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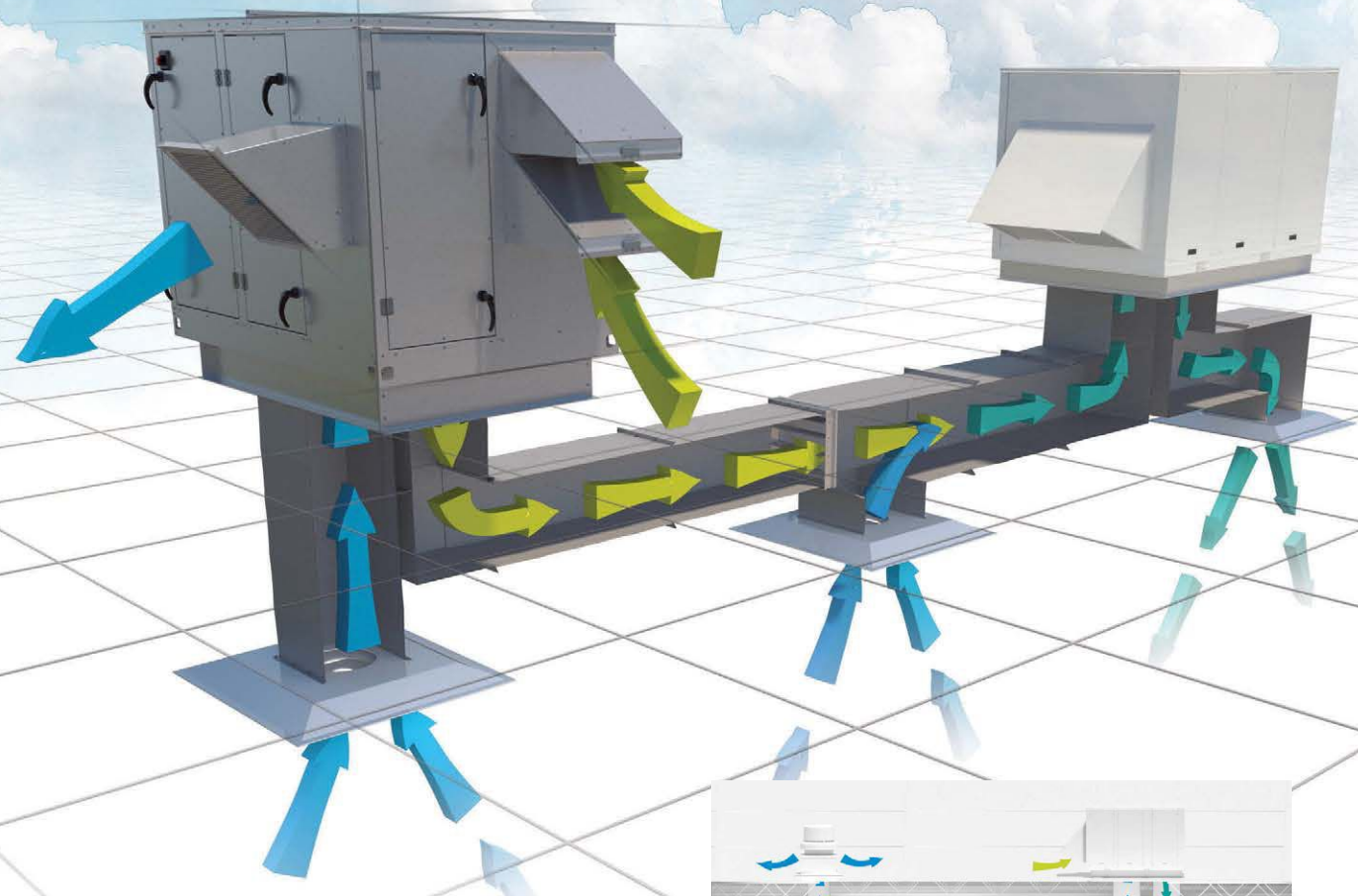
State Spirit:

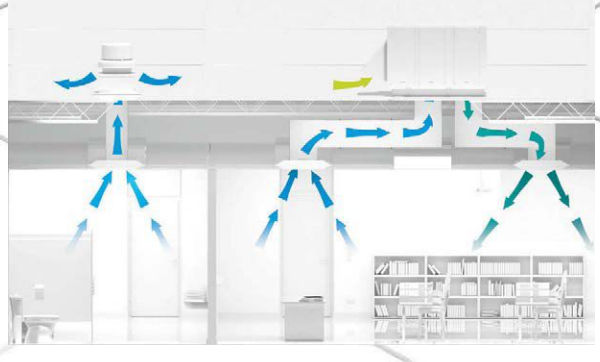
The Wyoming State Capitol Has Its First Major Rehab with Lessons Applicable for Other Buildings Constructed in the 1800s

+ More Government Projects

TREND ALERT: climate change mitigation progress

Energy Recovery Pays Back





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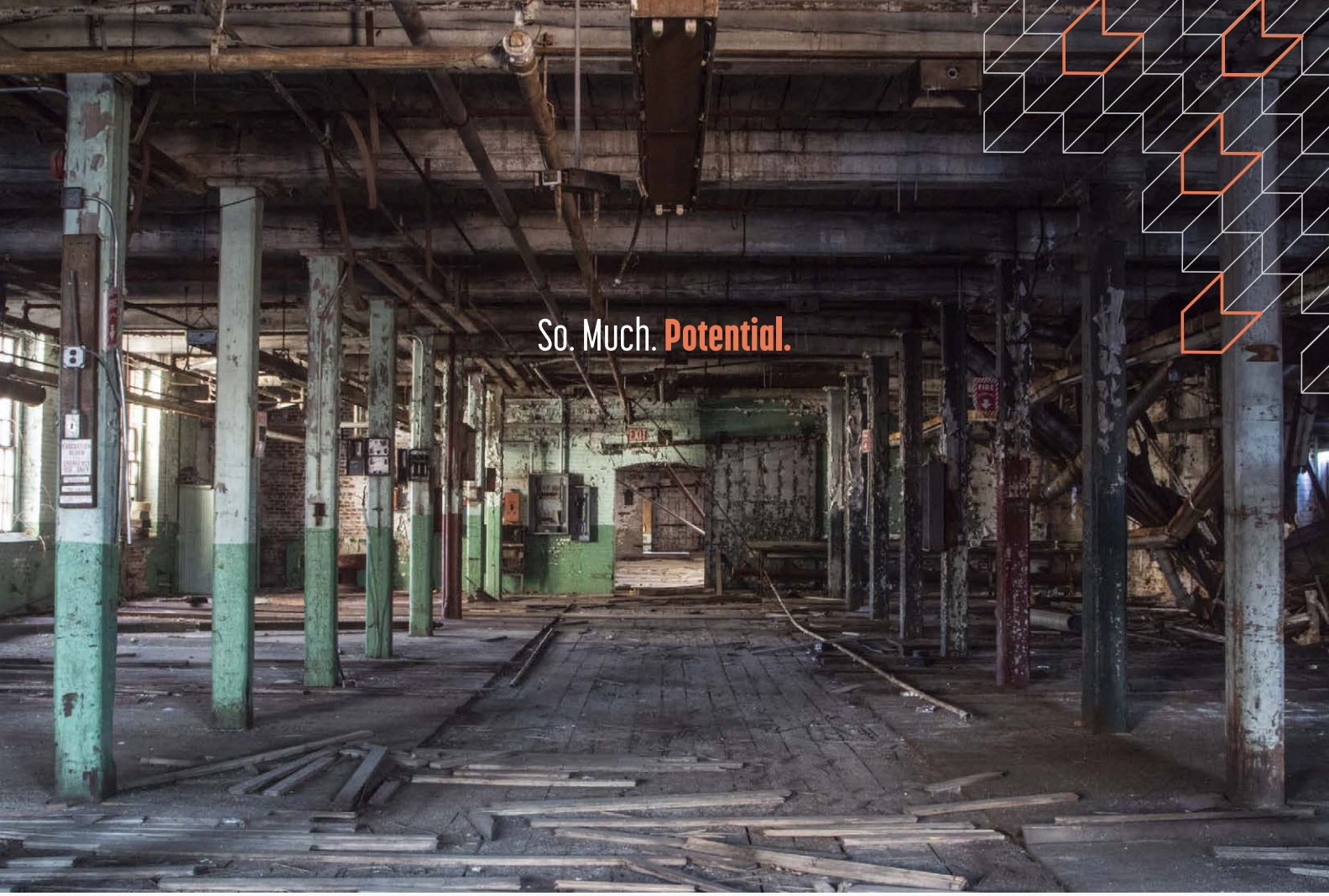

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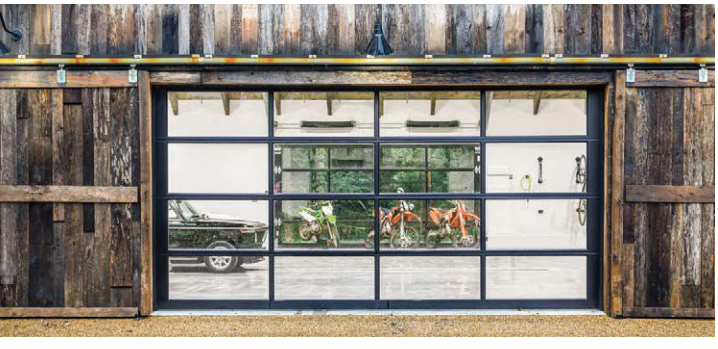

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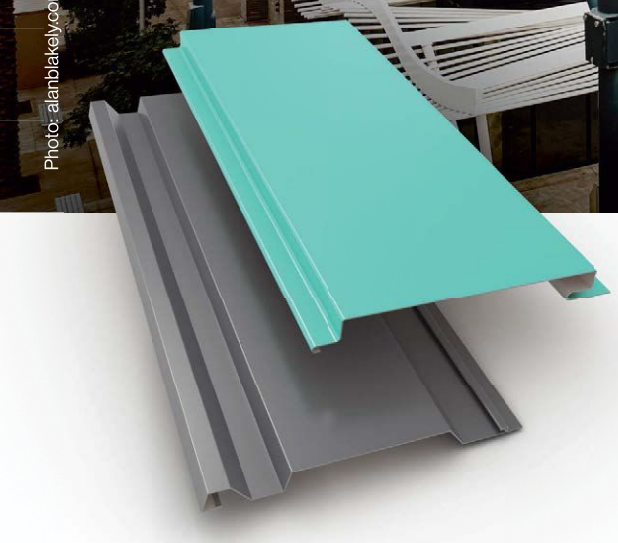

Colorful metal panels mimic signature sculpture

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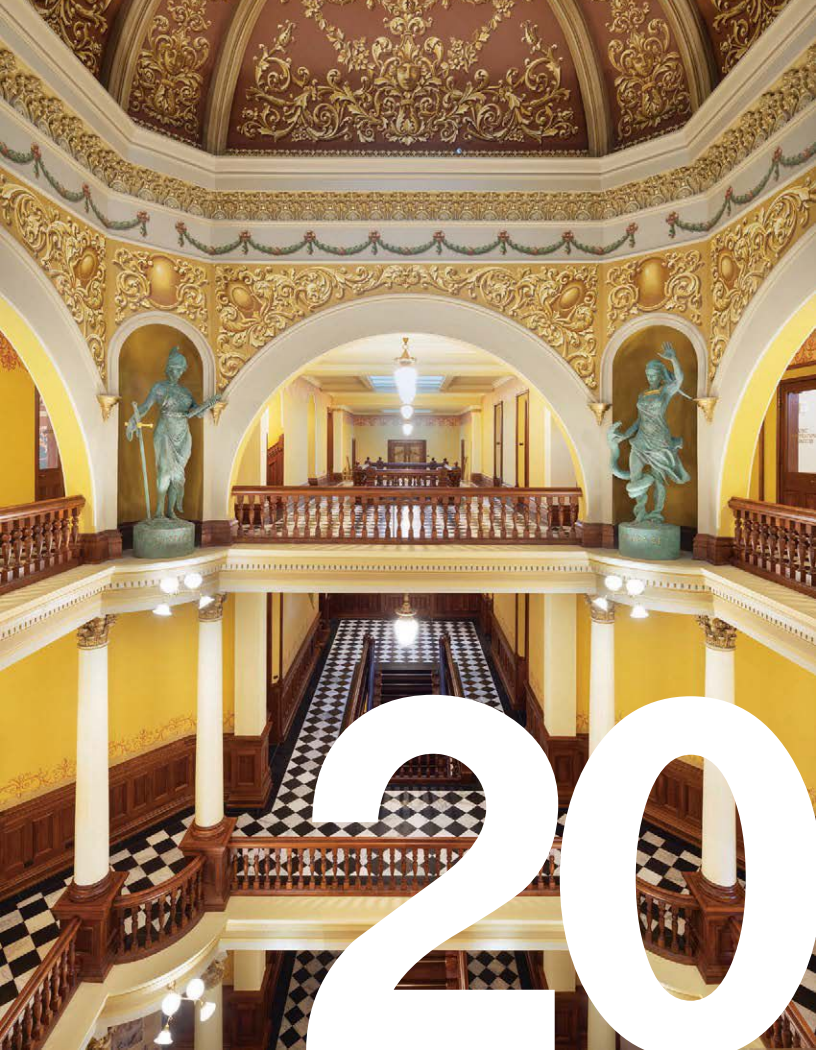

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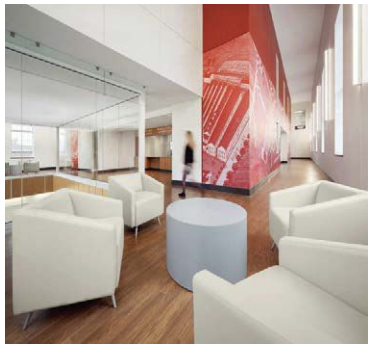

28 PERUSE GOVERNMENT FACILITIES FROM AROUND THE COUNTRY:

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- Buncombe County Courthouse, Asheville, N.C.

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COVER PHOTO: **DAN SCHWALM, COURTESY HDR**

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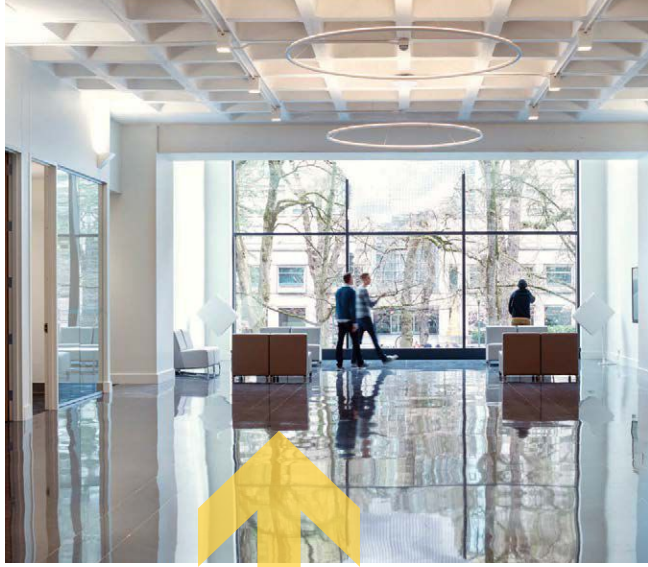

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WE MUST DO OUR BEST

Have you heard of Nordhavn? The neighborhood in Copenhagen, Denmark, has received press in recent years as the most sustainable and resilient community in the world. Nordhavn, which translates to North Harbor in English, is a former industrial harbor. It is the largest metropolitan development in Europe and is meant to be "an urban archipelago or a series of dense neighborhoods on the water". The architecture firm behind the development, Cobe, says that in just 40 years, Nordhavn will become a vibrant waterfront city, providing homes for 40,000 inhabitants and workspaces for another 40,000.

"The division of Nordhavn into islets makes it easy to stage the development with development taking place islet by islet and thus preventing urban sprawl. Future generations will have the opportunity to influence the architecture on the individual islets over time," says Dan Stubbergaard, architect and founder of Cobe. Visit www.cobe.dk/place/nordhavn to learn more.

According to this issue's "Trend Alert", page 58, sustainability is becoming a trend all over the world. In Europe, sustainability is becoming mandatory, and clients are competitive in making buildings more sustainable, explains Matthias Hollwich, founder of HWKN Architecture. "In the U.S., it still feels more like it's 'nice to have', and in the Middle East it's just starting to become a thing. We are seeing progress," Hollwich says in the article. But is that progress enough?

Way back in 2003, I became editor of one of the first green-building magazines in the design and construction industry. I will say that green building is much more ubiquitous now, but it still feels like an uphill battle every day. In the small community in which I lived the past eight years, nobody was building or remodeling sustainably and they were sneering at the idea of all-electric buildings and EV chargers. Heck, in the past five years of my daughter's life, I've never hired a single babysitter who recycles—and these are teens! I'm always digging through the trash after they go home. It's quite disheartening.

This issue is packed full of ideas, supporting research and the latest guidelines to help you to continue fighting the good fight. Are you interested in achieving zero net carbon and zero net energy? Read about ANSI/ASHRAE Standard 228-2023, "Standard Method of Evaluating Zero Net Energy and Zero Net Carbon Building Performance" in "Energy", page 16. The standard provides the calculation method and factors needed to determine whether a building is or is not zero net. It can also show how close a building, site, community or portfolio is to achieving zero net status.

In addition, RMI (formerly Rocky Mountain Institute) recently published a report titled, "Transforming Existing Buildings from Climate Liabilities to Climate Assets". It offers a comprehensive strategy that combines analyses of operating- and embodied-carbon emissions, underscoring strategic material selection that focuses on low-carbon or carbon-storing products.

I hope this issue motivates you as you continue on the journey of doing better. With the knowledge we have these days (compared to what we knew when I started writing about green buildings in 2003), there's really no excuse not to be doing our best.

CHRISTINA KOCH
Associate Publisher/Editorial Director
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CONTRIBUTING WRITERS

Keith Emerson, P.E., CEM, ASHRAE Life Member, is retired after a career focused on energy efficiency. Starting with the design of power plants, he moved to starting and running programs for various electric (and some natural gas) utilities. Within ASHRAE, he has been involved with energy-related standards since 1993. Emerson chaired the committee that wrote Standard 228, which sets the path for evaluating zero net energy and zero net carbon building performance. Read about the standard in "Energy", page 16.

Wade Goehring is associate vice president, senior project manager with HDR. He calls the Wyoming State Capitol rehabilitation project one of the highlights of his career. Constructed in 1886—before Wyoming was a state—the building had never had a major renovation. Goehring writes in our "Cover Story", page 20, about the top-to-bottom renovation and restoration of the Capitol Building, including expansion of the extension between the Capitol and Herschler State Office Building, and the remodel and expansion of the Herschler building.

Ryan Colker, J.D., CAE, is the vice president of innovation at the International Code Council where he identifies emerging issues in the building industry, including how new technologies can be leveraged by codes and standards. He also serves as executive director of the Alliance for National and Community Resilience. In "Business", page 36, Colker provides proof that resilience and life safety are delivered through building codes.

Heather West is a Minneapolis-based writer and owner of Heather West Public Relations. High-performance, environmentally responsible products and services, and well-designed projects have been her topics of interest for more than 30 years. In "Component", page 43, she shares how architectural finishes can protect and enhance existing buildings' windows and doors.

