Louisiana and learned from the firsthand experience of Creole and Vietnamese fishing communities who live interdependently with local aquatic species. “Meeting with these communities really impacted the students and their projects,” says adjunct assistant professor Phu Hoang, noting that the residents students met with either returned after or arrived following the devastation of Hurricane Katrina. Field work included a day trip on a shrimp boat that exposed students to both human and nonhuman coexistence in the area.

“I took them to experience the climate crisis at a physical scale,” Hoang says. “It’s quite tangible here, as this area of the Gulf is losing the equivalent of a football field of ground an hour to rising water levels.” Other tours included oil and gas industry sites—likely to be most resistant to future regulations stemming from the Green New Deal. An expanded definition of public works saw students designing carbon-neutral housing, a research lab, a nature reserve—even the conversion of a decommissioned oil rig.

The studio eschewed the binary thinking that comes from an either/or formulation and encouraged students to design for what Hoang terms a state of “being with.” He explains that designers think mostly in terms of one or two

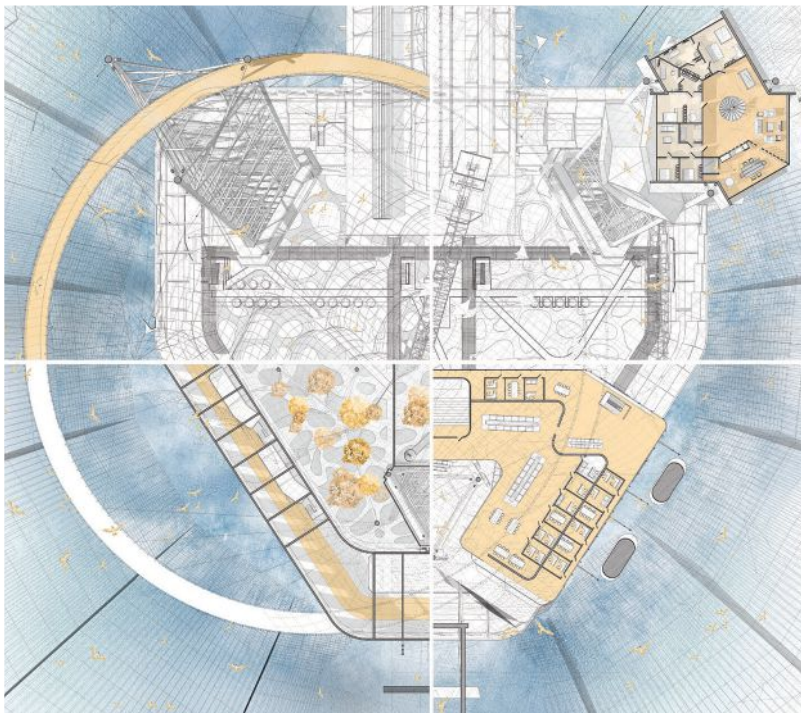
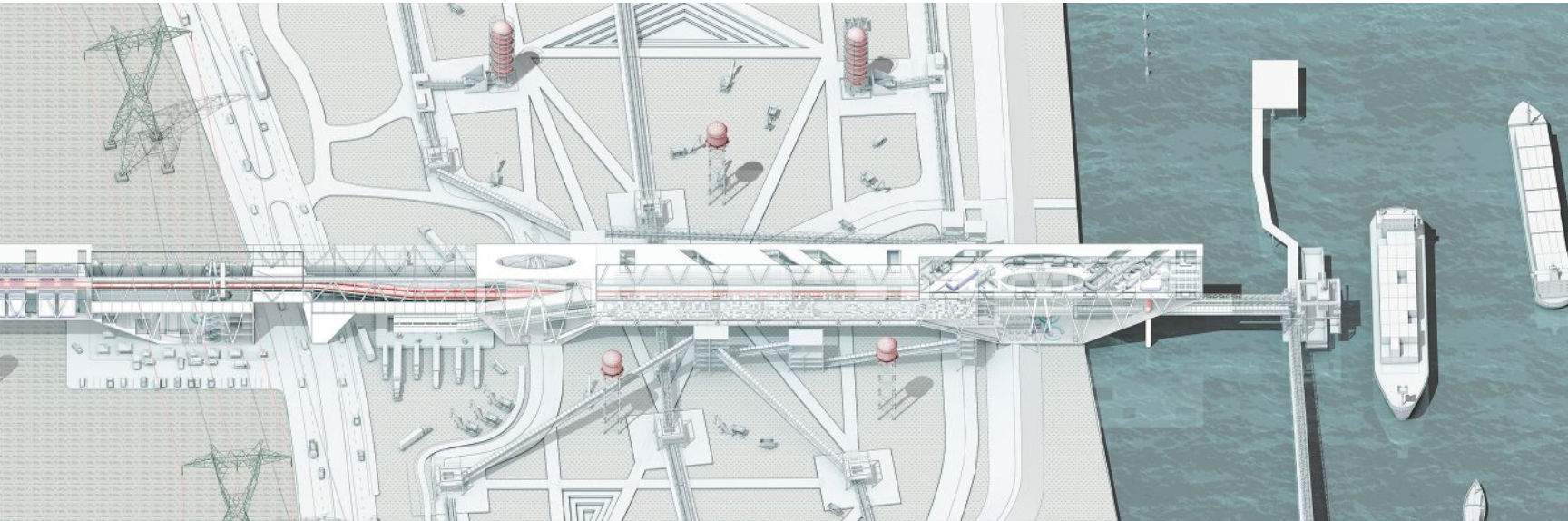
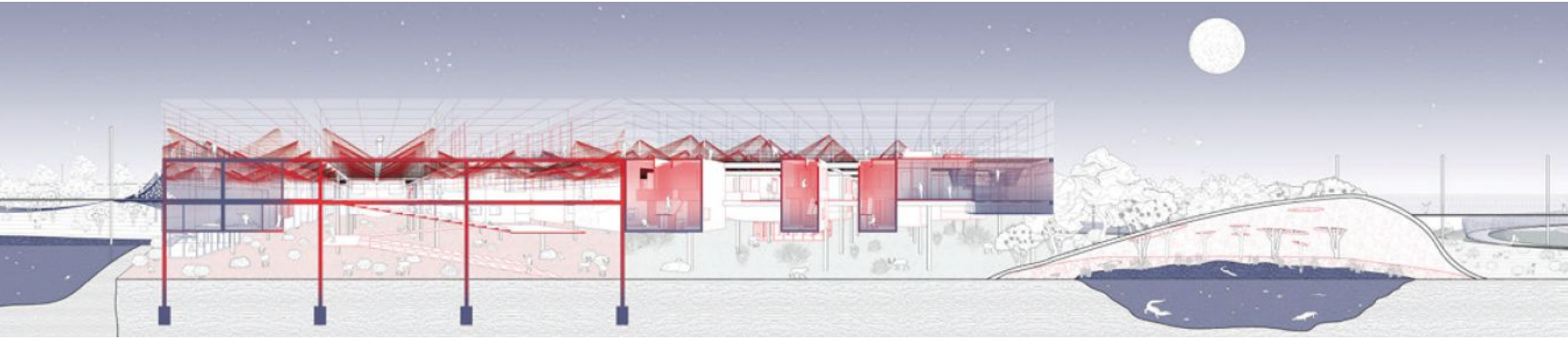
scales up or down from the scale they work in, which for architects is typically from the scale of the body to urban design. “I asked them to design at architecture or infrastructure scale, then at the scale of these other species—a much smaller scale—and then at what I call planetary scales,” he says. Thinking about how their designs fit at a much larger scale often meant that individual projects were networked across the landscape. Positioning that architecture should be seen as an extension of the environment and that indoor and outdoor are not two separate realms, Hoang required that each design comprise 50% indoor and 50% outdoor spaces.

Juror Weihan Vivian Lee found the projects’ grounding in the spatial manifestations and technologies of an imagined future particularly compelling. “There’s a certain kind of audacity about these drawings that show a confidence in what they propose,” Victor Body-Lawson said.



STUDIO CREDITS

Course: Being-With: Coexistence at a Planetary Scale
School: Columbia University, Graduate School of Architecture, Planning and Preservation, New York
Level: Third-year advanced M.Arch. studio (professional and post-professional)
Duration: Fall 2019 semester
Instructor: Phu Hoang (adjunct assistant professor)
Students: Haitong Chen, Qiazi Chen, Peizhe Fang, Chang Pan, Lu Xu, Yechi Zhang (submitted work); Danli Wang, Dalton Baker, Jacob Gulinson, Shiyin Zeng, ASSOC. AIA, Han Zhang, Yanan Cheng



↑ ↑ TOGETHER BUT SEPARATE | Chang Pan and Lu Xu's examination of sea-level rise in the region shows that in the future, towns protected by levees will be the only dry land for miles. Their proposal devises strategies for humans and animals to coexist in this shrinking real estate, while also integrating sustainable infrastructure for programs such as salinity and solar energy farms.

↑ GREEN NEW GRID | This proposal by Yechi Zhang and Qiazi Chen replaces an existing coal storage site with programs for public works—including renewable energy production, brownfield bioremediation, a research laboratory, and a harbor facility—in a post-coal approach to architectural form that remains adaptable to future environmental change.

← BIO-HABITAT RINGS | Haitong Chen and Peizhe Fang anticipate the effects of post-peak oil as well as sea-level rise in their proposal to convert decommissioned offshore, mid-seas, and high-seas oil rigs into mixed-use hubs incorporating housing, recreation, and research facilities, and the infrastructure for rapid-response remediation for oil spills.

DEEP DUST | THE KILLING DARK

CARLETON UNIVERSITY, AZRIELI SCHOOL
OF ARCHITECTURE AND URBANISM

STUDIO BRIEF

This studio takes Johannesburg, South Africa's ignominious history as a provocation to explore—through mapping and technical and narrative representation—the spatial and social implications of an extractive terrain. Using drawing as a medium for conceptual and critical inquiry resulted in proposals for a speculative, ethical future for the city's landscape.

INVESTIGATION

This six-week-long studio at Carleton University in Ottawa, Canada, comprised 16 second-year M.Arch. students from architecture, urbanism, and conservation. (It was the first of a pair of Spring 2020 classes, and was completed just prior to the onset of COVID-19.) While the constrained timeline of the studio did not allow for a field trip, associate professor Ozayr Saloojee, who was raised in Johannesburg as part of a family involved in the anti-apartheid movement, provided a direct connection to the site and topic.

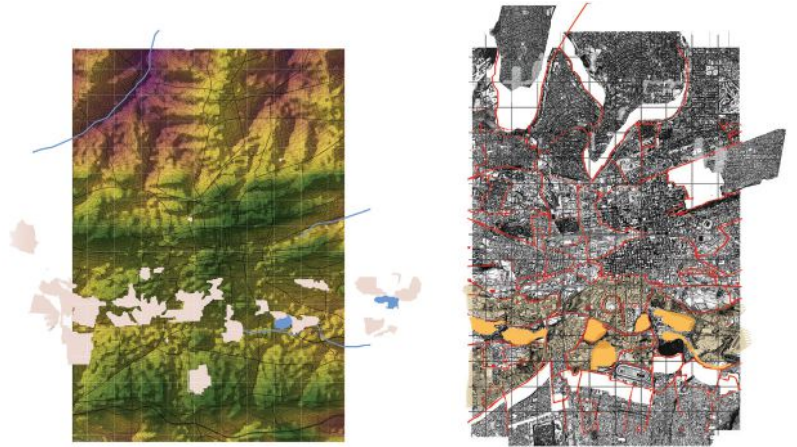
The course consisted of three projects, each of which asked questions about labor, privilege, wealth, and how these concepts can be investigated through both the ground that we walk on and the architecture that sits on it. "They started with standard maps to situate the project," Saloojee says, noting that he wanted the students to wrestle with the geopolitical landscape through these documents. "I wanted to engage questions of spatial politics and to encourage the students to think about the spatial implications and possibilities of the things that they do and the drawings we make."