Amy Gilbertson, FAIA, LEED Green Associate, is a principal of Trivers, a St. Louis-based architecture, planning, urban design and interiors firm. Gilbertson shares her passion for revitalization in "Under Construction", page 46, in which she writes about the Frank E. Moss U.S. Courthouse in Salt Lake City, which currently is undergoing an environmentally conscious seismic retrofit that will be used as a model by the General Services Administration for other government buildings in its portfolio.

Erica Ceder, AIA, LEED AP, is a principal at DLR Group and specializes in the restoration and rehabilitation of historic properties. As such, she led the project team in the renovation of the iconic Portland Building, which she writes about in "Transformation", page 50. The team was challenged to take a dark and grim building and turn it into a bright workplace without making major changes to the exterior.

Corey Weiner is the founder of C2A Studio, an onsite as-built laser scanning service for architects, interior designers and renovators. Science and art come together with laser-scanned as-built floor plans, elevations, 3D CAD/BIM models, 3D mesh files, point clouds and online-hosted reality-capture visualizations. Weiner explains how he works and the importance of his work in historic preservation in "Historic", page 54.

Eva Rosenbloom is a senior associate on RMI's REALIZE-MA team, which focuses on a deep-energy retrofit accelerator driven to catalyze the zero-carbon building revolution for existing buildings. **Chris Magwood** works with RMI's Embodied Carbon Team in the Carbon-Free Buildings Program. He brings focus on carbon-storing material while using his experience with LCA studies and policy development. The pair write about the important topic of using low-embodied-carbon and carbon-storing building materials in retrofits to reduce total building emissions in "Business", page 39.

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HOW LOW CAN YOU GO?

ANSI/ASHRAE Standard 228 Sets the Path for Evaluating Zero Net Energy and Zero Net Carbon Building Performance

WRITTEN BY | KEITH EMERSON, P.E., CEM, ASHRAE LIFE MEMBER

Interested in getting to zero? How do you know when you have a "zero energy" or "zero (operational) carbon" building? A new ANSI/ASHRAE consensus standard has recently been published with the answer.

ANSI/ASHRAE Standard 228-2023, "Standard Method of Evaluating Zero Net Energy and Zero Net Carbon Building Performance" (bit.ly/438DPM9), provides the calculation method and factors needed to determine whether a building is or is not zero net. It can also show how close a building, site, community or portfolio is to achieving zero net status. The calculation is based on source energy, a code word for looking at energy not only in terms of what is crossing the boundary of the building site but also counting what is used to produce that energy and get it to the building. Similarly, multipliers are used for carbon dioxide and other climate-change-producing chemicals to give the amount of carbon-dioxide equivalent (CO_2e).

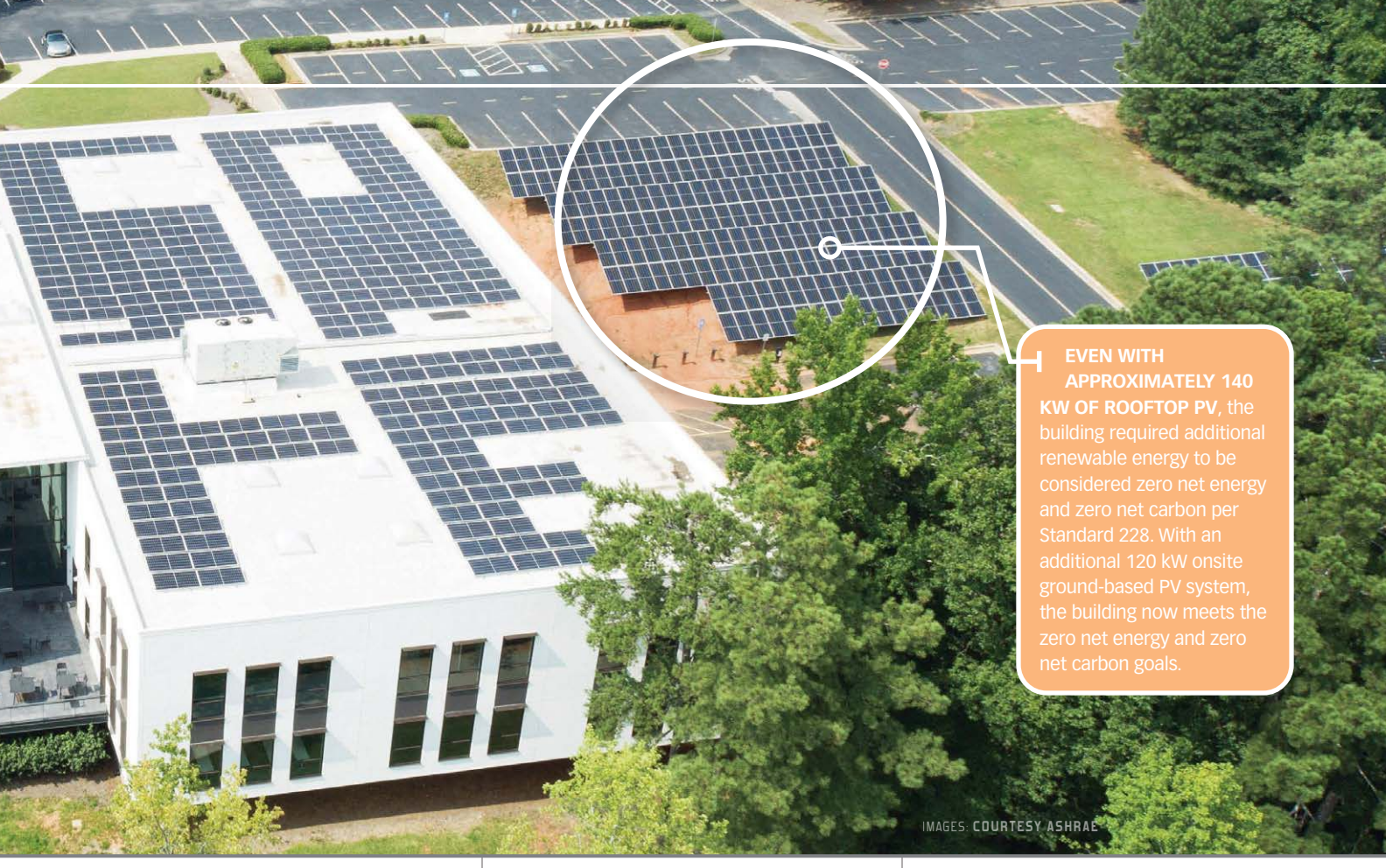
EVALUATING ENERGY

Let's first look at energy and the critical role of the building's site boundary in the standard. The "site" can be a building, group of buildings or even a portion of a building along with the surrounding area of land inside a boundary the user defines. Normally this would be the property line. Energy-containing fuel, like natural gas, and pure energy, like electricity, can be metered coming into the site or even sometimes flowing out of the site across the boundary and can come from a number of sources. It can also be generated within the site, such as from a renewable source, like photovoltaic (PV) panels.

There are other standards dealing with efficiency within a building. For the purposes of Standard 228, if energy, such as electricity, is created and used within the site and does not cross the site boundary it is not considered in the standard's balancing equation for compliance. If electricity from renewable or another source is exported across the boundary and is put on the grid, all the other generators on the electric grid do not need to produce that power. Depending on the mix of generating assets, exporting electricity back to the grid can result in a credit from not having to generate it with grid-based non-renewable or carbon-based sources.

There are certain situations where renewable electricity is too plentiful during the day and non-renewable generation has to be added in the evening and overnight. Generating solar-powered electricity at noon and exporting it into a grid overflowing with renewable energy does not compensate for having to burn natural gas for power at night. Where more granular information is available on this issue, possibly even hourly, an adopting authority can require that the calculation be based on that more finely tuned and locally available data to avoid giving credit where it is not earned. Some California locations have this level of detail available now and it is likely to become more prevalent in the future.

What if there is no ability to generate renewable energy onsite to balance what is coming into the site? Renewable energy from outside the site can be counted toward a building's renewable generation, but it must meet certain qualifications and is discounted in the calculation. The amount is also limited to encourage the installation of onsite generation. The limit



EVEN WITH APPROXIMATELY 140 KW OF ROOFTOP PV, the building required additional renewable energy to be considered zero net energy and zero net carbon per Standard 228. With an additional 120 kW onsite ground-based PV system, the building now meets the zero net energy and zero net carbon goals.

IMAGES: COURTESY ASHRAE

on counted offsite renewable energy is based on a reasonably efficient building.

Transportation energy that comes into the site and then goes out of the site through car chargers or gasoline/diesel fueling is netted out.

CONCENTRATING ON CARBON

"Carbon" is shorthand for the carbon dioxide that is creating global warming. Additional chemicals are rolled in by using the term "carbon-dioxide equivalent", or CO_2e. For carbon, the standard takes an approach similar to energy, looking at what crosses the site boundary and multiplying by a factor for CO_2e emissions. At the moment, only operationally generated carbon in the form of fuel and energy use is considered. There is one exception: Refrigerant leakage can be such an important part of the CO_2e emissions during operation that it was included in the calculation.

Similar to contracting for off-site renewable energy, having "carbon offsets" counted in the equations is another question. While the path is available for very limited carbon-offset purchases, it may not result in a zero-carbon rating under the current standard. It will likely be much easier to avoid the need if alternative options, such as increased onsite renewable generation, are available.

Another approach for reducing operational carbon is to ensure regular building electricity is delivered from a specific renewable source under a long-term contract rather than from general grid energy. Care should also be taken to watch some smaller energy uses, like landscaping, and refrigerant would need to be selected carefully or be handled through a small carbon offset.

As mentioned, operational carbon is used in the Standard 228 calculations at the moment. ASHRAE currently is looking into a total-life approach to carbon for the future, incorporating materials and other embedded energy at the front end and the disposal of materials at the end of life.

STANDARD 228 EXAMPLES

The following is an example calculation, using Standard 228. Although the standard typically requires two years' worth of annual calculations, in this example one year is used.

A 3-STORY, 66,700-SQUARE-FOOT OFFICE BUILDING near Atlanta was built in 1978 on an 11-acre site. A very extensive remodel in 2020 emphasized energy efficiency and resulted in very low energy use of 18.5 kBtu per square foot per year (5.42 kWh per square foot per year). Rooftop photovoltaic panels also were added. The building is all-electric and net-metered.

A 3-story, 66,700-square-foot office building near Atlanta was built in 1978 on an 11-acre site. It had a very extensive remodel with a large emphasis on energy efficiency in 2020. Changes during the 2020 remodel included adding insulation to walls and the roof; decreasing the window-to-wall ratio; and changing the mechanical system to four pipe, using one large and six smaller heat pumps. These and other changes have resulted in a very low energy use of 18.5 kBtu per square foot per year (5.42 kWh per square foot per year). Rooftop photovoltaic panels also

were added. A ground-mounted PV system is now in place. The building is all-electric and net-metered. Example Calculations 1 and 2 show the process of determining zero net status.

Note that even with approximately 140 kW of rooftop PV, the building required additional renewable energy to be considered zero net energy per Standard 228. It also would not meet the zero net carbon goal. However, the additional 120 kW onsite ground-based PV system was added, allowing the building to meet the zero net energy and zero net carbon goals. Example Calculation 2 shows the effect of the additional onsite energy generation in the carbon calculation.

THE FUTURE

In a number of Canadian provinces, all electric generation is by hydroelectricity. Any renewable energy exported just offsets this renewable hydropower. In situations like this, any all-electric building connected to that grid would be considered zero net energy, no matter how much electricity it consumes for its energy services. This surplus of renewable power is a situation that the U.S. is just starting to face in certain locations and at certain times of day.

Possibly ANSI/ASHRAE Standard 228 will sunset when renewable and carbon-free energy become our new normal. It will be interesting to see what happens when using energy has a significant cost but limited or no environmental consequences.

Until that time, there is still work to be done. ASHRAE has continued the Standard 228 development committee as Standing Special Project Committee (SSPC) 228, meaning that changes can be suggested at any time. You may send any thoughts for future work to ASHRAE. Call (800) 527-4723 for information about how to submit suggestions to the committee.

Purchase ANSI/ASHRAE Standard 228-2023, "Standard Method of Evaluating Zero Net Energy and Zero Net Carbon Building Performance" at www.techstreet.com/ashrae/standards/ashrae-228-2023?product_id=2562375.

EXAMPLE CALCULATION 1

ZERO NET ENERGY CALCULATION *Note: photovoltaic panels on roof*

Energy Form	Annual Site Energy kWh/yr	Source Energy Factor	Annual Source Energy (kWh/yr)
140 kW roof-mounted photovoltaic panels (internal use)	197,400		
The roof-mounted PV offsets energy that would otherwise cross the boundary.			
Net imported grid electricity crossing site boundary	164,250	2.86	469,755
Imported grid natural gas	0	1.09	0
Imported landscape energy	172	1.19	205
20 percent of the 11-acre site requires landscaping energy to be maintained.			
Exported renewable energy in excess of net	0	2.86	0
Exported transportation vehicle energy	-23,400	2.86	-66,924
In this case, electric vehicle charging for vehicles going out of the site boundary.			
Onsite offset needed to be "zero net" at 2.86 source factor	140,850 kWh/yr		403,036
The net amount of energy needed to bring the equation to zero net.			
Approximate minimum off-site PV system size needed	120 kW		
Procurement limit for off-site renewable energy calc	2,201,100 kWh/yr		
There is a limit on off-site renewable energy. This example does not approach that limit.			
Building area = 66,700 square feet Energy intensity, office climate zone 3A = 33 kWh/ft2-yr			
CONCLUSION: The building can be zero net energy with additional on or off-site renewable energy. Owner chose to install an additional onsite ground-level photovoltaic system to augment the roof-mounted panels, making the building zero net energy.			

EXAMPLE CALCULATION 2

ZERO NET CARBON CALCULATION *Note: Photovoltaic panels on roof and ground level*

Energy Form	Annual Site Energy kWh/yr	Greenhouse Gas Emissions Factor (kg CO2e/kWh)	Annual GHG Equivalent Emissions (kg CO2e)
140 kW Roof-mounted photovoltaic panels	197,400		
Offsets energy crossing the boundary.			
120 kW Onsite ground-mounted PV panels	169,000		
Offsets remaining site energy needs with the excess energy exported.			
Net imported grid electricity crossing site boundary	0	0.555	0
All grid electric energy offset by onsite photovoltaic production.			
Imported grid natural gas	0	0.228	0
Imported landscape energy	172	0.303	52
20 percent of the 11-acre site requires landscaping energy to be maintained.			
Exported renewable energy in excess of net	-4,750	0.555	-2,636
Exported transportation vehicle energy	-23,400	2.86	-66,924
	kg R410A	kg CO2e/kg	
In this case, electric vehicle charging for vehicles going out of the site boundary.			
Refrigerant losses at 2 percent of charge (120 tons)	3	1920	6,336
	kWh/yr	kg CO2e/kWh	kg CO2e
Onsite offset needed to be zero net carbon =	-125,240	0.555	-69,508
PV power needing to be exported for zero net carbon rating.			
Conclusion: With the addition of the onsite ground-based PV system, the building is both zero net energy and zero net (operational) carbon.			

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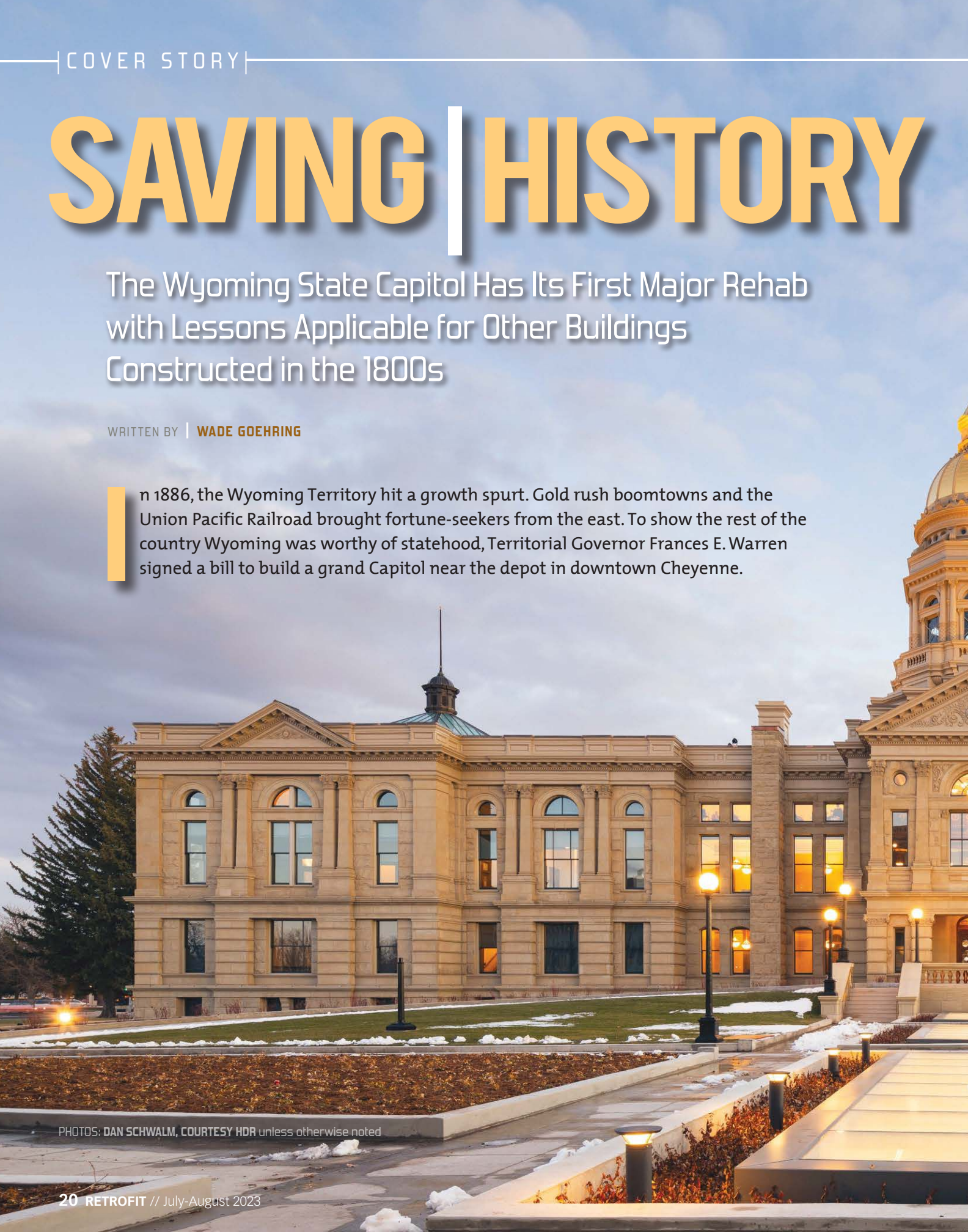
SAVING HISTORY

The Wyoming State Capitol Has Its First Major Rehab with Lessons Applicable for Other Buildings Constructed in the 1800s

WRITTEN BY | **WADE GOEHRING**

In 1886, the Wyoming Territory hit a growth spurt. Gold rush boomtowns and the Union Pacific Railroad brought fortune-seekers from the east. To show the rest of the country Wyoming was worthy of statehood, Territorial Governor Frances E. Warren signed a bill to build a grand Capitol near the depot in downtown Cheyenne.



PHOTOS: **DAN SCHWALM, COURTESY HDR** unless otherwise noted

Constructed in the Renaissance Revival style with the finest materials—marble, cherry wood, ornate glass, and a 146-foot-tall spire and dome—and adorned with art depicting life in Wyoming, the new Capitol was the territory's crown jewel. For the grand opening, shops closed; a time capsule was filled with territorial laws, the state seal, newspapers and photos; and folks gathered from across the state to celebrate.

Immediately thereafter, Wyoming made history. In 1889, it became a state and, half a century before the rest of the country, granted women the right to vote. "The Equality State" tradition continued for decades, allowing women to hold public office, paying women teachers equally and becoming the first state to elect a woman governor in 1924. These historic votes, cast in the Capitol Building, led to its listing on the U.S. National Register of Historic Places in 1973 and National Historic Landmark distinction in 1987.

For more than a century, through struggles large and small, the state persevered and thrived while its hallmark building stood as a symbol to the Wyoming spirit. After 130 years and decades of deferred maintenance, the building began to show wear, too much to ignore. The dome and sandstone deteriorated, the plumbing disintegrated, and aging electrical wires hung loose inside the walls. The building strained with structural cracks, skylights leaked, and the lack of air conditioning and fire-prevention measures left occupants at risk. State officials faced a decision: completely restore the building or prepare to lose it for good.

The Capitol Square Project, the largest of its kind in Wyoming, was a top-to-bottom renovation to rehabilitate and restore the Capitol Building, replace and relocate the central utility plant, remodel and expand the extension between the Capitol and Herschler State Office Building, and remodel and expand the Herschler building. Constructed in 1981, the modernist Herschler State Office Building was a design of the time. Outdated and inefficient, it had wayfinding problems, lacked security, and possessed an underutilized atrium that carried sound and increased heating and cooling costs. The four-year Wyoming Capitol Square Project replaced outdated building systems, added critical life-safety infrastructure, and addressed public space needs while expanding and refurbishing office space.

Using construction practices modern and historic, HDR and its team restored the Capitol to its former grandeur with beautiful arches, ceilings, windows and woodwork, as well as incorporated modern building systems; universal accessibility; and space to create a cohesive, one-of-a-kind Capitol area.

The phased work minimized impacts to government operations and relocated Herschler building employees from one side to the other while construction occurred, and then back again. The team overcame missing as-built drawings, mitigated hazardous materials, conquered Wyoming's harsh weather and flourished with painstaking detail.

Completed on budget and schedule in December 2019, the renovated Capitol Square stands as a testament to history and an example for the future.

STRUCTURAL CONCERNS

Although the Capitol underwent several upgrades and improvements, with two major expansions since its completion, this project marked its first comprehensive overhaul.

Prior to the project, the team knew poor soil underlaid the Capitol. It wasn't compact enough and the building's settlement required the team to design a micropile system to stabilize the structure. The underpinning process for the micropiles strengthened the existing foundation to support heavier loads than the building's original design. This also allowed the team to pass utilities under the historic footings.

To install the new foundation system, the contractor drilled micropiles into the ground close to the wall—one inside the building and one outside—then connected them with a steel needle beam under the existing foundation. The contractor installed more than 600 micropiles, up to 33-feet deep, then filled them with grout. After setting, the team tested their strength. Excavating up to 6-feet below grade, the team installed the new structural components and MEP systems.

Above ground, the new MEP systems presented separate but significant challenges. Required to take out shear walls, the team verified the removals would not impact the building's structural integrity. When possible, they used original chases. Within the brick and timber structure, they often had to channel to install utilities—using precise measurements to maintain building integrity. Rather than surface-mounting conduit on walls or building new walls to hide new ductwork, the team created channels in load-bearing brick walls to hide these items behind the walls' plaster finish. Coordination again proved instrumental, as each conduit and duct was individually channeled. The team coordinated through BIM and then laid out the channels in the field before channeling into a wall.

The team re-gilded the **CAPITOL DOME** in gold, which extended its life expectancy from just 15 years to 90. Further, the dome was susceptible to wind and damage from hail. Without a proper renovation, it could have structurally impacted the rest of the Capitol. The team created 3D models of the dome to assess its structural behavior prior to renovations.

NEW CENTRAL UTILITY PLANT

Before the project, just 75 percent of the Capitol had heating and cooling. The original campus central utility plant (CUP) supplied mechanical and electrical service to five government buildings: the Capitol, Herschler State Office Building, Barrett State Office Building Supreme Court and Hathaway State Office Buildings located south of the Capitol.

The decision was made to relocate the underground CUP, which had been adjacent to the northeast corner of the Capitol. The CUP's above-ground components included a generator, switchgear and transformer. The cooling tower's mist contributed to the building's stone degradation while the generator, transformer and switchgear posed security risks and detracted from the grounds' appearance. The underground portion of the CUP was undersized for the new mechanical systems. The existing HVAC equipment had exceeded its useful life and was an inefficient grouping of cobbled-together systems. The CUP was relocated to the southwest corner of the Herschler building and buried underground to preserve views of the Capitol. It was expanded to 18,000 square feet, which allowed for an appropriate, modern system with reduced maintenance and operations costs.

As part of the Capitol rehabilitation, the team organized new systems in four vertical chases from the garden level to the attic with new mechanical rooms adjacent to the chases on the garden level. They removed the outdated piping, wiring and ductwork, along with the ceiling tiles that hid them. The infrastructure cores are on each floor, alongside new restrooms and elevators.

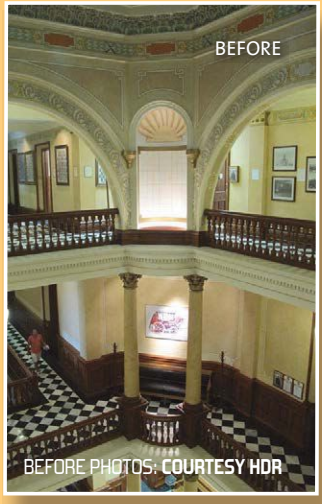
LIGHTING UPGRADES TO 100-YEAR-OLD FIXTURES

The team worked with a specialty lighting shop to renovate more than 800 lights throughout the building. The challenge was to increase light levels in the space without adding fixtures, changing the fixtures' aesthetics or creating glare. The new solid-state, chip-on-board LEDs produce up to 12 times more light without increasing the size of the bulbs. They generate more than 160 lumens per watt, in comparison to 10 to 15 per watt for a typical incandescent fixture. They're not just brighter; they are significantly more energy efficient.

Moreover, many of the historic fixtures also needed extensive repairs. Unable to find replacement pieces because they don't exist, the lighting team reproduced the complex cast-glass pieces in-house. Research identified the makeup of the piece and the method of construction; then the team attempted to use the same methods to produce the replacement pieces.

EXPANDED MEETING SPACE

Prior to construction, the project's feasibility study identified a need for approximately 90,000 square feet of programmatic space. In the past, during legislative sessions, standing outside because of crowding was the norm. Because masonry walls confine the



BEFORE PHOTOS: **COURTESY HDR**

THE CAPITOL'S ORIGINAL ARCHITECT created four niches in the rotunda, designed to feature statues. His plan never came to fruition. As part of the renovation, four statues—each standing about 9-feet tall and weighing more than 600 pounds—were commissioned for the niches. "The Four Sisters" represent the values and attributes of Wyoming and its citizens. "Truth," leads the way, illuminating the path for Wyoming's pioneers. "Justice" sets the course for Wyomingites to live freely and peacefully. "Courage" allows them to carry on, encouraging and supporting them through hard times. And "Hope" inspires residents to continue striving for the future, building the Wyoming they desire.

RETROFIT TEAM

STRUCTURAL ENGINEER, ARCHITECT, INTERIOR DESIGNER AND LANDSCAPE ARCHITECT // HDR, www.hdrinc.com

STRUCTURAL ENGINEER FOR HISTORIC STRUCTURES // Silman, www.silman.com

HISTORIC PRESERVATION ARCHITECT // CSHQA, www.cshqa.com

MEP ENGINEER // Loring Consulting Engineers, www.loringengineers.com

LIGHTING DESIGNER // Gary Steffy Lighting Design Inc., www.gsld.net

STONE RESTORATION // Wiss, Janney, Elstner Associates Inc., www.wje.com

METAL RESTORATION // Martin/Martin Consulting Engineers, www.martinmartin.com

AUDIOVISUAL CONSULTING // K2, www.thisisk2.com

CIVIL ENGINEER // BenchMark Engineers, benchmarkengineers.com

PROGRAM MANAGEMENT // MOCA, moca-pm.com

MATERIALS

FLUSH WOOD DOORS // Aspiro Series from Masonite Architectural, www.masonite.com

HOLLOW METAL DOOR FRAMES // Curries, www.curries.com

VINYL TILE, LVT // Johnsonite, www.tarkett.com

CARPET // Panoramic from Milliken, www.milliken.com, and Step in Style II from Mohawk, www.mohawkgroup.com

MILLWORK // Sidney Millwork, sidneymillwork.com

SKYLIGHTS // Skyline Sky-lites, www.skylites.com

STONE TOILET PARTITIONS // Vermont Quarries Corp., www.vermontdanbymarble.com

CURTAINWALL // Oldcastle BuildingEnvelope, obe.com

CONSTRUCTED IN 1981, the modernist Herschler State Office Building's envelope was failing. To harmonize the building's design and resolve the failing envelope, the team replaced the cladding system with a unitized rainscreen system of stone and curtainwall that complements the historic nature of the adjacent Capitol. The new exterior not only allows more daylight into the building and reduces utility costs, but enabled building expansion. Widening the building to the south took advantage of the existing foundation and reinforced its proximity to the Capitol. New lighting, wiring and finishes provide modern office amenities to the occupants.

structure and expansion was not feasible, the team renovated the poorly designed rooms to add usable space where possible. On the west end of the first floor, two large meeting rooms were added for more public participation in policymaking. With room for 50 audience members, these rooms can host events when not in legislative use.

Although the team could not create all the requisite meeting space in the Capitol, it was made up for in the Capitol extension—the below-grade building that connects the Capitol to the Herschler building. Expanded by 28,000 feet, the extension now features six new legislative hearing/meeting rooms—four that seat 75 and two that seat 100—a media center, visitors' center, learning center and an expansive 238-seat auditorium. These rooms feature high-tech audio and visual systems so proceedings can be streamed.

The team's design approach included special attention to universal accessibility. Constructed before ADA legislation, the Capitol's elevators narrowed the corridors, which impeded accessibility and challenged evacuation efforts. It also lacked exit signs and emergency backup power. That's all changed now with new, relocated elevators, exit signs throughout and a backup generator.

Most importantly, the team shortened egress paths and included exit signs. Internal staircases were extended from the third-floor galleries to the garden level, which provides a second means of egress during emergencies. This also allowed the team to remove the unsafe, unattractive exterior fire escapes on the building's north side.

100 YEARS OF CONSTRUCTION

Modernizing a century-old building was destined to be a challenge, but the team took special care not only to renovate, but to restore and respect the Capitol.

The team expected hazardous materials, including asbestos and lead. The extensive investigation period provided an idea of the quantity of hazardous materials, but the team expected to find more along the way. One example was in the Herschler building's exterior walls. The glue holding the stone façade included asbestos. With proper mitigation plans in place, the team overcame the challenges and properly removed and disposed of the materials.

Based on photos and investigations, the team anticipated finding buried gems throughout the building, but the most notable items were what they didn't expect. Coffered ceilings, crown molding, picture rails, cornices, ornate columns and capitals, arched doorways, tall windows, decorative doorknobs and an expanse of remarkable woodwork were restored to their historic grandeur. Unexpectedly, the team discovered opera posters on the ceilings and oil paintings on six vault doors. All were painstakingly restored to how they appeared in the late 1880s.

Although the project was undertaken more than a century after original construction, the team used much of the same methods as the original constructors did. In many instances, handwork replaced machinery. The crew hand-carved exterior stones, handworked millwork and hand-dug significant amounts of the excavation because the team physically could not get equipment into the rooms.

THE SUPREME COURT CHAMBER (above) was butchered by a 1970s remodel. The Supreme Court had moved to its own building decades earlier. During the '70s remodel, the balcony was removed to add a floor for additional office space, a chandelier was removed, skylight covered, wood paneling removed and walls painted. During the restoration, the team found the faded stenciled walls under layers of paint.

THE WINDOWS (below) behind the podium in the House Chamber had been covered but now are revealed as they were intended.

On the west wing's exterior, the team replaced 195 stones and repaired 366 hand-carved stones that had deteriorated by weather over the last century. Replacing them required reopening the original stone quarry in Rawlins, Wyo., which closed more than 100 years ago. Reopening it allowed the team to get the exact stone used in the original construction and a surplus for future work.

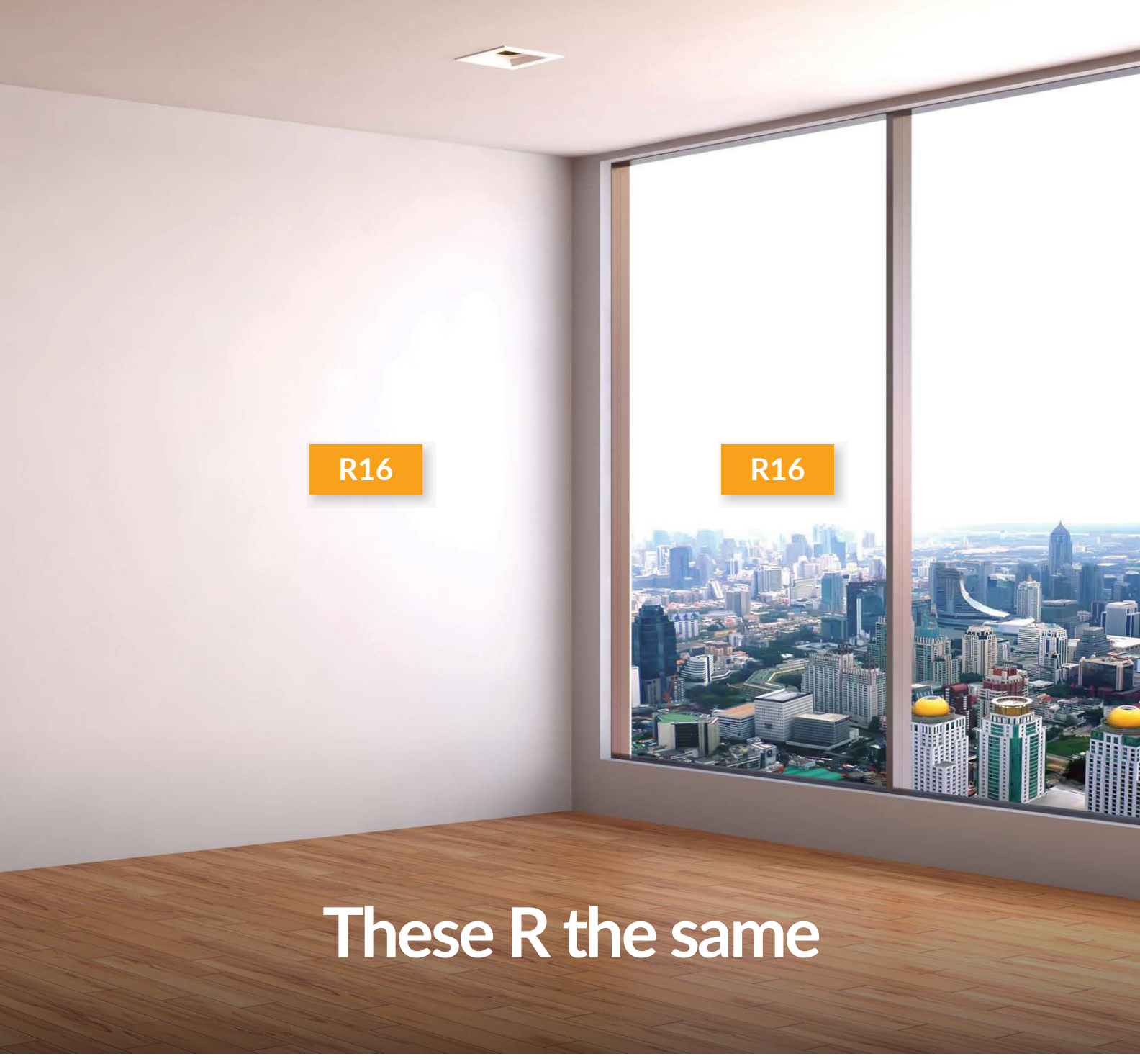
Further, team members intricately refurbished the upper entablature, cornice, pediments and parapet walls above the stone capitals, re-forming them with copper and stainless steel. The team removed and replicated each element originally fabricated in ornate sheet metal with new sheet metal, secured it to the building and painted it to match the sandstone.

The team recreated decorative paintings in the Capitol to match the original construction paintings. Using patterns discovered during the project and historic photos, artisans painted the most historic rooms and corridors in the trompe l'oeil style, which means to "fool the eye". This style creates the illusion of a 3D effect through highlights and shadows.

SUCCESSFUL FULFILLMENT OF CLIENT/OWNER NEEDS

As state leaders cut the ribbon to reopen the Capitol, Governor Mark Gordon said, "You walked into this building with a sense of pride, a sense of obligation and a sense of duty to the people of Wyoming that cannot be expressed. It is so good, so good to be back. I am excited to welcome the public to experience firsthand the results of our Capitol restoration program. This project is for the people of Wyoming and is about Wyoming's future, as well as her past. This is a time to be proud of Wyoming's heritage."

The capitol reopened on July 10, 2019, for tours on Statehood Day, closed again for final construction and opened for general use on December 19, 2019, on time, on budget and on the 150th anniversary of the state giving women the right to vote. The grand reopening of the Capitol showcased the building's dome as an icon of Wyoming that glows with renewed glory for the entire state to celebrate. For those involved throughout the effort, this project was not about just saving the State Capitol. It was about saving Wyoming's history.