The second project, Machine Atlas, was modeled on architect Theo Deutinger's *Handbook of Tyranny* (Lars Müller Publishers, 2018), which

the studio hacked to specifically explicate the tools necessary for extraction landscapes. In a nod to popular culture, Trevor Noah of "The Daily Show" (perhaps one of this generation's best-known South Africans) was used as a scale figure in each student's atlas. "They produced these wonderful diagrams reflecting on the agency of physical tools," Saloojee says. The final collection of 240 items included both physical tools like backhoes, excavators, drilling rigs, and nonphysical tools like judicial decrees, copyrights on colors, banks, banking logos, and vaults.

The final project required each student to develop a micro-narrative and a single building depicted through a deep section drawing. "I wanted them to situate the world they wanted to explore in a post-apartheid future," Saloojee says.

"The output is stunning," said Jonathan Tate—a sentiment shared by all the jurors. "I was impressed by the use of mapping techniques to demonstrate invisible infrastructures," Weihan Vivian Lee added. "It was fascinating to see the sheer scale and magnitude of things being extracted out of this place without the knowledge of most people who live there," Victor Body-Lawson said.



STUDIO CREDITS

Course: Deep Dust | The Killing Dark

School: Carleton University, Azrieli School of Architecture and Urbanism, Ottawa, Canada

Level: M.Arch. graduate options studio

Duration: Six weeks, Spring 2020

Instructor: Ozayr Saloojee (associate professor)

Students: Camille Ringrose, Angela Chiesa, Kristen Oyama, Sally El Sayed, Joel Tremblay, Shannon Clark, Vedad Haghghi, Stéphanie Chrétien, Nicholas Bava, Adrian Hong (submitted work); Tasia Craig, Robin Hoytema, Freed Gomes, Walter Fu, Michael Jaworski

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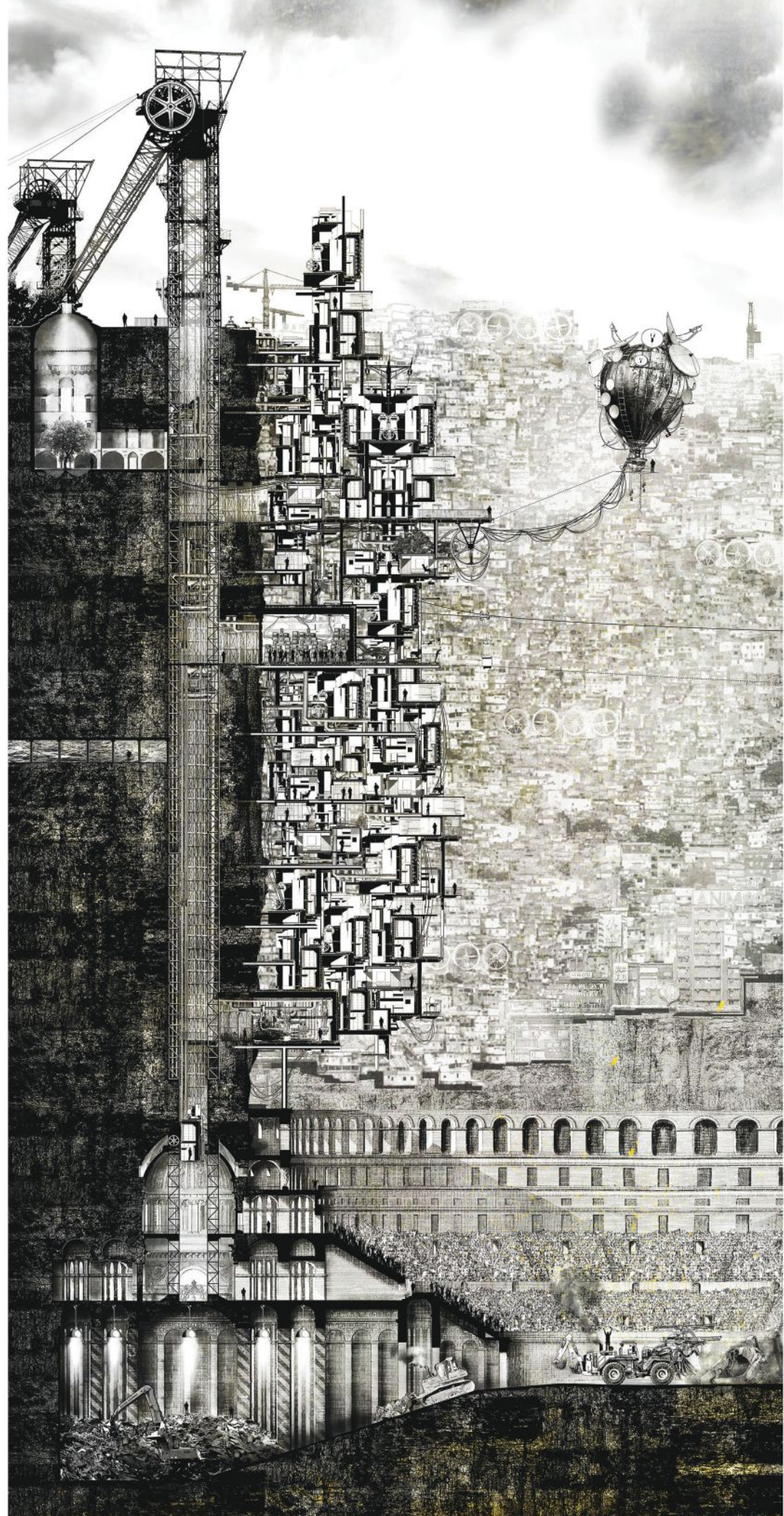
NOTES | OTHER

↑ MACHINE ATLAS

Students worked together to develop a studio-wide "machine atlas," or what the project description terms "a critical compilation of tools, systems, and infrastructures deployed in service of mobilizing (and moving) the earth." For each entry submitted to the atlas, students were encouraged to draw connections between the item or tool and larger systemic influences in the region (entries from Camille Ringrose, Vedad Haghighi, and Shannon Clark are shown above). The final 240-item directory was used as source material for students' final projects.