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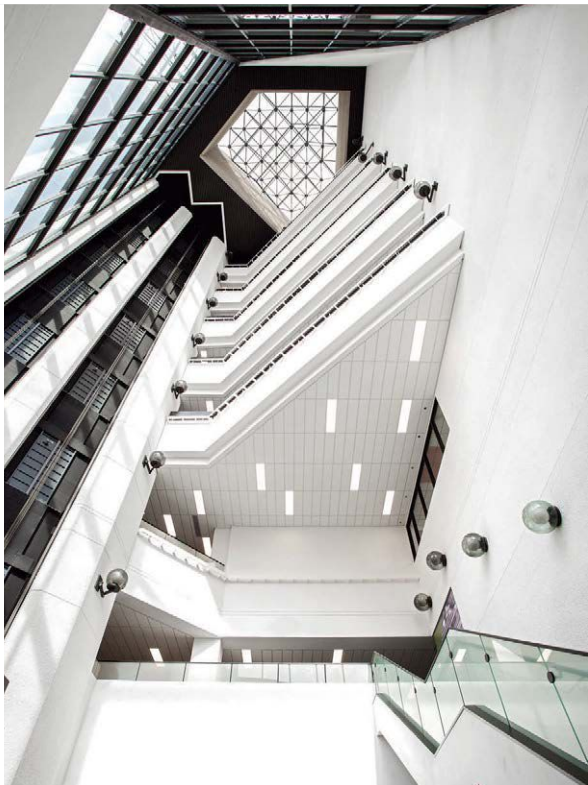

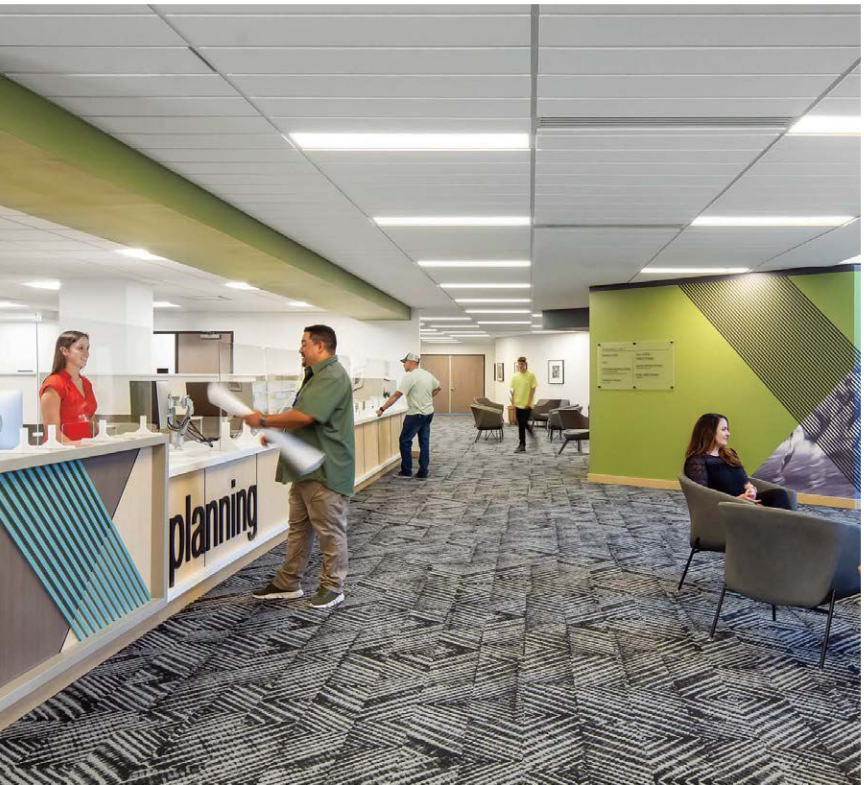

RETROFIT TEAM

ARCHITECT, INTERIOR DESIGNER, LANDSCAPE ARCHITECT, STRUCTURAL ENGINEER: Dekker Perich Sabatini, www.dpsdesign.org

- Megan Holubiak, principal
- Benjamin Gardner, CEO and principal

CLIENT: Bernalillo County, bernco.gov

GENERAL CONTRACTOR: HB Construction, hbconstruction.com

MATERIALS

The following is a sampling of materials used in the project:

UNDER-SLAB VAPOR BARRIER: Stego Wrap 15-mil Vapor Barrier from Stego Industries, www.stegoindustries.com

FLUID-APPLIED MEMBRANE AIR BARRIER: WeatherSeal Waterproof Membrane & Air Barrier from Parex, www.parex.com

THERMAL INSULATION: Faced Batt Insulation from Johns Manville, www.jm.com, and Styrofoam Scoreboard XPS Foam Insulation from Dupont, www.dupont.com

ALUMINUM STOREFRONT: E4500 Series Storefront Framing, T14000 Series Storefront Framing and CW400 Series Curtainwall from Tubelite, tubeliteinc.com, with Insulated Glass Units from Oldcastle BuildingEnvelope, obe.com

METAL COMPOSITE PANELS: 4-millimeter FR Core ACM Rainscreen System from Alucobond, www.alucobondusa.com

NEW EIFS: Senergy EIFS Wall System Senerflex Classic PB from BASF, www.basf.com

EXISTING EIFS RECOATING: StoPrime and StoColor Lotusan from Sto Corp., www.stocorp.com

ROOFING: 80-mil PVC over 1/2-inch Securock Gypsum-fiber Roofboard over Flat/Tapers ENRGY 3 Roof Insulation from Johns Manville, www.jm.com

ROOF HATCH: Type E-20 Roof Hatch from BILCO, www.bilco.com

ROOF PAVERS: Hanover Guardian Roof Paver System from American Hydrotech, www.hydrotechusa.com

EXPANSION JOINT ASSEMBLIES: Roof Expansion Joints from Johns Manville, www.jm.com, and 1200 Series Foam Seal and 811 Series from Inpro, www.inprocorp.com

FIRE DOOR: Model T2000-G Vertical Coiling Fire Doors with Integrated Swing Egress Doors and Auto-Set Model FSFD-M-G Fire Door from McKEON, www.mckeondoor.com

THE RETROFIT

Bernalillo County's headquarters brings staff together to better connect with constituents. The building accommodates more than 800 employees and provides access to a wide range of public services in one central location. The facility aims to have a positive impact on the community through greater convenience and transparency.

Delivered through a design-build partnership, the project included the renovation of an existing 8-story tower and construction of a new Commission Chambers building. A single entry unites the two buildings into a cohesive facility that fosters interdepartmental interaction. One of the project's main goals was to create a space that reflects the constituents. Dekker Perich Sabatini's design is stately and inclusive. By showcasing the county's public art collection, the building encourages community engagement.

The project also promotes health and embraces sustainability, earning a two star certification from Fitwel. To assist employees with the transition to this new facility, a change-management effort included questionnaires, forums, open houses, and training sessions about how to use the new space and its amenities. This process helped the design team determine what staff valued most in the new space. An office mockup provided feedback on the space's functionality, which was incorporated into the final product.

CITY HALL | Fitchburg, Mass.

RETROFIT TEAM

ARCHITECT: ICON Architecture, www.iconarch.com
MEP/FP, TEL/DATA/SECURITY ENGINEER: Rist-Frost-Shumway Engineering, www.rfsengineering.com
STRUCTURAL ENGINEER: RSE Associates, www.rseassociates.com
CIVIL ENGINEER: Bohler, bohlerengineering.com
LANDSCAPE ARCHITECT: Gregory Lombardi Design, lombardidesign.com
CODE CONSULTANT: Code Red Consultants, coderedconsultants.com
SPECIFICATIONS: Kalin Associates, kalinassociates.com
COST ESTIMATING: Miyakoda Consulting, www.miyakoda.com

MATERIALS

The following is a sampling of materials used in the project:

ALUMINUM-CLAD WOOD WINDOWS: Pella, www.pella.com
FIBERGLASS WINDOWS AND FIBERGLASS INFILL SPANDREL PANELS: Intus Windows, www.intuswindows.com
LOBBY TILE: Porcelanosa, www.porcelanosa-usa.com
RESTROOM TILE: Daltile, www.daltile.com
RESINOUS RESTROOM FLOORING: Dur-A-Flex, www.dur-a-flex.com
DIAMOND 10 LVT: Armstrong Flooring, www.armstrongflooring.com
MILLWORK BASE: Tarkett, commercial.tarkett.com
ELEVATOR: KONE, www.kone.us
MOVABLE GLASS PARTITION: Modernfold, www.modernfold.com
CEILINGS: Ecophon, www.ecophon.com, and Armstrong World Industries, www.armstrongceilings.com
CARPET: Milliken, www.milliken.com
PLASTIC LAMINATE: Wilsonart, www.wilsonart.com
MILLWORK HARDWARE: Richelieu, www.richelieu.com
PAINT: Sherwin-Williams, www.sherwin-williams.com

THE RETROFIT

A major renovation of Fitchburg's historic City Hall building at 718 Main Street was recently completed. The project is part of an ongoing renaissance of Fitchburg with the artist and innovation economies at the forefront.

Built in 1853, City Hall is a local historic landmark. ICON Architecture was challenged with balancing a legacy Greek Revival building with a modern work environment that could bring the city's departments together under one roof. By bringing City Hall back to Main Street, ICON Architecture would be creating a "City Hall for All" that was accessible and functional for all departments and residents of Fitchburg.

PHOTOS: **TRENT BELL PHOTOGRAPHY**

The 1853 exterior has been fully restored with brownstone and terra-cotta details carefully repaired or replaced. The original entry has been re-established as the building's primary and fully accessible public entry. The interior was wholly redesigned to accommodate 14 administrative departments, including the Office of the Mayor. Straightforward wayfinding was an important design consideration.

"Our team really enjoyed restoring this historic building and modernizing the interiors to meet contemporary municipal needs and bringing it to modern standards," says Ned Collier, principal at ICON Architecture. "One of the most interesting elements we tasked ourselves with was bringing daylight into the building. Every office has access to daylight and views."

In addition to the City Hall building, an adjacent mid-1980s building (formerly a bank) was converted into the legislative building, housing the City Council Chambers. The coffered high-ceilinged banking hall was ideal for the chamber with sufficient space for the 15-member council table and audience seating for up to 120 people. As a standalone building, the chamber is easily accessible to the public for night meetings and flexible in its use during the day. All city departments have moved into their new respective spaces at the revitalized site.

The project received the 2021 Paul & Niki Tsongas Award from Preservation Massachusetts and 2021 Boston Society for Architecture Accessible Design Award.

PHOTOS: **EAST COAST LIGHTNING EQUIPMENT**

FIVE MUNICIPAL BUILDINGS

Sturbridge, Mass.

RETROFIT TEAM

LIGHTNING-PROTECTION EQUIPMENT INSTALLER: Smokestack Lightning Inc., www.smokestackusa.com

MATERIALS

Taking chances with lightning is a dangerous game. During Summer 2022, lightning struck the Orr's Island Fire Station in Maine, damaging equipment and disrupting operations, including communication equipment on the tower behind the station. Not wanting to incur the same fate, Sturbridge representatives hired Smokestack Lightning Inc. to install lightning-protection equipment on five municipal buildings. The lightning-protection system installed in compliance with National Fire Protection Association lightning-protection requirements will prevent the damage and interruption of service at Sturbridge's municipal buildings.

"The town reached out to us," says Bill Simpson, president of Smokestack Lightning. "Their police and fire station are housed in a single location, and they realized they didn't want to risk their entire infrastructure going down in a storm."

There is simply no good time for a police or fire station to be offline. Ensuring that lightning protection is installed and properly maintained is a must for these facilities. Lightning is a severe-weather event that affects most areas of the U.S. frequently. However, lightning is overlooked in the vast majority of U.S. building codes.

LIGHTNING-PROTECTION EQUIPMENT MANUFACTURER: East Coast Lightning Equipment, ecle.biz

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PHOTOS: WESTERN SPECIALTY CONTRACTORS

RETROFIT TEAM

EXTERIOR RESTORATION CONTRACTOR: Western Specialty Contractors, westernspecialtycontractors.com
ENGINEER: SKA Consulting, www.skaconsulting.com
SCAFFOLDING SUPPLIER: Scaffolding Solutions, www.scaffoldingsolutions.com

THE RETROFIT

Western Specialty Contractors' Charlotte Branch used its expertise in historic masonry to restore the façade of Buncombe County Courthouse.

The historic courthouse was designed by architect Frank Pierce Milburn and built between 1924 and 1928. The 17-story skyscraper's façade consists of brick and ashlar veneer and features complex setbacks with an overlay of Neo-Classical Revival limestone and terra-cotta ornament. The courthouse was listed on the National Register of Historic Places in 1979.

Over time, the landmark structure's façade had deteriorated and required extensive restoration. Western Specialty Contractors contracted with Buncombe County to do the specialized work, which included brick and sealant replacement and terra-cotta repairs.

Taking on the project meant that Western Specialty Contractors experts would have to work 195-feet above the ground to repair the building's envelope. The crew worked with local supplier Scaffolding Solutions to determine the scaffolding needed to allow the building to remain operational during construction and keep workers safe during inclement weather.

"Access to the façade was a driving part of this project," says Western Assistant Project Manager Quinn Griffith. "We strategized scaffold access on every phase in order to save time and money on the extensive project."

Work on the façade started on April 20, 2020, and was completed on budget and ahead of schedule in August 2021.

The end result is a beautifully restored, structurally sound and waterproof façade that will last for many years to come.

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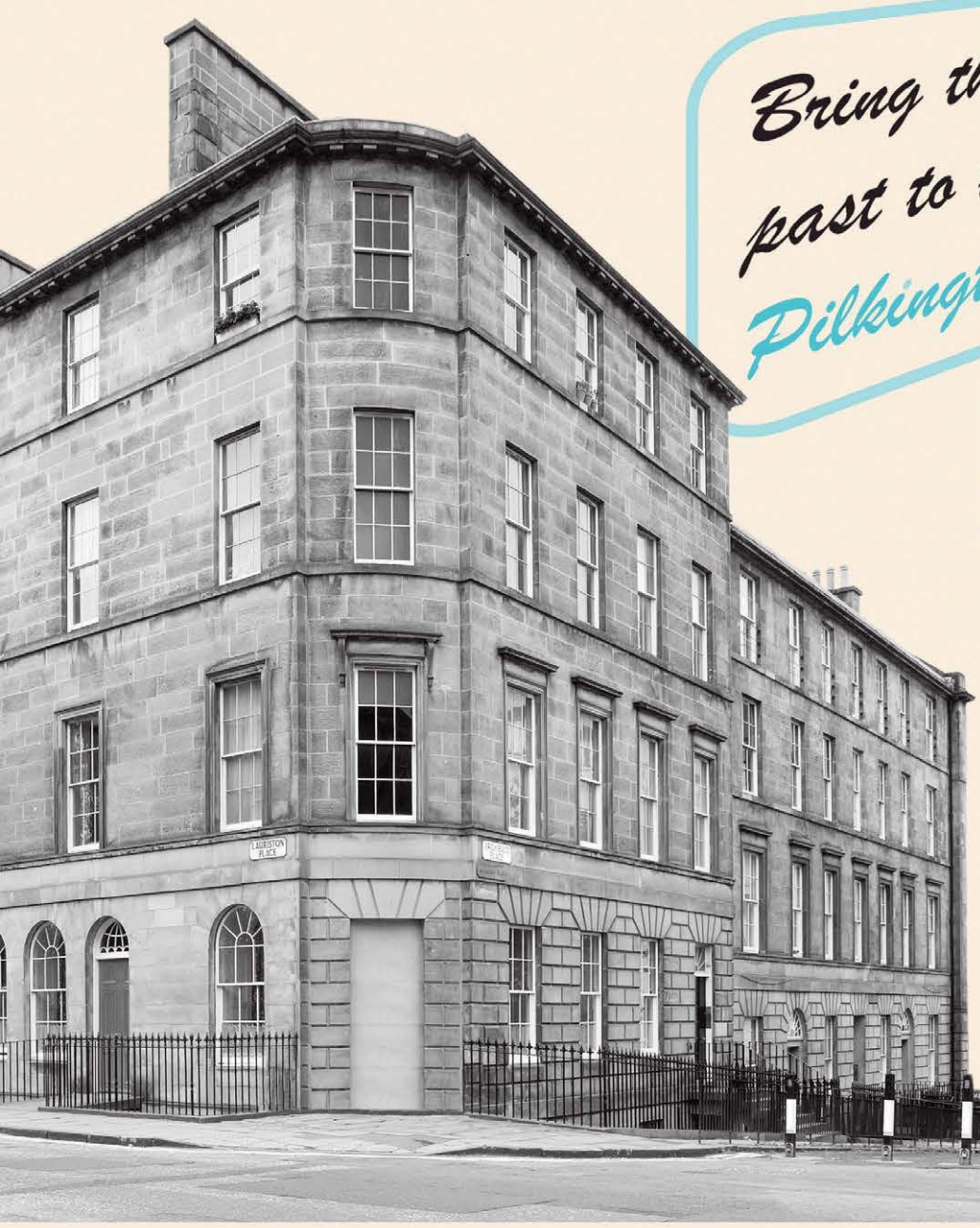

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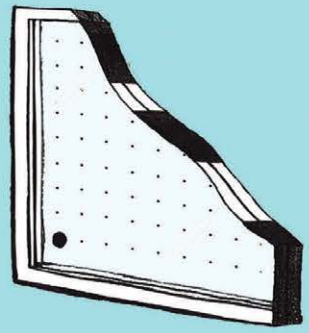
Archibald Place (left) was able to maintain its existing building appearance while upgrading its monolithic glass to modern IGU performance.



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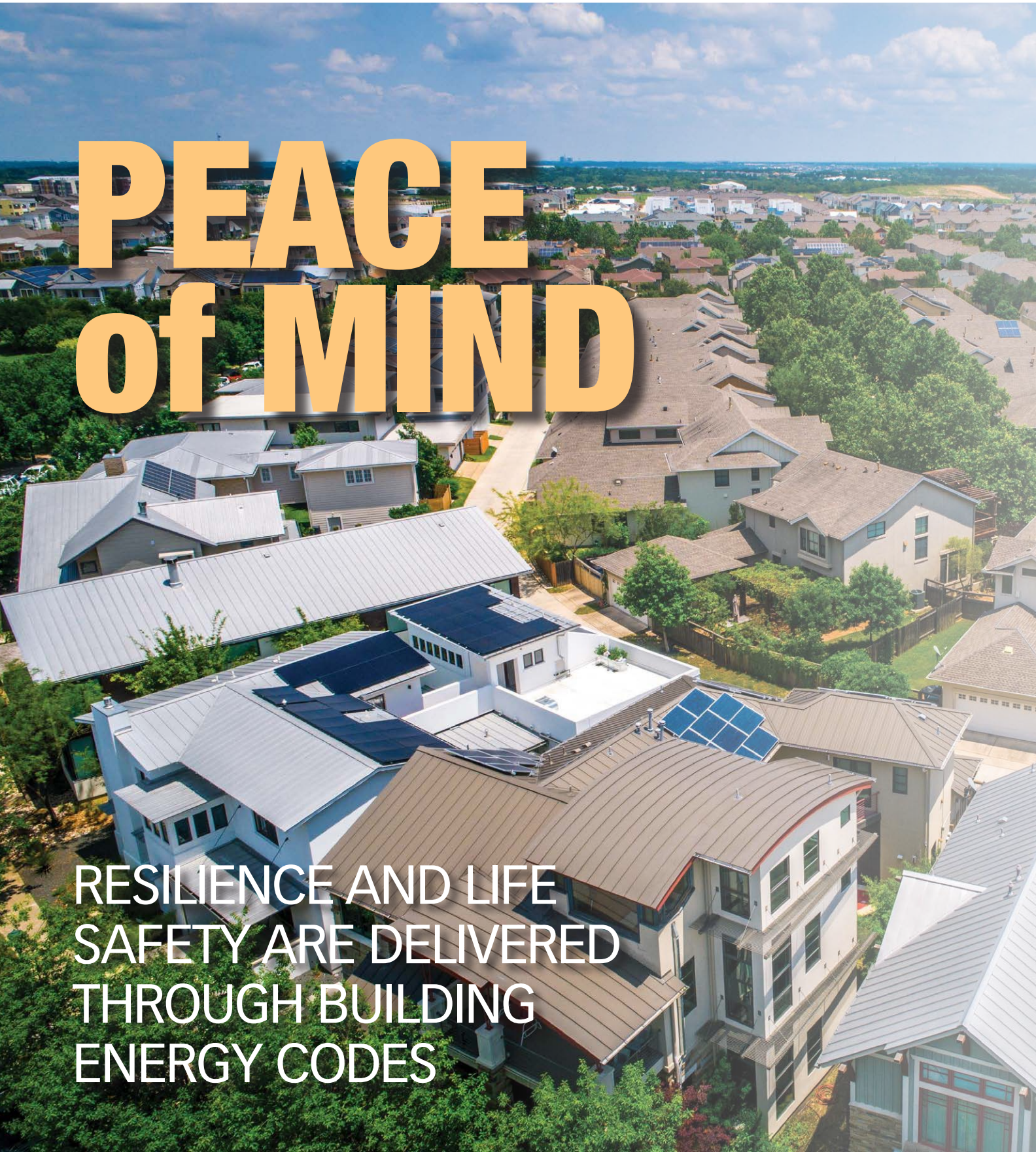


PEACE of MIND

RESILIENCE AND LIFE SAFETY ARE DELIVERED THROUGH BUILDING ENERGY CODES

PHOTO: COURTESY INTERNATIONAL CODE COUNCIL

WRITTEN BY | **RYAN COLKER, J.D., CAE**

During the past five years, the U.S. has experienced 90 weather- and climate-related disasters that exceeded $1 billion in damages.

As extreme weather events caused by climate change become more frequent and intense, governments and organizations are turning their focus toward improving climate resilience policies.

In recent years, buildings have become a focal point in efforts to improve climate resiliency. The rise in greenhouse gas (GHG) emissions is a substantial driver in the changing climate, and the building and construction sector is the largest contributor, accounting for roughly 40 percent of global emissions. At the same time, the built environment serves an important role in protecting communities from the impacts of climate change.

Because of this, the adoption and implementation of modern energy codes has become increasingly important to help mitigate GHG emissions and lower energy use while enhancing resilience. Ensuring buildings use energy efficiently is essential for protecting human health, economic prosperity and reducing the impacts of the changing climate.

RESILIENCY IMPACTS OF ENERGY CODES

To date, building energy codes have primarily focused on reducing energy costs, energy use and emissions. However, as adapting to the impacts of climate change becomes a priority, energy codes now also are being recognized for their contributions to resilience. Some of these resilience elements include energy efficiency, fire safety, moisture management, durability and extreme weather protection.

Enhancing resilience in buildings through energy efficiency is a major goal for the U.S. Department of Energy's (DOE's) National Laboratories. To help aid the development of improved resiliency initiatives, National Laboratories conducted a 2023 study, "Enhancing Resilience in Buildings Through Energy Efficiency", to quantify the value of building energy codes in regard to extreme weather-hazard resilience. The results of this study are expected to be published this summer. (Read about the study at bit.ly/3q9Ln2J.)

Through its research, DOE found that energy codes have a direct impact on energy-resilience outcomes. These impacts include increased thermal resistance within the building and the ability to maintain healthy levels of ventilation and indoor air quality, which is a primary source of moisture and durability issues.

In nearly every situation, improving efficiency in residential buildings to meet or exceed current energy-code requirements saves lives during extreme-temperature events. Furthermore, increasing efficiency in existing single-family buildings to meet code requirements of the 2021 International Energy Conservation Code (IECC) increases habitability by as much as 50 percent during extreme cold and by up to 40 percent during extreme heat.

SUPPORTING PASSIVE SURVIVABILITY THROUGH ENERGY CODES

Building energy codes also support passive survivability or the ability of a building to remain habitable in the face of hazardous events, such as extreme-temperature events. Through provisions for efficient buildings and HVAC, refrigeration equipment, as well as guidance on shading and reducing solar heat gain, energy codes can reduce the impacts of and enhance occupancy during such hazardous events.

The need for passive survivability may arise during extreme heat or cold events when a community's power grid is stressed. Reduced energy demand to obtain comfortable temperatures through increased building efficiency can also enhance the resilience of the energy grid.

Through passive survivability, community and individual resilience are enhanced by providing a safe and comfortable indoor environment even during extended periods of disruption or emergency.

These findings emphasize how implementing modern energy codes is central to both mitigating climate emissions and energy use while enhancing resilience.

THE RISE IN GREENHOUSE GAS EMISSIONS IS A SUBSTANTIAL DRIVER IN THE CHANGING CLIMATE, AND THE BUILDING AND CONSTRUCTION SECTOR IS THE LARGEST CONTRIBUTOR, ACCOUNTING FOR ROUGHLY 40 PERCENT OF GLOBAL EMISSIONS.

DEVELOPMENT OF BUILDING ENERGY CODES

Energy codes have made significant improvements in energy savings since their initial development roughly 40 years ago. For example, the Code Council updates the IECC every three years to reflect new knowledge, advanced technologies and evolving human behavior to provide model codes that promote building safety, sustainability and resiliency.

It has been proven that communities that regularly adopt and implement modern energy codes and standards provide cost savings for residents and businesses while improving overall health and resilience. The Pacific Northwest National Laboratory (PNNL) produced a final determination on the 2021 IECC that found a 9.4 percent energy-savings improvement and an 8.7 percent improvement in carbon-emissions reduction for residential buildings relative to the 2018 IECC—ultimately saving homeowners an average of $2,320 over the life of a typical mortgage. (Read the determination at www.energy codes.gov/determinations.)

PNNL also produced an analysis on the 2021 IECC commercial provisions that found site energy savings of 12.1 percent and a 10.2 percent GHG emissions savings for commercial buildings relative to the 2018 IECC. The determination concluded that, on a national weighted average basis, the 2021 IECC is 6.5 percent more efficient for site energy use and saves 3.3 percent more in energy costs than ASHRAE Standard 90.1-2019.

Enhanced energy codes and regulations, often referred to as "stretch codes" or "reach codes", can be used to further support building resiliency. These codes provide a means to advance energy efficiency and reduce emissions in a jurisdiction, delivering a tool that allows cities and counties with ambitious climate goals to move forward at a quicker pace than others in the state.

Some examples of these stretch codes include:

- **The State of Massachusetts' Stretch Energy Code and Municipal Opt-in Specialized Code (www.mass.gov/info-details/building-energy-code):** The stretch code emphasizes energy performance while the Specialized Code ensures new construction is built consistent with Massachusetts' greenhouse gas limits. These stretch energy codes provide flexibility to jurisdictions and surpass the proposed base code modeled on the 2021 IECC, which will go into effect later this year.
- **The Inflation Reduction Act:** The Inflation Reduction Act Building Codes Technical Assistance program (www.energy.gov/scep/technical-assistance-adoption-building-energy-codes) will make $670 million available to adopt a building energy code that meets or exceeds the zero-energy provisions in the 2021 IECC code or other codes and standards with equivalent or greater energy savings. This funding should be available later this year and the Code Council is prepared to work with jurisdictions to access this funding.
- **The 2021 International Green Construction Code (IgCC):** The IgCC, which is a collaboration between the Code Council, ASHRAE, USGBC and IES, is a stretch code based on ASHRAE Standard 189.1 and includes chapters on advanced energy efficiency and an appendix that aligns code requirements with LEED requirements. The IgCC also includes a chapter on materials and resources related to embodied carbon as that strategy continues to pick up momentum. Future editions of the IgCC are expected to include even more resilience-focused measures.

IMPORTANCE OF BUILDING ENERGY CODES

Buildings play a critical role in GHG emission reduction to mitigate the negative impacts of a changing climate. Recognizing the important role of building codes, standards and building safety professionals in ensuring safe and resilient communities, President Biden proclaimed May 2023 as National Building Safety Month. The proclamation, which can be found at bit.ly/3MTKBA9, discusses how building energy codes "improve energy efficiency and indoor air quality in federally supported housing and make [these] properties more resilient to climate impacts."

Policies at the state and local levels to achieve zero-emission buildings and enhance community resilience must include a strong focus on current and future buildings. The adoption and effective implementation of building energy codes are central to the realization of a resilient future.

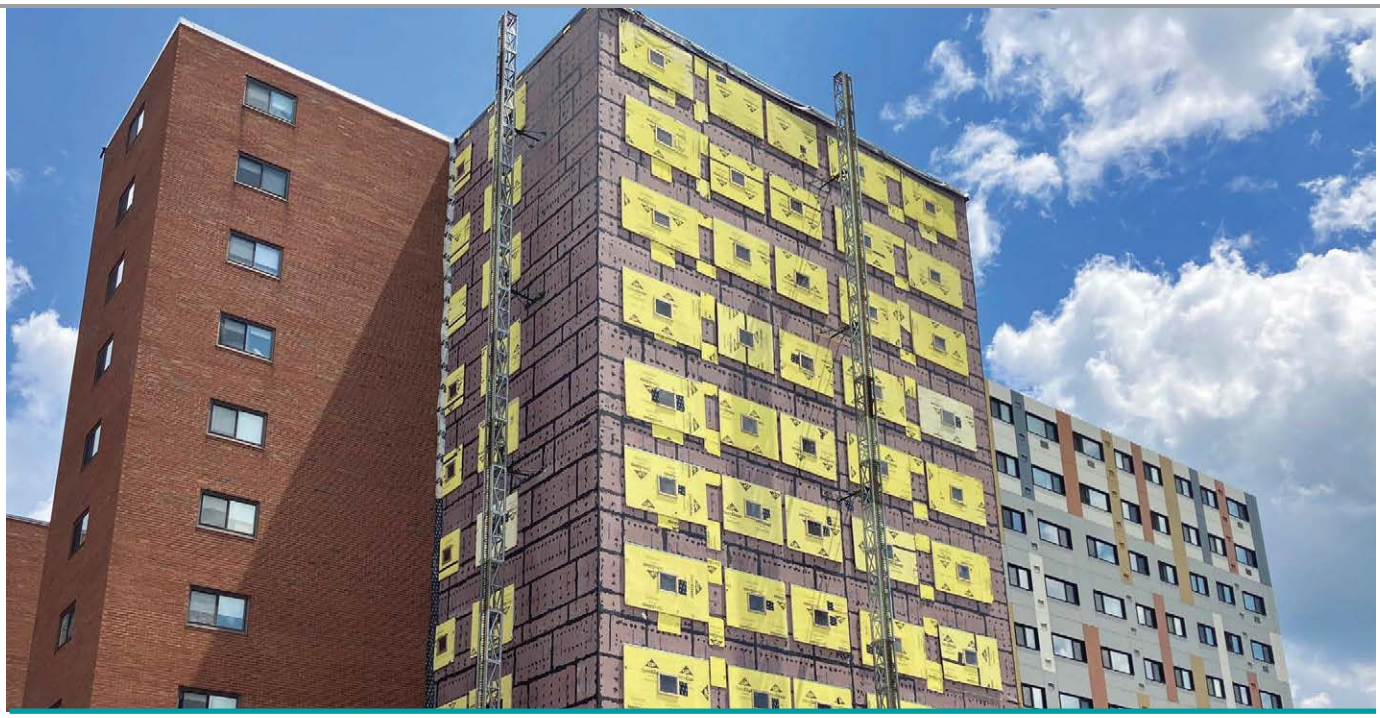
From CLIMATE LIABILITIES to CLIMATE ASSETS

PHOTOS: ISTOCK

LOW-EMBODIED-CARBON AND CARBON-STORING MATERIALS IN BUILDING RETROFITS CAN REDUCE TOTAL BUILDING EMISSIONS

WRITTEN BY | EVA ROSENBLOOM AND CHRIS MAGWOOD

Eighty percent of existing U.S. buildings will still be in use by 2050, but many are highly inefficient and reliant on fossil fuels. Retrofitting existing buildings is a vital strategy to improve building performance and reduce climate-warming pollution; the operation of buildings accounts for 28 percent of global greenhouse gas emissions. Deep-energy retrofits that improve the efficiency of building envelopes and incorporate high-performance mechanical systems can achieve reductions of 50 percent or more in both building energy consumption and operating emissions.



RMI'S RESEARCH DEMONSTRATES THAT MATERIALS SPECIFIED FOR THE INSULATION COMPONENT OF THE ASSEMBLY CAN HAVE A SIGNIFICANT IMPACT ON THE TOTAL EMBODIED CARBON OF RETROFIT PROJECTS.

Investing in retrofits can also lead to 50 to 75 percent fewer embodied-carbon emissions compared to demolishing and reconstructing properties. However, careful consideration must be given to any upfront embodied-carbon emissions associated with materials used for retrofits because these emissions can offset retrofit operational-emission reductions. Strategic material selection that focuses on low-carbon or carbon-storing products is crucial for optimizing climate benefits.

To explore this approach, RMI (formerly Rocky Mountain Institute) recently published a report titled, "Transforming Existing Buildings from Climate Liabilities to Climate Assets". It offers a comprehensive strategy that combines analyses of operating- and embodied-carbon emissions. The report is available for download at rmi.org/insight/transforming-existing-buildings-from-climate-liabilities-to-climate-assets.

BUILDING RETROFITS AND THEIR BENEFITS

Retrofitting strategies that prioritize energy-load reductions, electrification, and renewable-energy production can eliminate operational emissions and mitigate the impact of electrification on the grid. However, the physical retrofit work necessary to reduce operating emissions can result in an embodied-carbon impact that can be mitigated by integrating best practices and strategic material selection.

Deep-energy retrofits are especially important in cold and mixed-humidity climates, where they reduce thermal loads from high-emitting buildings. These retrofits involve super-insulating building shells, implementing high-performance all-electric mechanical systems, incorporating additional energy-efficiency measures and integrating renewable-energy sources. They offer additional benefits, such as improved comfort, reduced vulnerability to fossil-fuel price fluctuations and increased resilience during power outages.

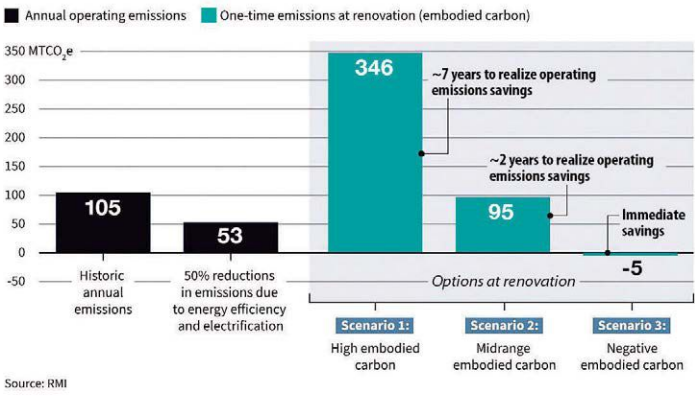
UNDERSTANDING EMBODIED CARBON

In recent years, embodied-carbon emissions, which account for 11 to 21 percent of global emissions, have gained attention alongside operational emissions because both types of emissions are critical levers for addressing climate change. In the RMI report, we specifically look at emissions from raw-material harvesting and manufacturing of building products or materials that would be used in retrofits. This production phase of building materials is considered the "cradle to gate" phase of embodied carbon.

This phase represents a significant

upfront spike in emissions that can offset the operating-emissions reductions achieved through retrofits. In this decisive decade, industry professionals should take a holistic approach to building decarbonization and focus on managing and mitigating these emissions. Although the referenced RMI report primarily examines the "cradle to gate" phase, other subsequent phases that cause embodied-carbon emissions, such as construction methods, waste, maintenance and disposal, should also be considered to evaluate the full climate impact of retrofit projects.

Up-Front Embodied Carbon Emissions vs. Operating Emissions Reductions of a Low-Rise Deep Energy Retrofit Utilizing R-30 Insulation Options and Fiber Cement Siding



Source: RMI

RMI REPORT: LOW-EMBODIED-CARBON PRODUCTS IN RETROFITS

Material considerations are especially important in cold and mixed-humidity climates that require more intensive exterior insulation systems to cut thermal loads. Many retrofits use high-embodied-carbon materials, like foam insulation, to reduce operating emissions. RMI's research demonstrates that materials specified for the insulation component of the assembly can have a significant impact on the total embodied carbon of retrofit projects.

Through the case-study analysis, the report compares the results from three different rigid insulation boards, achieving the same thermal performance for a deep-energy retrofit. The results showed that of the three scenarios, one product would realize net-emissions-reduction benefits after seven years, one after three years, and one would facilitate an immediate benefit from operating-emissions reductions and provide potential for storing carbon (see the graph on this page).

Key takeaways from this research include:

- Deep-energy retrofits in cold climates generally have an embodied-carbon impact equivalent to two to seven years of operating-carbon reductions.
- Low-carbon and carbon-storing materials are available today within different construction methodologies that significantly reduce this timeframe and enable immediate climate benefits. View Appendix C in RMI's report for a list of these materials.
- A combined analysis considering anticipated operating-carbon emissions reductions and the embodied-carbon impact of the assembly design allows for the best achievable climate impact.

The analysis demonstrates that with the implementation of an exterior insulation system with mid-range global-warming potential, the embodied-carbon emissions associated with the deep-energy retrofit delay full realization of operating-emissions reductions to less than three years. In the worst-case scenario with using higher-embodied carbon materials, this timeframe is postponed further. Despite this delay, retrofitting buildings remains an effective strategy to reach climate goals, especially compared to replacing them with new traditional construction. In best-case scenarios, where carbon-storing materials can be used in the retrofit, there is no emissions spike at all, operating-carbon reductions are realized immediately, and the existing building can store carbon for the remainder of its lifetime.

AN IMMEDIATE NEED TO ADDRESS EMBODIED CARBON IN RETROFITS

The widespread use of carbon-storing materials in deep-energy retrofits would transform existing buildings from carbon emitters to carbon-storing buildings. Waiting four to six years for emissions reductions from deep-energy retrofits leaves us with insufficient time to meet global climate targets and avoid the worst outcomes. Instead, we must accelerate widespread adoption of low-carbon materials in retrofits to achieve a net-zero building sector.

Innovators, manufacturers and design professionals are needed now more than ever to propel the industry forward with new materials, products, and design and construction services that ratchet down upfront embodied-carbon emissions so that retrofitted buildings can achieve operating emissions savings as quickly as possible. RMI's initiatives—REALIZE-MA (rmi.org/our-work/buildings/realize/realize-ma) and the Advanced Building Construction Collaborative (advancedbuildingconstruction.org)—provide expertise and promote collaboration for scalable solutions. However, this transition requires far greater public and private-sector support, incentives and resources for stakeholders.

Policymakers have the ability to shorten the path to achieving this future by supporting investment in low-embodied-carbon products, carbon-storing materials and deep-energy retrofit solutions. Supportive legislation and financial assistance to standardize environmental product declarations, increase material transparency and identify low-carbon construction alternatives are urgently needed. It's time to seize this opportunity to retrofit aging and inefficient buildings with low-embodied carbon materials. Together we can reduce climate pollution, create jobs, and provide better buildings while simultaneously tackling both embodied- and operational-carbon emissions in the built environment.

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RESILIENT and SUSTAINABLE DOORS and WINDOWS

WRITTEN BY | HEATHER WEST

Economists and commercial developers advise caring for existing assets offers the greatest return on investment. Historic preservationists and environmental experts add that the most sustainable property is the one that is never built. Coupling these reminders with a renewed focus on resiliency, many building owners are choosing to retrofit and renovate.

Replacing, repairing and restoring existing window and door systems are among the strategic improvements that help extend a property's life and value. Aluminum is the most common framing material for commercial buildings' curtainwall, storefront, windows, skylights, doors, entrances and other fenestration systems. Both anodize and painted coatings can offer a long-lasting finish for architectural aluminum products, and each has its own characteristics and benefits. There are two main finishing types for aluminum products in exterior applications: 70 percent polyvinylidene fluoride (PVDF) resin-based painted coatings and anodize finishes.

Whether the building's finish has faded and discolored after years of use or an architectural aluminum product has been damaged during construction, fenestration product manufacturers and finishing service providers can help ensure the project's aesthetic, performance and environmental goals are met.

For onsite renovation and field repair of fenestration components, licensed applicators can repaint the aluminum framing and products on an entire building. Small sections of painted aluminum framing also may be touched up, but material with an anodize finish must be replaced.

AESTHETIC APPEAL

Finishes that offer a unique appearance, texture or resilient weathering performance provide a strategic advantage in appealing to owners and occupants who want their buildings to have an enduring, architectural statement.