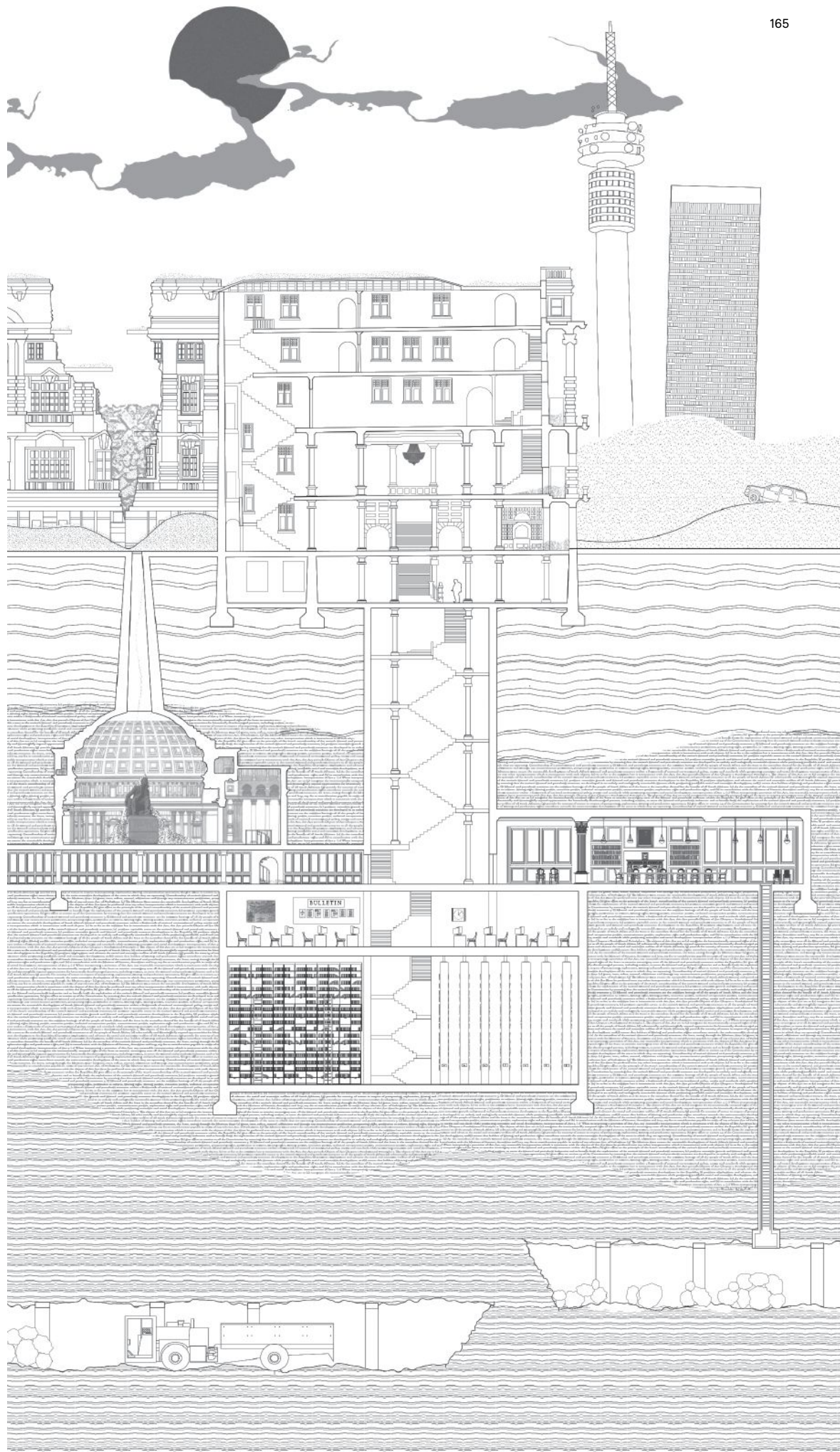
← THE MAP IS NOT THE TERRITORY

The first project in this studio was to research Johannesburg's geological, racial, and social history, and to propose a triptych of maps based on those findings—maps that were inspired by geological drawings and filtered through the students' own conceptual framework. In this triptych, Sally El Sayed explores Johannesburg's natural, subdivisional, and racial divides.



→ MINE / DEEP DUST /
THE KILLING DARK

For their final project, students developed an architectural response to the studio's provocations—a single drawing for an architectural mining intervention on a site of their choosing (Joel Tremblay's drawing is shown at right, and Camille Ringrose's is shown opposite). Students were tasked with considering how their interventions could encourage what the project description cites as "a critical, interpretive and speculative re-reading of architecture's role ... as an emancipatory tool in a contested landscape."



FLATLANDERS

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• HOUSING FOR DOWNTOWN LOS ANGELES

CALIFORNIA POLYTECHNIC STATE
UNIVERSITY, SAN LUIS OBISPO

STUDIO BRIEF

The design of a mixed-use mid-rise development incorporating housing, media, and creative office space, and occupying an entire city block in Downtown Los Angeles's fashion district, became this studio's canvas for exploring questions of private versus public space, circulation, programmatic blending, adjacency, and sectional relationships.