For an eye-catching, dynamic finish choice, architectural aluminum systems painted with mica and metallic coatings bring sparkle, shimmer and shine to practically any color. The reflective quality of these specialty coatings appears to change throughout the day and seasons.

Anodize finishes emphasize the natural metallic look of aluminum. Clear and black anodize are the most popular. Until recently, the color palette for architectural anodize finishes has been very limited. Bronze and champagne tones have been expanded to include copper anodize and bordeaux anodize.

A tactile quality is imparted to coatings by adding fine aggregate. Textured terra-cotta painted colors gain authenticity with a gritty stone-like feel.

Spattercoat finishes can deliver the appearance of marble, stone, brick or other materials. The paint spatters can be many or few, large or small, thick or thin to produce the desired 3D textured effect.

When one of the 50,000 colors or available specialty finishes still do not quite fit the project's requirements, finishers with

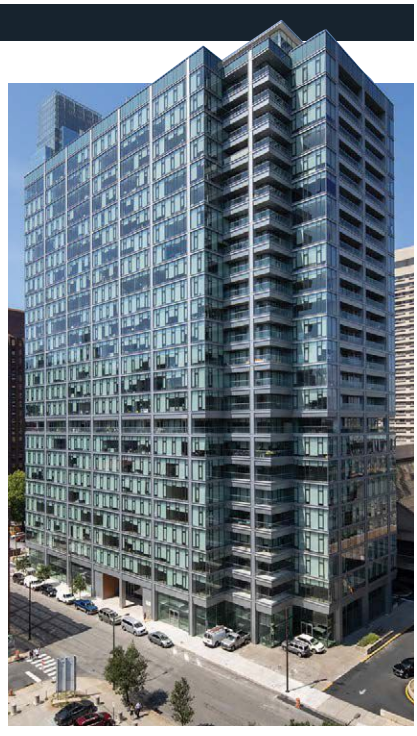
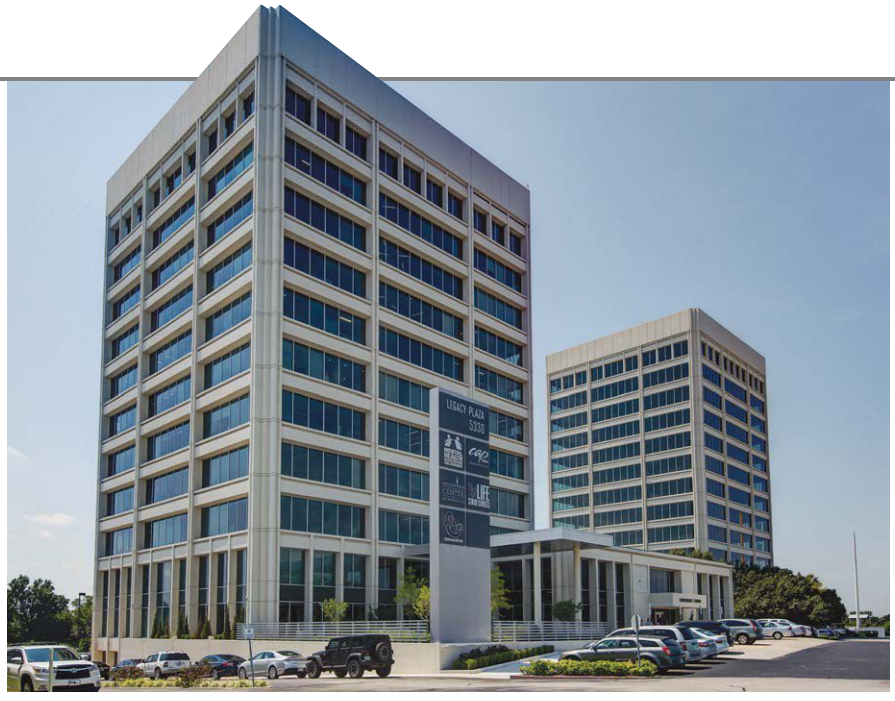


PHOTO GREG BENSON PHOTO, COURTESY APOGEE ENTERPRISES INC., WAUSAU WINDOW AND WALL SYSTEMS, AND LINETEC

↑ **FRANKLIN TOWER RESIDENCES** updated the Philadelphia skyline with 550 luxury apartments fashioned from a former concrete office tower. The 1980s structure was converted into a premier, modern, residential property. Its exterior was re-clad in energy-efficient glass and thermally improved aluminum framing. The majority of Franklin Tower Residences' window, curtainwall and entrance systems were finished in a Bright Silver color using a four-coat metallic 70 percent PVDF resin-based architectural coating. A two-coat mica coating also was applied in a Shanghai Silver color. Metallic- and mica-painted finishes meet the AAMA 2605 specification standard for the highest level of performance.

Better Understand the Finish Options Available for Updating Existing Architectural Aluminum-framed Windows and Doors



LEGACY PLAZA in Tulsa, Okla., encompasses three, renovated buildings now serving as a centralized facility for seven non-profit partner organizations. Contributing to the modern appearance and energy-efficient performance of this reimagined building complex, the aging windows were replaced with updated aluminum-framed ribbon window, curtainwall and entrance systems.

LEGACY PLAZA was constructed in 1975, prior to the advent of commercial window systems with high-performance, low-e, insulated glazing and thermally broken framing members. Along with its non-thermally broken frames and existing 0.25-inch clear, monolithic glass with a reflective bronze film, time and weather had caused the caulking, seals and finishes to deteriorate.

LEGACY PLAZA's replacement window system's 2 1/4-inch-wide by 4 1/2-inch-deep aluminum framing members were thermally broken, insulated and finished to achieve the project's specified thermal performance, sound mitigation and condensation resistance, as well as a long-lasting appearance.

PHOTOS: DAYBREAKPICS.COM, SUNNY THOMAS, COURTESY TUBELITE AND LINETEC

an in-house blending laboratory can scan samples of anything from a piece of metal to a swatch of fabric and formulate the recipe of tints and bases to create a match. Paint coatings can align with an organizational logo, school colors, team uniforms or company brand.

Finishing service providers with computer-controlled mix-and-match color systems and quality-assurance processes must be approved partners with high-performance paint manufacturers. These systems, processes and partnerships not only achieve a precisely verified color match, but do so with confidence that the color will be consistent and meet the paint specification for the project's requirements.

PROVEN PERFORMANCE

Specifying aluminum framing with high-performance finishes offers protection against weathering, aging and pollution.

Anodize finishes are created through an electro-chemical process where the aluminum on the surface of a part is converted from aluminum to aluminum oxide. This extremely hard, durable surface finish is second only to a diamond in its hardness. Because of these properties and because the coating is integral to the part itself, anodize is highly resistant to marring, scratching and other damage often associated with the needs of high-traffic environments.

For the most durable and wear-resistant finish available, choose Class I anodize specified to meet AAMA 611-20, "Voluntary Specification for Anodized Architectural Aluminum". Setting the standard for fenestration products, AAMA specification documents are published by the Fenestration and Glazing Industry Alliance (FGIA).

For high-performance painted finishes, specify AAMA 2605-22, "Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels". Updated in 2022, finishes that meet AAMA 2605 withstand long-term ultraviolet radiation, which results in the highest level of color/gloss retention and chalk resistance. PVDF finishes also resist acids, alkalis, oils and dirt pickup.

In coastal climates and corrosive environments, finished architectural

aluminum also may specify a 70 percent PVDF coating system with chrome phosphate pretreatment along with an inhibitive chrome-rich primer. Anodize finishes that meet AAMA 611-20 Class I also can be a suitable, resilient and sustainable choice for coastal climates.

SUSTAINABILITY STRIDES

Supporting projects' sustainability goals, many aluminum fenestration systems can be manufactured with recycled content.

Because liquid paint solvents contain VOCs, environmentally responsible finishers safely capture and eliminate these at their facilities using a 100 percent air-capture system and regenerative thermal oxidizing equipment. The painted aluminum cures under factory-controlled conditions before the finished material is installed on the job site.

There are no applicable VOCs associated with anodized aluminum. It is an inert, non-combustible material that is 100 percent recyclable and poses no health risks. Recognizing these attributes and anodized aluminum products' 40-year life expectancy, at least one anodize finishing provider recently earned a Declare Label as Living Building Challenge (LBC) Red List Free from the International Living Future Institute.

Declare LBC Red List Free indicates full compliance with the highest-level criteria. Declare LBC Red List Free products are recognized by the U.S. Green Building Council's LEED Rating System and other green and well building programs.

For properties with windows, doors and fenestration systems featuring painted aluminum framing, onsite finishing specialists can support sustainable building goals. Water-based, PVDF resin-based, air-dry coating systems meet the interior specification for the Green Seal standard and uphold LEED criteria.

ONSITE SERVICE

For any repair other than a small scratch or blemish, it is strongly suggested that a licensed, professional field service applicator inspect the situation and determine the best suitable paint or repair procedure. Onsite repair, refinishing and restoration of architectural projects require special equipment and exceptional knowledge. A minor mistake in any segment of repair can cause major problems over time.

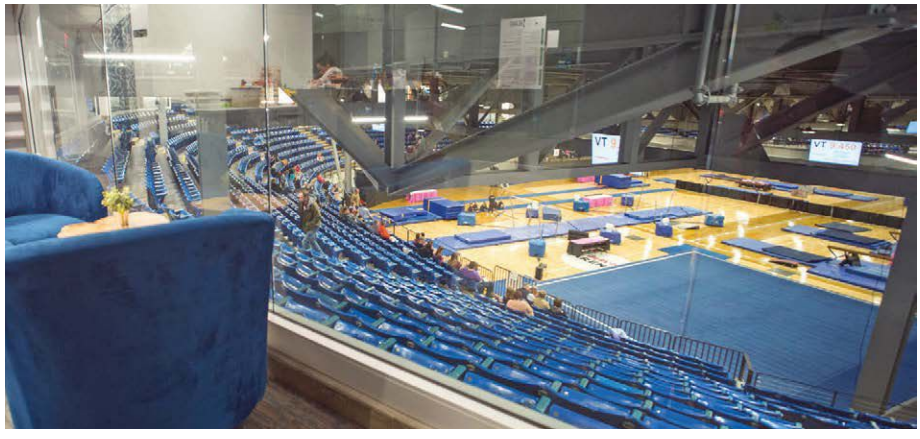
If the property is to remain occupied during renovation, be sure the team has a good reputation for coordinating and minimizing disruption for occupants. Keep in mind that the field team may need to enter the tenants' space to do their work; for example, to repair or restore the interior face of a curtainwall.

Ongoing care and maintenance of the finished aluminum should follow the AAMA 609 and 610-15, "Cleaning and Maintenance Guide for Architectural Finished Aluminum" specification. Working closely with fenestration product manufacturers and architectural finishing service providers will ensure optimal results.

PHOTOS: FOUTCH A+D, COURTESY TUBELITE AND LINETEC

↑ Considered the nation's first multi-level sports complex, **HYVEE ARENA** adaptively reused the historic Kemper Arena's single-level venue transforming it into a modern, four-level, multi-functional, 10,000-seat recreational facility in Kansas City, Mo. Listed on the National Register of Historic Places, the arena's renovations needed to meet strict aesthetic standards.

↓ After analyzing the finish on the former Kemper Arena's existing glazing systems, the finishing service provider's in-house color laboratory customized a "Super White" color to match the owner's and historic review committee's approved appearance. Meeting the project's performance requirements, the finish was specified to meet AAMA 2605. Durable 70 percent PVDF resin-based architectural coatings were applied to more than 20,600 square feet of replacement storefront, entrance and interior aluminum framing systems.



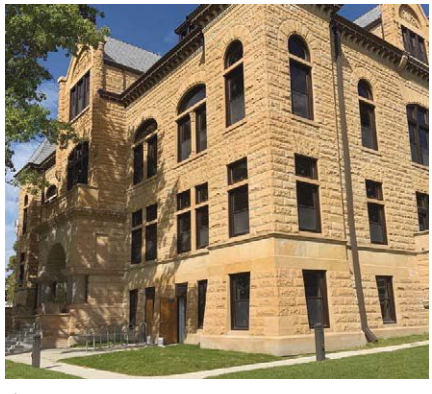


PHOTO COURTESY VEREGY, WINCO WINDOW COMPANY AND LINETEC

↑ Existing window frames on the **ADAIR COUNTY COURTHOUSE**, Kirksville, Mo., were retained, wrapped and panned over. Because some windows required radius and elliptical templates, several field verifications ensured they were made correctly and fit properly. Gray vision glass, spandrel glass and stucco-embossed dark bronze panels complement the updated appearance.

NO ADVERSE EFFECT

FRANK E. MOSS U.S. COURTHOUSE UNDERGOES AN ENVIRONMENTALLY CONSCIOUS SEISMIC RETROFIT

WRITTEN BY | **AMY GILBERTSON, FAIA, LEED GREEN ASSOCIATE**

PHOTO: **TRIVERS**

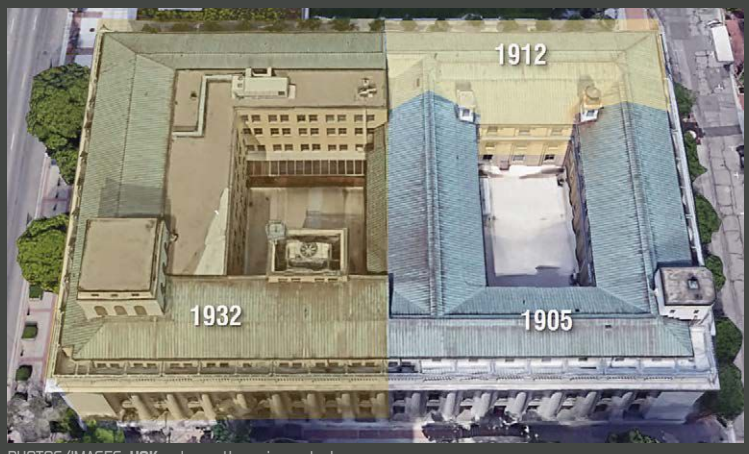
In today's world where so many things are thrown away, there is something immeasurably gratifying about restoring historic structures from times when pride and precision trumped speed and profit. Large-scale restoration opportunities are few and far between and competition for them as an architect is fierce, so landing one is tremendously rewarding. Such has been the case with the Frank E. Moss U.S. Courthouse in Salt Lake City, which is currently undergoing a seismic upgrade, backfill and renovation.

Salt Lake City at the turn of the 20th century was no longer just an open-range home to indigenous people, a secluded Mormon settlement or a ragged frontier outpost. It was a diverse and burgeoning economic center on the brink of becoming a major metropolis.

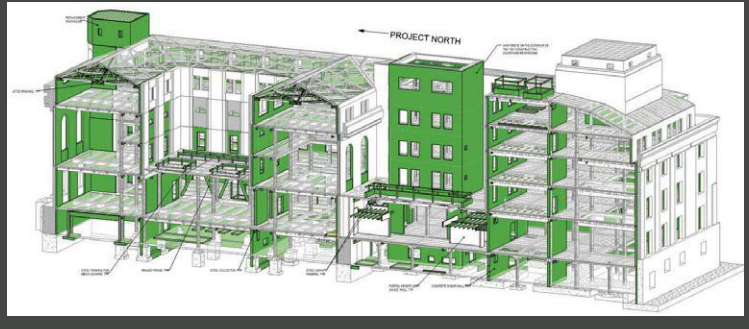
After decades of attempts, Utah finally achieved statehood in 1896. Its leaders recognized an immediate need to erect structures that reflected the capital city's increasing stature. What is now known as the Exchange Place Historic District emerged. The first of its eight buildings was the U.S. Post Office and Courthouse—the state's first federal building—which introduced the Classical Revival style to Utah and brought with it an air of sophistication previously unknown to the area.

Completed in 1905, the original building had a U-shaped structure. Two additions in 1912 and 1932 closed the end of the "U" and added another U-shaped section, which doubled the size of the original footprint. When the last addition was constructed, the Classical Revival style was reinterpreted as a form of modern classicism common for many public buildings in the 1930s. In 1990, it would be renamed the Frank E. Moss U.S. Courthouse after the Utah native who served as U.S. Senator from 1959-77.

Given the rich history of this landmark, being selected to sustainably retrofit it back to its original glory is the type of project I dream about—bringing vitality and purpose back to a building in service of the surrounding community and celebrating history in concert with modern innovation.



PHOTOS/IMAGES: **HOK** unless otherwise noted



COMPLETED IN 1905, THE ORIGINAL U-SHAPED BUILDING RECEIVED TWO ADDITIONS IN 1912 AND 1932, WHICH DOUBLED THE SIZE OF THE ORIGINAL FOOTPRINT. TODAY, A NEW CONCRETE BUILDING ESSENTIALLY IS BEING CONSTRUCTED INSIDE THE ORIGINAL STRUCTURE TO STABILIZE IT.

The St. Louis office of HOK and Trivers partnered on a response to a nationwide Design Excellence search the General Services Administration (GSA) issued in 2019. GSA was looking for a team to upgrade and renovate the Moss courthouse, including a tenant build-out on every floor. After this major renovation—the building's first since 1932—12 federal agency tenants will move back into the facility, most notably the U.S. Bankruptcy Court and U.S. Citizenship and Immigration Services. HOK's nationally recognized leadership in sustainability and workplace design combined with Trivers' expertise in modernizing historic structures led to our team being selected for this monumental effort.

Because the Moss courthouse is built along the Wasatch Fault, the largest earthquake threat in the interior U.S., a key component of the project is a seismic retrofit, which modifies the existing structure to make it more impervious to events, such as earthquakes. This type of resilient design is also intended to resist climate stressors, like the harsh winter storms characteristic of the Wasatch Mountains.

Slated for completion in 2025, priorities for the $100 million project are to increase the Moss courthouse's resilience and sustainability. To achieve that, original finish materials in most of the building's historic areas have been disassembled and are being stored at an offsite location. Original walls will be strengthened with concrete, and lateral bracing will be installed throughout the facility. HOK's structural engineers designed the retrofit using shotcrete—spray concrete—because it conforms to seismic retrofit codes and was determined to be the most effective way to stabilize the original structure and its two additions. Essentially, a new concrete building is being constructed inside the original structure.

To protect the historic integrity of the Moss courthouse, the project has a Section 106 requirement. Laid out and administered by the Advisory Council on Historic Preservation (ACHP), Section 106 mandates that firms working on historic projects receiving federal funds must engage the community regarding proposed work, and measures of adverse effect must be studied.

Trivers developed and led the communications strategy and community

WITH ITS **ORNAMENTATION AND PROPORTION**, CLASSICAL REVIVAL-STYLE ARCHITECTURE, AS WELL AS ITS NEOCLASSICAL ADAPTATION, THE COURTHOUSE EVOKES A SENSE OF PROMINENCE.

engagement efforts for the Section 106 process at the Moss courthouse and assembled interested local stakeholders. We regularly seek input from this group, but beyond serving as advisors, they have become influential ambassadors for the project. We have been able to incorporate their unique perspective into the restoration, and their support has helped generate buy-in and excitement among other Salt Lake City residents. These individuals have fostered a growing sentiment of ownership in the community that has made our work even more gratifying.

According to ACHP, adverse effect occurs when an undertaking may alter—directly or indirectly—any of the characteristics of a historic property that qualify it for inclusion in the National Register of Historic Places in a manner that would diminish the integrity of its location, design, setting, materials, workmanship, feeling or association.

We are proud the Moss courthouse project has received a "No Adverse Effect" designation. This is the GSA's first seismic retrofit project that has received this type of distinction. As such, the GSA plans to use the project as a model for other government buildings in its portfolio.