INVESTIGATION

The Los Angeles Metropolitan Program is an annual 20-week-long course that places students from the Department of Architecture at California Polytechnic State University, San Luis Obispo in L.A.—160 miles south of the school's campus. Students hold internships at local offices while tackling a project that addresses issues specific to the city's particular urbanism.

The Spring 2020 edition was affected by COVID-19. A field trip to New York had to be canceled and students, faculty, and L.A.-area participants suddenly became figures on computer screens rather than in-person collaborators. But the group thrived nonetheless. "People needed something that we could do together, to go online and engage intellectually as a group," professor Stephen Phillips, AIA, says. One unexpected benefit: Convening in virtual space allowed Phillips to expand the roster of lecturers to include far-flung professionals whose participation would ordinarily have been precluded by transportation and lodging costs.

The semester-long project addresses a very complex site and program—with an agenda.

"It's about the spaces in-between," Phillips says. The brief stipulated that the students design a 12-story, mixed-use mid-rise with 50% porosity, which required students to develop spaces that leverage the links between forms, and to take into consideration the programmatic, spatial, and circulatory implications of them. "I've always taught that social politics matter, and that buildings matter, too," Phillips says. "How do they correlate? We shouldn't abandon architecture, but we should use it for strong social and political agendas."

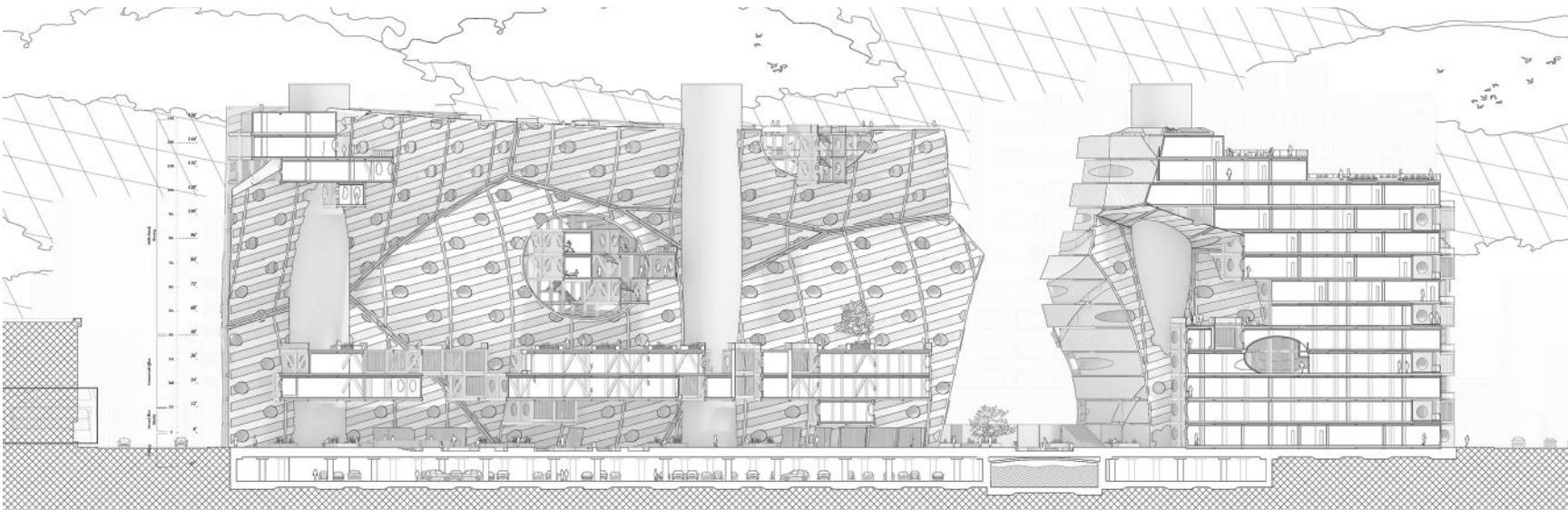
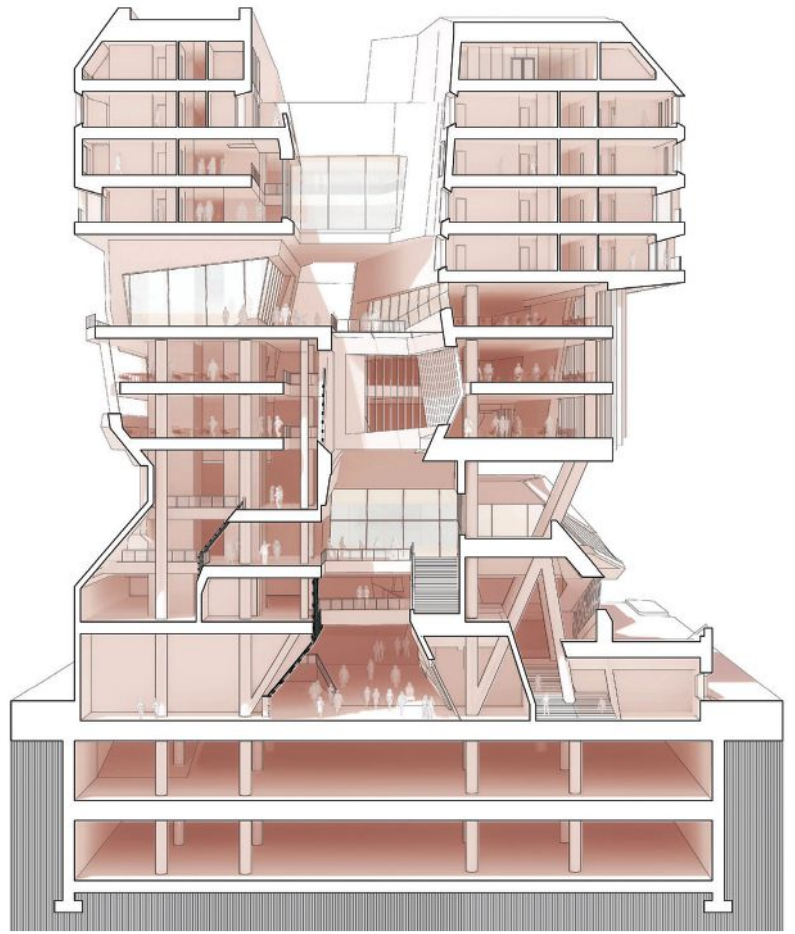
The schemes were drawn in great detail to prove feasibility, and, Phillips says, the result is that "there is a formal lyricism embedded in these projects."

Victor Body-Lawson lauded the students and their brief for considering systemic issues of equity in access to housing as the projects were developed, and found the Associate and Dissociate scheme one of the most compelling of all the entries. "It represents architecture that continues to push form to create beautiful buildings," he said.



STUDIO CREDITS

Course: Flatlanders: Multi-Income, Mixed-Use, Mid-Rise Housing for Downtown Los Angeles
School: California Polytechnic State University, San Luis Obispo, Department of Architecture; The Cal Poly Los Angeles Metropolitan Program in Architecture and Urban Design
Level: Fourth-year undergraduate
Duration: Spring 2020
Instructors: Stephen Phillips, AIA (professor); Pavel Getov, Teddy Slowik, Ismael Soto, Fabio Zangoli, Sarah Hearne, Alex Maymind (lecturers)
Students: Curt Budd, Liam Lautze, Violeta Smart (submitted work); Alan Maedo, Amy Oh, Ariel Adhidevara, Arthur Monteiro Dos Santos, Christy Luong, Daniel Weaver, Eric Lopez, Erin Bailey, Evon Chang, Ezra Zuidema, François Rucki, Inno Yoro, Ivan Singh Parihar, Jake Hamilton, Jin Watanabe, Jordyn Voss, Kaye Lao, Kevin Wu, Michael Laberinto, Nadthachai Kongkhajornkidsuk, Rafael Gali, Reann Dela Cruz, Rex Lawrence, Roger Yap, Ryan Lau, Trevor Allen, Zack Pasma, Zane Ellis-Rector



← MANY VILLAGES, SOMETIMES

Violeta Smart's proposal addresses L.A.'s legacy of segregation and injustice by investigating how to create a meaningful sense of inclusion at the intersection of its varied programs.

↑ WAVE [X] GRID

Liam Lautze's mixed-use, mass-timber structure takes advantages of adjacencies, such as a flower garden and market, and housing for the formerly homeless, to envision job training programs and other services.

↑ ↑ ASSOCIATE AND DISSOCIATE

In order to draw the necessary associations and dissociations between programmatic elements, Curt Budd developed the massing of his proposal with a focus on strategic segmentation.

THE RAJASTHAN CITIES: JAIPUR

UNIVERSITY OF VIRGINIA, SCHOOL OF ARCHITECTURE

STUDIO BRIEF

Looking at the specific needs of Jaipur, India, this Fall 2019 studio explored urban and architectural strategies to address the need to harvest water during the few months of monsoon rain, while also striving to create a more equitable city in terms of natural resource allocation and access to egalitarian public amenities.

INVESTIGATION

This semester-long research studio at the University of Virginia School of Architecture in Charlottesville, Va., brought two research professors together with 14 students across architecture, urban planning, and landscape architecture. Following six weeks of initial research, the studio (along with a group from Tulane University investigating a similar program) spent a week in New Delhi and Jaipur.

“The trip was formative in understanding the complexity of the city,” assistant professor María González Aranguren says. “We run the studio as an office where everyone has to work with different disciplines, learn from others, and work in a group.”

The preliminary research was presented to local officials while the class was in Jaipur. “If you are going to make a difference in the world, then working in collaboration with government representatives, as well as citizens groups who may not have the voice, means, or status to approach a professional, are key to delivering successful solutions—especially in the developing world,” professor Pankaj Vir Gupta adds.

Following their return to Charlottesville, the students designed their own strategic interventions, informed by their field research

and observations. “These students are attentive to the people who remain unrepresented, who never have a voice in requesting architectural help,” Gupta says. This ethic was reinforced by the instructors, who helped them to develop meaningful prototypical solutions that are tailored to the pressing need for obtaining, maintaining, and regulating clean water by Jaipur’s inhabitants. “It’s important for the students to realize who the user of everything is when they’re trying to make an equitable city,” Aranguren says. “This does not mean an absence of poetry or creativity,” Gupta adds. “In fact, there’s more need for it.”

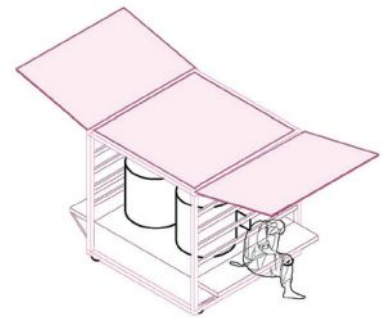
For the jury, this scheme was the obvious choice for the Sloan Award. “It’s compassionate, it’s immediate, and there’s a need for it,” juror Victor Body-Lawson said. “These are smaller interventions that could be plugged into different neighborhoods that have water and health problems.” Weihan Vivian Lee lauded the different tactical scales that the studio explored to solve real problems: “I like the finer grained exploration of how you would implement this,” she said, while Jonathan Tate appreciated the rigor of the investigation, noting that “every component is categorized and described, documented, and contemplated.”