Furthermore, HOK is leading the design team's efforts to achieve LEED Gold certification, which can be earned by adhering to prerequisites and credits that address carbon, energy, water, waste, transportation, materials, health and indoor environmental quality. The U.S. Green Building Council evaluates and awards these prestigious designations.

To meet the rigorous standards required for LEED Gold certification, the renovated structure will use 50 percent less energy and 30 percent less water than a similar-sized building. The design team is pursuing full building electrification. Adaptively reusing the facility also reduces embodied carbon by 59 percent compared to constructing something new.

Buildings have their own personalities, and visitors tend to take them on, displaying them in their own affectations. With its ornamentation and proportion, Classical Revival-style architecture, as well as its neoclassical adaptation, the courthouse evokes a sense of prominence. This is likely one of the reasons it was the style of choice for many historic U.S. government buildings, courthouses, banks, schools and churches. Its grandeur commands respect.

The Exchange Place Historic District first served as an intersection for a diverse cross-section of early Americans who were still learning to live and work together toward common goals. But more than a gathering place, it was an area that announced to the world that Salt Lake City was becoming a key financial and cultural force shaping the new American West.

The preservation and retrofitting of the Moss courthouse are important steps in recreating that energy for new generations of Americans living and working in the Exchange Place Historic District. The opportunity to be a part of that is both an honor and a privilege.

GSA PLANS TO USE THE PROJECT AS A MODEL FOR OTHER GOVERNMENT BUILDINGS IN ITS PORTFOLIO.

RETROFIT TEAM

CLIENT // General Services Administration, www.gsa.gov
ARCHITECT; INTERIOR DESIGNER; SUSTAINABILITY; AND STRUCTURAL, MECHANICAL, AV/IT/SECURITY ENGINEER // HOK, www.hok.com
HISTORIC ARCHITECT // Trivers, trivers.com
FAÇADE // Simpson Gumpertz & Heger, www.sgh.com
GRAPHICS/WAYFINDING // Kuhlman Leavitt, kuhlmannleavitt.com
STRUCTURAL ENGINEERING SUPPORT // Dunn Associates Inc., www.dunn-se.com
FIRE PROTECTION // Henderson Engineers, www.hendersonengineers.com
SWING SPACE DESIGN, ACCESSIBLE ANALYSIS // Oculus, oculusinc.com
ENERGY MODELING // IMEG, www.imegcorp.com
PLUMBING ENGINEER // Spectrum Engineers, spectrum-engineers.com
COST ESTIMATING // Construction Control Corp., cccutah.com
CONSTRUCTION MANAGER AS CONSTRUCTOR // Big D Cos., www.big-d.com
CONSTRUCTION MANAGER AS ADVISOR AND COMMISSIONING AGENT // Jacobs, www.jacobs.com
CODE CONSULTANT // CCI, www.codeconsultants.com
GEOTECHNICAL ENGINEER // Gerhart Cole, gerhartcole.com
ENVIRONMENTAL TESTING // Terracon, www.terracon.com

MATERIALS

CONFIRMED

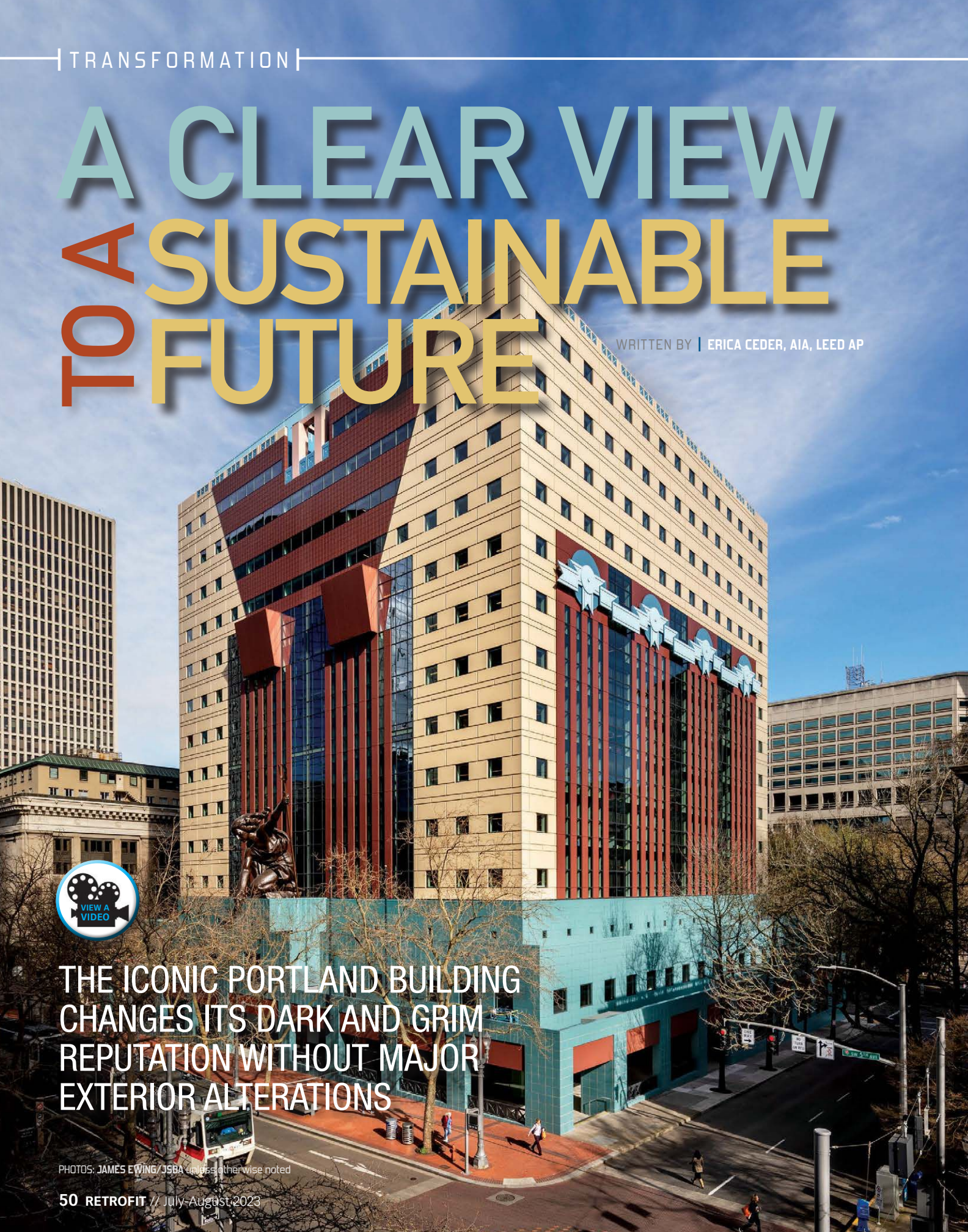
ULTRA-HIGH-PERFORMANCE CONCRETE PANELS // Envel, envelfacade.com
WINDOWS // Marvin, www.marvin.com
HISTORIC LIGHTING // St. Louis Antique Lighting Co., www.slalco.com

BASIS OF DESIGN

TERRAZZO FLOORING IN HISTORIC AND MODERN RESTROOMS
COUNTERTOPS IN HISTORIC RESTROOMS // Cosentino, www.cosentino.com
COUNTERTOPS // Corian, www.na.corian.com, and Cambria, www.cambriausa.com
BROADLOOM IN COURTROOMS AND CARPET TILE THROUGHOUT TENANT SPACES // Shaw Contract, www.shawcontract.com
WALK-OFF CARPET // Milliken, www.milliken.com
DRAPERY IN COURTROOMS // Designtex, www.designtexsi.com, and Pollack, www.pollackassociates.com
PEW UPHOLSTERY // Sina Pearson, bit.ly/3oyFrQr
WRITING INSERTS // Edelman Leather, www.edelmanleather.com
FLOOR AND WALL TILE // Stone Source, www.stonesource.com
WALLCOVERING // Maharam, www.maharam.com, and Designtex, www.designtexsi.com
GLASS ENTRANCES AND STOREFRONTS // Maars Living Walls, maarslivingwalls.com, and Raco, racointeriors.com
ACOUSTICAL CEILINGS // Armstrong World Industries, www.armstrongceilings.com
ROOFING // Carlisle SynTec Systems, www.carlislesyntec.com

A CLEAR VIEW TO A SUSTAINABLE FUTURE

WRITTEN BY | ERICA CEDER, AIA, LEED AP



THE ICONIC PORTLAND BUILDING CHANGES ITS DARK AND GRIM REPUTATION WITHOUT MAJOR EXTERIOR ALTERATIONS

PHOTOS: JAMES EWING/JSBA unless otherwise noted

The Portland Building stands out among the buildings of downtown Portland, Ore., as a Postmodern collage of historical references and symbols. This colorful and spirited addition to the city designed by Michael Graves and built in 1982 became administrative offices for the City of Portland. Despite international recognition for its groundbreaking design, it faced problems with its structure, exterior and operational systems that repairs alone could not fix.

By 2016, the 400,000-square-foot Portland Building had reached a point where it needed to address performance issues and adapt to better suit how the City of Portland wanted to support its employees and engage with the public. Long-standing water-intrusion issues paired with poor thermal performance and a lack of access to daylight and views had created constant maintenance dilemmas and an unpleasant interior environment. The resulting Portland Building Reconstruction Project consisted of a complete renovation/restoration of the original building, including new exterior cladding, seismic upgrade, MEP systems replacement and a new interior workplace.

The Portland Building Reconstruction Project sought to carefully balance respect for the historic design with sound technical solutions to help the building evolve and create a healthy, productive workplace for city employees and an open, welcoming space for community members.

EVOLVING AN ICON FOR A SUSTAINABLE FUTURE

The complete transformation of the Portland Building protects the significant design, reimagines the interior environment and addresses the building's pervasive performance problems, thereby preserving an important public asset and architectural icon for the next 50 to 100 years. In addition to the substantial embodied carbon saved by reusing the existing building, new high-performance building systems and an improved envelope drastically reduced energy use. Commitment to WELL certification and a focus on a healthy interior environment underscores the importance of employee wellness in this LEED Platinum building.

Prior to reconstruction, the Portland Building felt disconnected from the public by opaque walls and an unwelcoming interior. The reconstruction reveals views from the front door directly through the building to the historic park, as well as a prominently placed customer-service zone that provides visitors quick and easy access to city services. Full-height glass walls at the sidewalk level provide visual connection to the surrounding cityscape and serve as a symbol of the city's commitment to transparent government.

Although fixing leaks had been the original impetus for the reconstruction with seismic upgrading second, no holistic approach could be complete without changing the glass. The city surveyed the staff and the No. 1 complaint about the old building was the lack of natural light. Thankfully, glass technology has evolved since the early 1980s. It is no longer necessary to darken the glass like a pair of sunglasses. Today, contemporary curtainwall glass panels can reduce glare and heat penetration while still appearing clear.

The original Portland Building façade also included spandrel glass, where the back side of the panel is covered, so no light penetrates the interior. The final solution took the small repetitive openings and turned the spandrel glass transparent. This provided the interior design team with additional light in the space. One of the biggest challenges and opportunities for this project was to take a building that has had a long reputation of being dark and grim and turn it into a bright workplace without making major changes to the exterior of the building.

ROOM WITH A VIEW

Glass became just as important on the ground floor as part of a reconfigured urban design plan and entry sequence. The original retail spaces lining the covered ground-floor loggia had seen better days. By the time construction approached, little more than one small convenience store remained. Integrating retail into

RETROFIT TEAM

OWNER // City of Portland, www.portland.gov
ARCHITECT // DLR Group, www.dlrgroup.com
GENERAL CONTRACTOR // Howard S. Wright, a Balfour Beatty company, balfourbeattyus.com
OWNER'S REPRESENTATIVE // DayCPM/OTAK, www.otak.com
STRUCTURAL ENGINEER // KPFF, www.kpff.com
MEP ENGINEER // PAE, www.pae-engineers.com

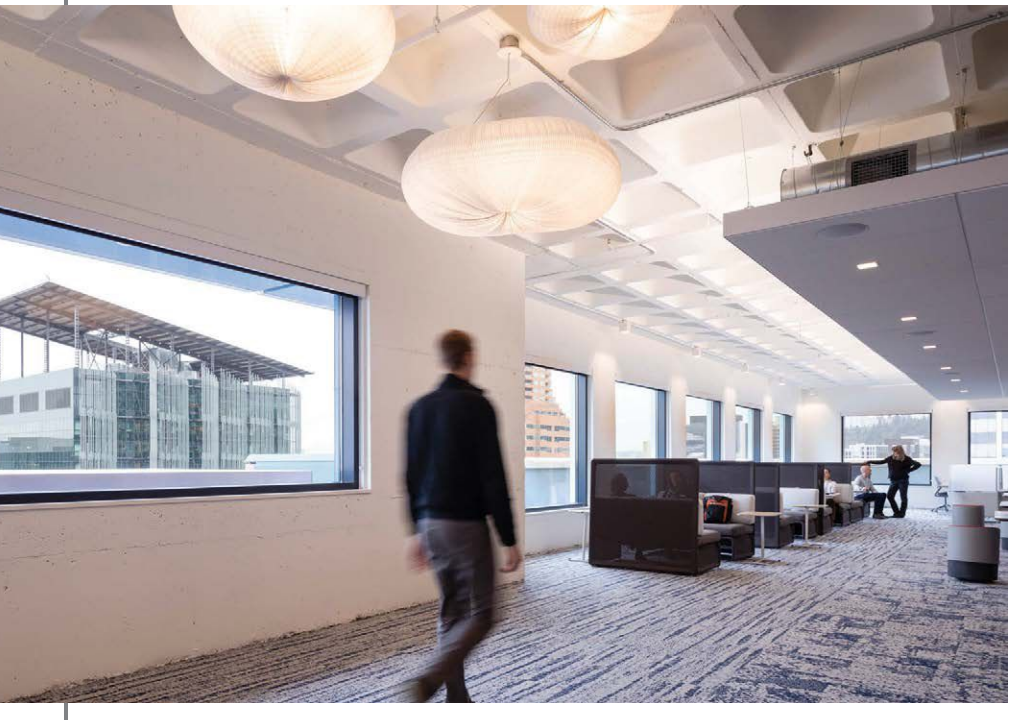
MATERIALS

CUSTOM UNITIZED CURTAINWALL // Benson Industries (MiTek), www.bensonglobal.com
TERRA-COTTA TILE // NBK Architectural Terracotta, nbkterracotta.com
GLAZING // Viracon, www.viracon.com
AIR-COOLED HEAT PUMPS/ HEAT-RECOVERY CHILLERS // Aermec, www.aermec.us
CEILINGS // Decoustics, decoustics.com
CARPET // Interface, www.interface.com
PAINT // Sherwin-Williams, www.sherwin-williams.com

FULL-HEIGHT GLASS WALLS AT THE SIDEWALK LEVEL PROVIDE VISUAL CONNECTION TO THE SURROUNDING CITYSCAPE AND SERVE AS A SYMBOL OF THE CITY'S COMMITMENT TO TRANSPARENT GOVERNMENT.

the ground level as a way to draw people in is no longer a viable option in urban planning for civic buildings.

Designers used to believe that having retail at the ground level would activate a building. Instead, it closed the civic function off from its surroundings. In the new design, the team asked, "How can we get a more transparent, open base that does not feel like the city is hiding something from the public, but instead



communicates an open and transparent philosophy of government?" In DLR Group's new design, former retail spaces were replaced with transparent public space. Today light pours in from all sides, with more than double the square footage. On the right side of the lobby, visitors can quickly find customer-service counters for easy access to public service. To the left is a new event space.

One of the Portland Building's less-beloved original features was a small underground parking garage, accessed via a garage door on Fourth Avenue. The garage opening, though it sloped down to the building's basement, had to be large enough that it necessitated removing another aspect of Graves' design: a large window providing views across the lobby, out past Fourth Avenue and to the park blocks beyond. During the redesign process, when the City of Portland committed to eliminating vehicle parking in the basement, it opened an opportunity to restore that original element, which should be a celebrated moment in the façade.

Indeed, because of the garage, the Portland Building was like a house without a view of its own backyard. When that happens, it's not just the view that's lost but the broader sense of connection—and, in this case, it showed. One of the biggest issues people had with the Portland Building was that walking into the lobby just seemed oppressive. It was a small space that was opaque on all sides. Now, however, a new wall of glass means that when entering the Portland Building, one looks through the ground floor to the park beyond. It's the kind of axial connection that classical architecture is based on, and it was surprisingly fundamental to Graves' ground floor.

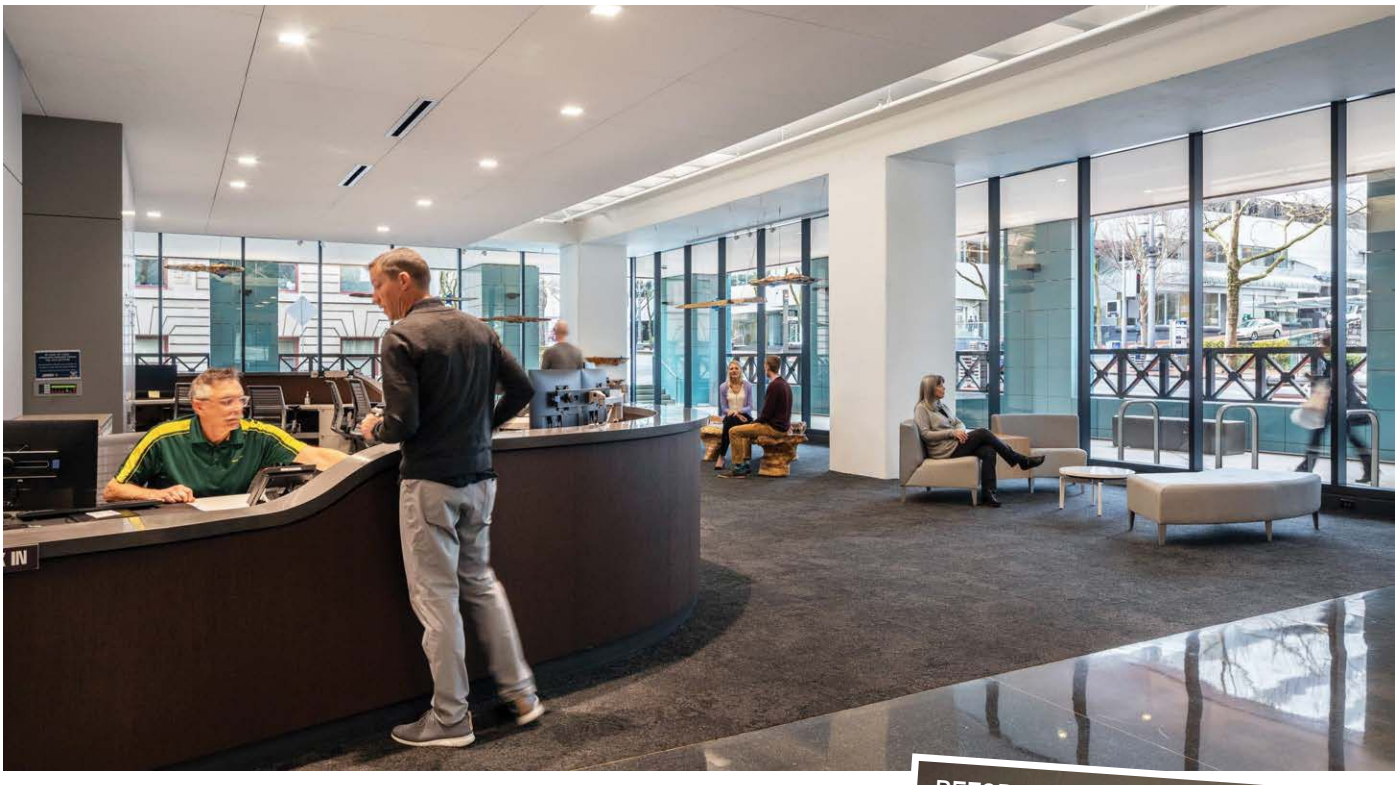
In the renovated Portland Building, there is vastly more natural light penetrating the new interior. Removing the original drop ceilings raised the overall height of each floor space and, even more importantly, when given a fresh coat of white paint, helps bounce incoming sunlight around the room.