- Water Tank Station

Current Situation



Strategy



STUDIO CREDITS

Course: The Rajasthan Cities: Jaipur

School: University of Virginia, School of Architecture, Charlottesville, Va.

Level: Advanced studio offered in the last semester of undergrad or grad work

Duration: Fall 2019 semester

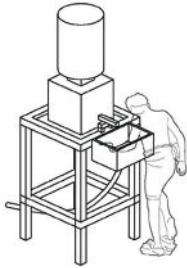
Instructors: María González Aranguren (assistant professor in architecture); Pankaj Vir Gupta (professor of architecture)

Yamuna River Project Fellow: Darcy Engle

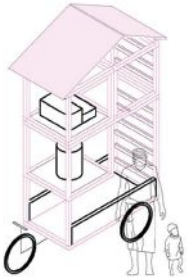
Students: Mary Kate Graeff, Chenjie Xiong, Qinqing Yu, Allison Ta (submitted work); Gaelle Gourmelon, Nicholas Wittkofski, Huiru Shen, Chloe Nagraj, Wenyan Yu, Audrey Liu, Karim El-Araby, Grace Douthit, Emmett Debree

- Mobile Water Purifying Station

Current Situation

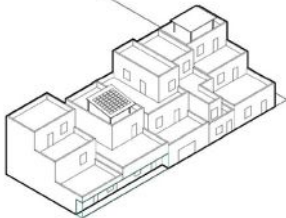


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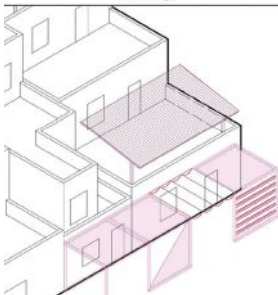


- Shading Area

Current Situation

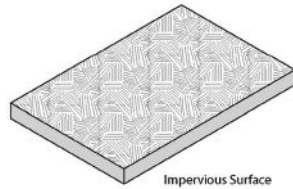


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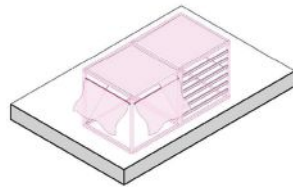


- Public Space

Current Situation

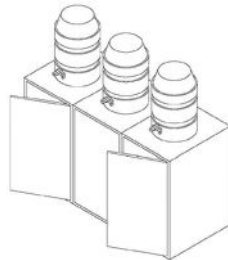


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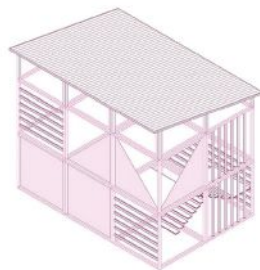


- Toilet

Current Situation



Strategy

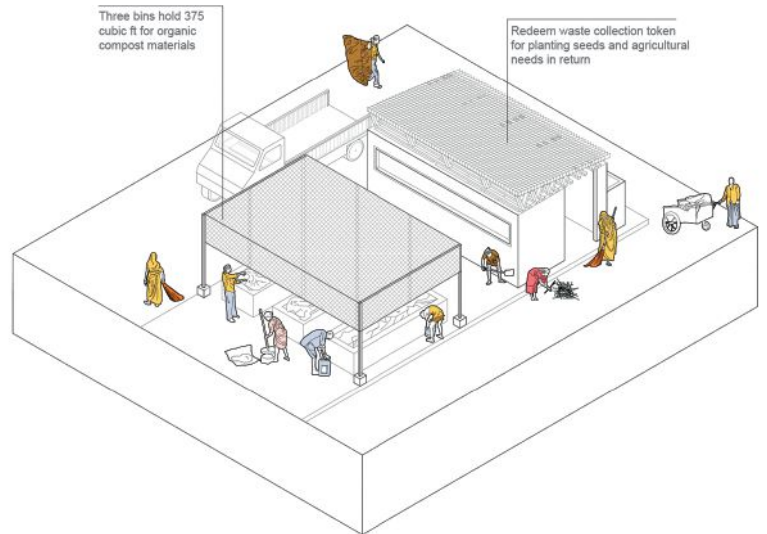


↓ REVITALIZING AMANISHAH NALA

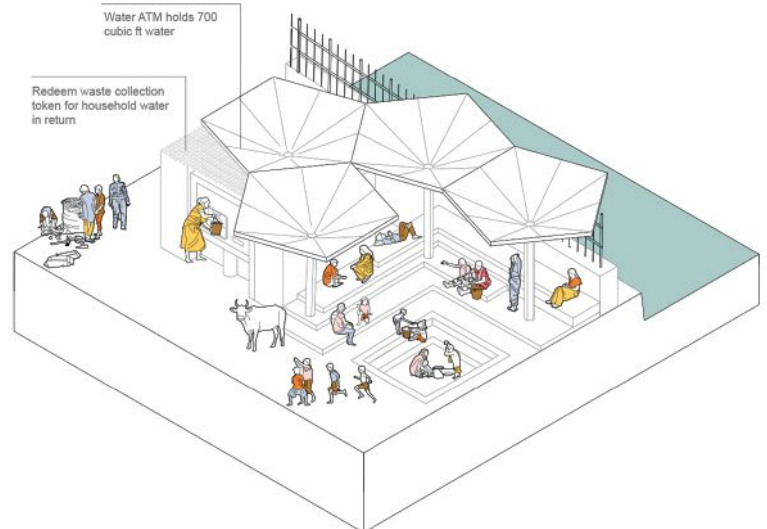
Qinmeng Yu and

Allie Ta analyzed water management at the Amanishah Nala Drain, where stormwater runoff filters through 2 meters of trash before hitting the waterway. Yu and Ta's proposal includes strategies to help extract solid waste from graywater traveling from upstream, including waste incentives, clean water strategies, and incremental installations of public amenities.

COMPOST HUB AND AGRICULTURAL MANAGEMENT

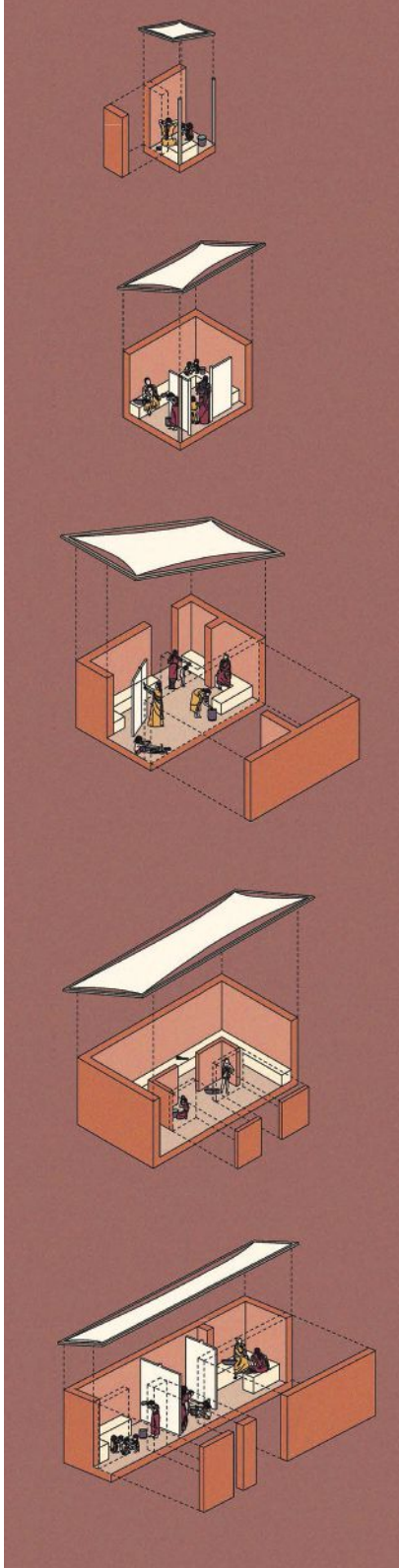


WATER ATM AND SHADING SYSTEM



↑ THE DEATH AND LIFE OF WATER: IMPROVING WATER USE IN JAIPUR PUBLIC SPACE

Chenjie Xiong examined access to clean water for Jaipur's residents. Only 52% of households (out of 9,000 in the test area) had access to treated tap water; nearly 80% of rainwater is lost during the monsoon season due to impermeable surfaces. Xiong's proposal integrates systems that combine water management with public amenities, lending visibility to the water collection process.



↑ BATHHOUSE PROTOTYPES
NEAR JAWHAR NAGAR SLUM

Mary Kate Graeff's proposal includes a series of bathing facilities, each with private, public, and hybrid spaces that support many household needs while providing an opportunity to not only conserve and reuse water, but to safely remove and treat contaminated water.







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Editorial: All Good (and Terrible) Things...

TEXT BY KATIE GERFEN

There's clichéd comfort in that characteristic shared by good and bad things alike—that they all, eventually, come to an end. And so we find ourselves at a point that seemed like it would never arrive: the end of 2020, the year that would not quit.

Let's be clear: 2020 has been terrible. It has relentlessly and painfully pushed us beyond our limits with a confluence of events that revealed the many ills plaguing our society that we have ignored for too long. It's played host to no fewer than four major crises, with more than 12 million COVID-19 cases and more than 255,000 dead in the U.S. alone; the brutality and undeniable effects of systemic racism and inequity that have resulted in increasing calls for social justice; the most active hurricane season ever, yet one more sign of the escalating effects of climate change; and a U.S. unemployment rate that reached a historic high in April and still hovers at twice the pre-pandemic level today.

But even within this crucible of events, there have been successes to celebrate. The National Organization of Minority Architects doubled its membership over the past two years and saw the highest-ever attendance at its 2020 virtual conference. While it is still too small and long overdue, the number of licensed Black women architects in the U.S. has reached the milestone of 500, according to the Directory of African American Architects. The more than 800 firms that signed AIA's 2030 Commitment reported a pEUI reduction of 49% across their portfolios, suggesting that, while work remains to achieve a carbon-neutral future, real progress is being made. And, when confronted with mandates for social distancing and infection control, architects jumped to manufacture personal protective equipment and to distribute design guidelines to make our schools, healthcare facilities, offices, housing, and cities safer.

Just because 2020 will be behind us doesn't mean that 2021 will be easy. There is much work to be done to make architecture accessible for all and to mitigate the effects of climate change. But I know that architects are not afraid of hard work, and I look forward to seeing

how this resilient industry will continue to confront the challenge of designing the equitable, safe, and sustainable places and communities that will make the built environment better for all.

If this year has done anything, it has put things in perspective. ARCHITECT has always been a magazine about people, and it has been the honor of my life to have so many of you share your stories with me, and to trust me to share them with others—for that, I thank you. But, after much reflection, I have realized that it is time for this good thing to end, and for me to leave ARCHITECT to take on new challenges—to find new stories to tell and new ways in which to tell them.

I have called this magazine home for 14 years, and I am grateful for everything that I have learned here—from you, our readers, and from the incredibly talented editors, designers, writers, production staff, and administrators with whom it has been my privilege to work and who will continue to skillfully steer ARCHITECT on its way. Your stories are in the best of hands with them, and I cannot wait to see how ARCHITECT will continue to grow and thrive as a result of their efforts.

Design has the power to effect meaningful change in the world, and I am eager to engage with it in new and different ways. There's so much more to learn, see, and do, and I am excited to start a new chapter. Thank you all for making this last one so meaningful.

I wish you peace in 2021.





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