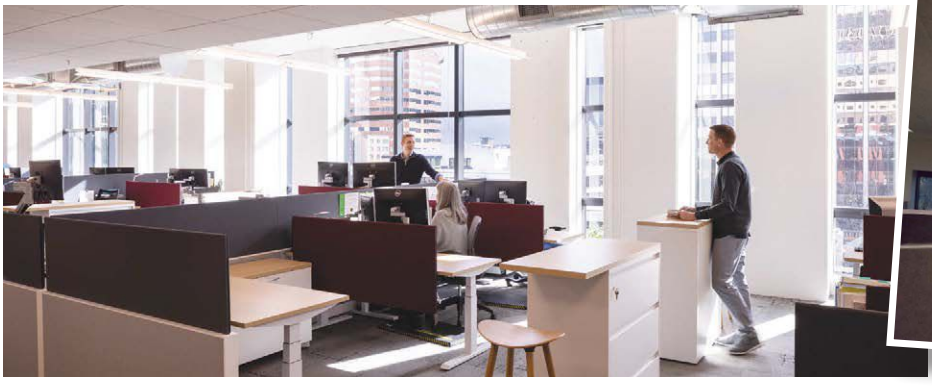
A SUSTAINABLE DIFFERENCE

To become the kind of people-friendly space that encourages collaboration, enables productivity and fosters employee retention, the Portland Building could not just add natural light, an expanded lobby and open offices. The design needed to meet the highest standards for sustainable design. It needed to be more energy- and resource-efficient than ever before and, more importantly, promote human health. That is why the design-construction team and the City of Portland pursued certification from WELL and LEED.

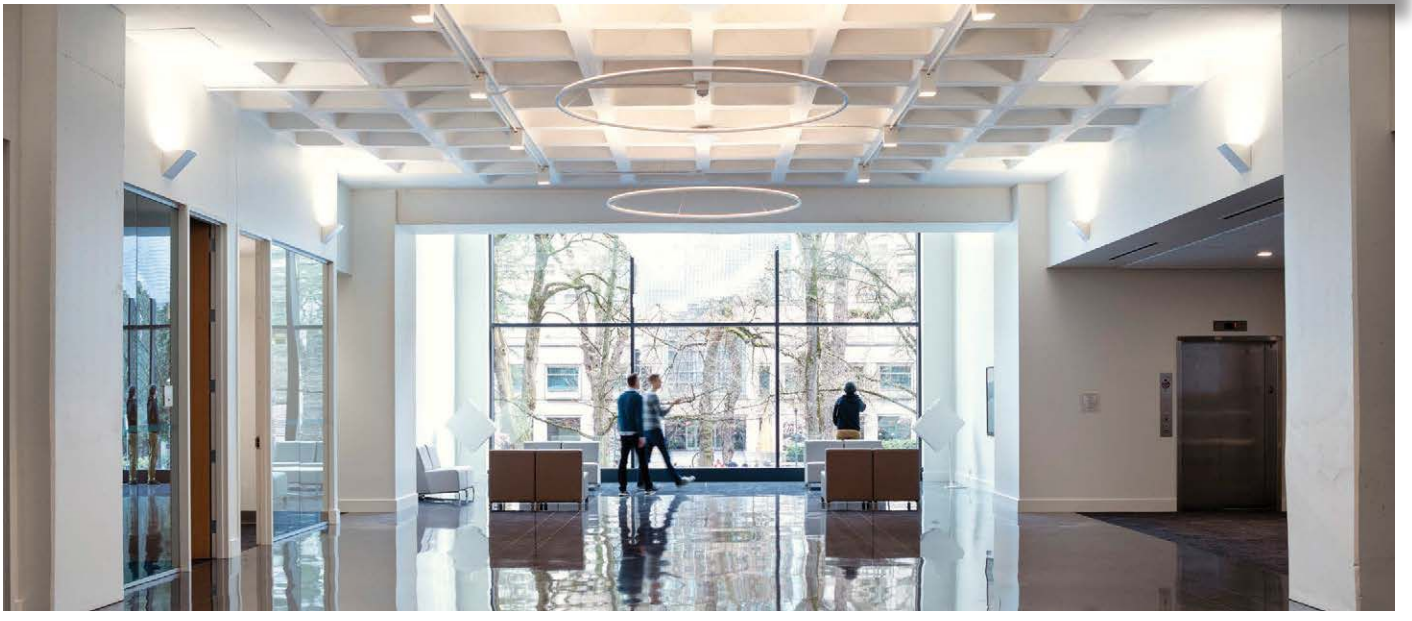
The WELL Building Standard is a performance-based system for measuring, certifying, and monitoring building-performance features, such as air, water and light, that impact human health and wellbeing. Administered by the International WELL Building Institute (IWBI), a public benefit corporation, WELL is composed of more than 100 different design features applied to each certified building. The certification makes the Portland Building one of the largest WELL-certified public building renovation projects in history. The team worked closely with IWBI because it wanted to establish the building as a new basis for this kind of building focused on the human experience.

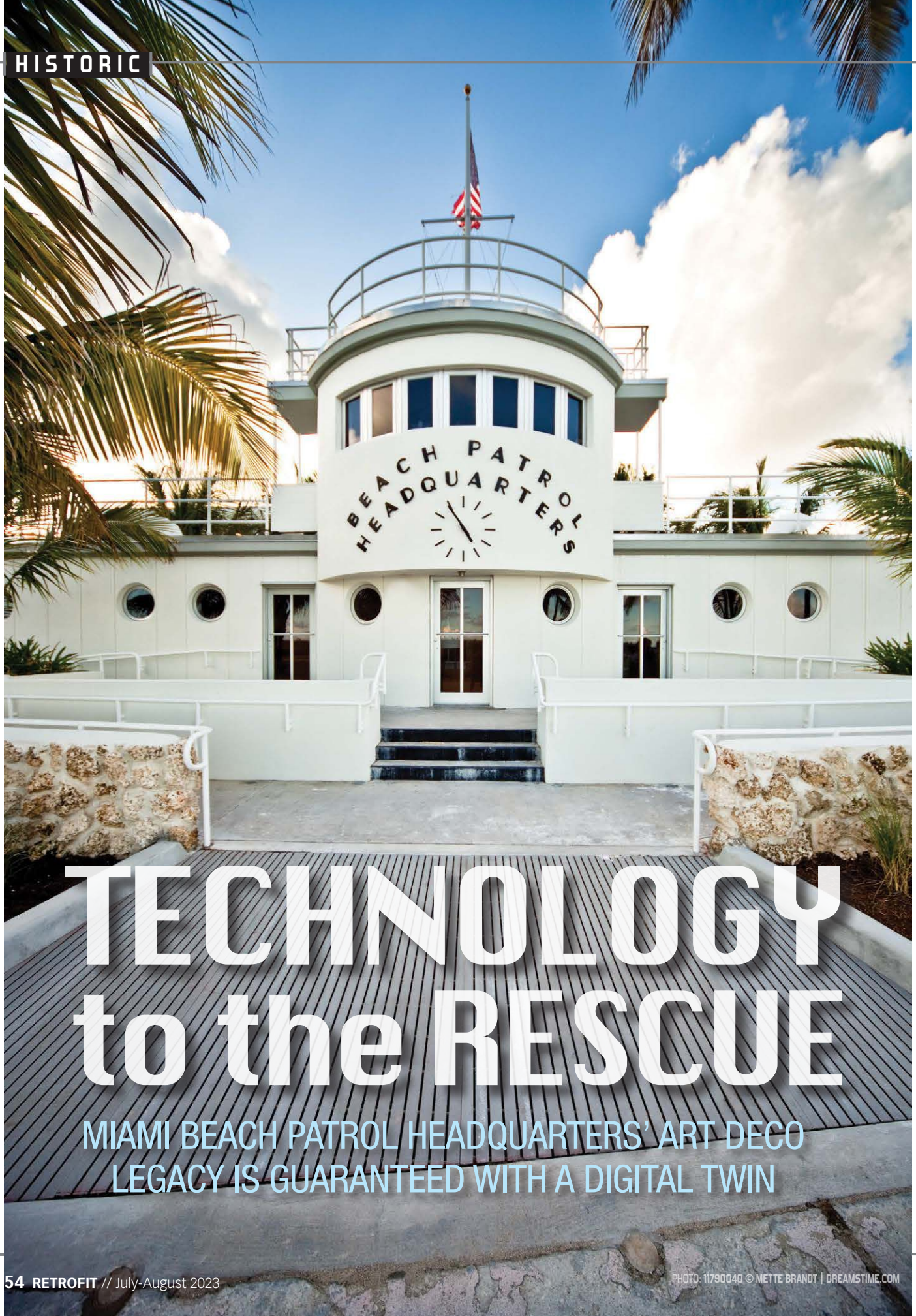
The reconstruction also achieved a Platinum rating from the U.S. Green Building Council's LEED program, which exceeded the City of Portland's required minimum standard of meeting LEED Gold. The renovated Portland Building reached 36 percent more efficiency over State of Oregon energy-code standards and uses 50 percent less energy compared to the pre-renovated structure.






BEFORE
BEFORE PHOTO, COURTESY DLR GROUP





TECHNOLOGY to the RESCUE

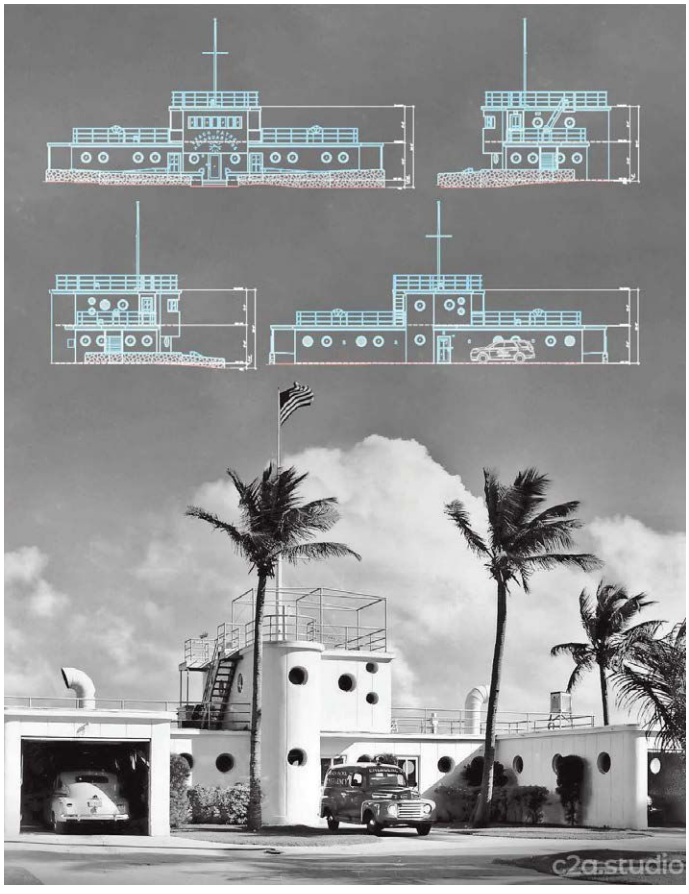
MIAMI BEACH PATROL HEADQUARTERS' ART DECO LEGACY IS GUARANTEED WITH A DIGITAL TWIN

WRITTEN BY | COREY WEINER

Ubrant pops of pastel colors, sleek architectural design, nautical themes, bold geometric shapes, and decorative motifs uniquely and distinctly define Miami Beach, Florida's Art Deco District. The Art Deco style emerged after the Great Depression and gathered prominence in Miami Beach after the Great Miami Hurricane of 1926 left 25,000 people without homes and businesses. These Art Deco buildings feature simple, clean shapes and were built from the 1920s through the early 1940s. They often are described as evoking resilience and optimism.

With more than 800 historic buildings located within Miami Beach's Art Deco District, today it is home to the highest concentration of Art Deco buildings in the world. Historic preservation of the Art Deco District began in the 1970s when the area faced the threat of demolition because of a lack of building maintenance. In 1976, the Miami Design Preservation League (MDPL) was formed; in 1979, the area was listed on the National Register of Historic Places.

Yet not every building has been saved and, recently, the issue of renovating buildings in the district has re-emerged. Essentially, the cost of historic preservation and repair continues to climb, prompting wealthy real-estate developers to consider renovating the buildings and building condo towers alongside them, forever changing the skyline. These discussions create a sense of urgency around documenting the buildings for historic preservation and future learning, especially as another critical factor impacts the district—extreme weather.



DIGITAL RECORDS are an excellent source for preservation and renovation. In the case of the Miami Beach Patrol Headquarters, which faces the impact of extreme weather, a digital record could assist in re-creating the building should it be damaged during a storm.

REALITY CAPTURE CREATES DIGITAL TWINS

Properly documenting any structure for posterity has its challenges, especially to create a digital twin, or a digital 3D model of a building. Along with ensuring people aren't included in the scan, inaccurate measurements can impact the ability to create a true digital replica of the physical world. Also, not every reality capture product delivers the same point-cloud quality, which is critical to properly interpret a scan. Alternatively, drawings and plans created with manual measurements and other traditional survey methods can be prone to error and may not fully capture the architectural splendor of an Art Deco building or any historic structure.

Instead, a highly accurate, vivid and lifelike 3D representation of the building provides a beautiful and precise digital model that, most importantly, contains critical building information about the infrastructure, materials used to build it and layout, for example. Having complete scans of a building, down to millimeter-level accuracy, including what's behind the walls and what's underground, above and alongside the building, provides much needed information when it comes to repairs, retrofits and renovations. This information allows architects and builders to virtually experiment with designs.

The key technology to creating digital twins for historic preservation is 3D reality capture. As a reality-capture scanning consultant, helping preserve the Art Deco District has been my goal. Taking the advice of Daniel Ciraldo, MDPL's executive director, I chose to help preservation efforts in the Art Deco District by scanning the Miami Beach Patrol Headquarters.

The Miami Beach Patrol Headquarters, which was built in 1939 on the beach, is one of the most iconic landmarks in the district. Tucked away from the bustle of the street and facing a broad expanse of white sand and shaggy dune grass, the stout 1 1/2 story structure of elegant curves and pert portholes is a pearl of the city's Art Deco District and the current headquarters of its Ocean Rescue team.

During the past year, the city of Miami Beach constructed a 7-mile-long beach walk from the northern limits to the southern tip of South Beach, making the Miami Beach Patrol Headquarters even more prominent. Given its location, the building is in the direct path of hurricanes and storms. This is why it's critical to have real, comprehensive and detailed surveys of the headquarters.

"The building is connected to memories. People remember

A COMPLETE LASER SCAN AND RESULTING DIGITAL TWIN OF THE HEADQUARTERS GIVES PRESERVATIONISTS A COMPREHENSIVE UNDERSTANDING OF THE BUILDING FOR A VARIETY OF PURPOSES, FROM MAINTENANCE AND REPAIR WORK TO CREATING DIGITAL TOURS AND MODELS OF A BUILDING FOR THE PUBLIC TO VIEW ONLINE.

going to the beach and seeing the building and watching it change," Ciraldo says. "With reality-capture scanning, it is important to have a sense of time and continuity, to understand how these buildings evolve, how their site evolves, how the neighborhoods evolve."

The beach patrol building includes public restrooms and showers for beachgoers, which posed particular challenges when it came to scanning the site and keeping people out of each setup. Along with beachgoers coming and going, utility trucks were entering by the side of the building. All this activity required fast setups for the scans and accuracy to get it right on the first take.

There are two options for laser scanning: static (tripod-based) scanners or handheld, mobile scanners. For the Miami Beach Patrol Headquarters, I used a handheld reality-capture scanner that made it easy to scan the entire building quickly and accurately in under an hour. I was able to walk and scan when certain areas were clear and pause accordingly. The scans included all façades and the building's multiple roof levels for a total of 23 scans and 3D color photos of the building's exterior. Without the steady flow of people and the need to move and reset the tripod for scans, the process would have probably taken 15 minutes.

BRIDGING THE PAST AND FUTURE

Beyond capturing a single historic structure, the resulting digital twins of buildings have profound implications for the future of historic preservation beyond traditional surveying methods. These methods are core to MDPL's mission of preserving, protecting and promoting the architectural, cultural, social, and environmental integrity of Miami Beach and the surrounding areas.

"Our roots are in protecting the buildings and much of the preservation relies on the use of surveying technology," Ciraldo remarks. "It's really cool to see how surveying has developed over time. In our archives, we have the original survey from 1979 where essentially, people are going one by one and describing the building in writing, on a piece of paper, and then taking individual photographs."

Ciraldo said he was impressed by what new reality-capture technology means

A DIGITAL SCAN of the Miami Beach Patrol Headquarters creates an accurate digital twin.

IMAGE: COREY WEINER

for the Miami Beach Patrol Headquarters, as well as other sites in the area. A complete laser scan and the resulting digital twin gives preservationists a comprehensive understanding of the headquarters for a variety of purposes, from maintenance and repair work to creating digital tours and models of a building for the public to view online.

"We can capture the building as it currently is, which has many uses in the future, whether for future renovation and restoration projects," Ciraldo adds. "We think it's more important than ever to have real, comprehensive and detailed surveys of these buildings, to have that record of how they look now, which can help guide our work going forward. It's really the next era of historic preservation."

THE BLK360 FROM LEICA GEOSYSTEMS created the laser scan for the Miami Beach Patrol Headquarters.

GOAL TO GO

WHAT PROGRESS IS THE DESIGN AND CONSTRUCTION INDUSTRY MAKING TOWARD CLIMATE CHANGE MITIGATION GOALS?

WRITTEN BY | **JIM SCHNEIDER**

IMAGES: PRACTICE FOR ARCHITECTURE AND URBANISM, COURTESY BURO HAPPOLD

The idea of designing and constructing environmentally friendly buildings is not new. The so-called "green building" movement goes back as far as the 1960s and '70s, when oil embargoes, rising energy prices and concerns about pollution came into public consciousness.

Rethinking buildings to combat climate change truly became part of the conversation in 1993 with the founding of the U.S. Green Building Council, or USGBC. The following year, the LEED certification program came into being and would transform the way we approach materials and construction.

LEED was the beginning of a series of goals and targets meant to drive the industry toward creating buildings that are less impactful, more efficient, healthy for occupants and resilient enough to face the challenges of a changing climate. The effort has become central to the philosophy of architects and other building professionals.

But the threats posed by climate change have not gone away. In fact, according to most scientists and recent reports from the International Panel on Climate Change, the need for action is greater than ever. And buildings are a significant part of the problem. The built environment generates about 40 percent of global CO_2 emissions each year. Within that number, building operations are responsible for 28 percent annually and the embodied carbon from materials and construction are responsible for 13 percent annually.

However, buildings also can be a big part of the solution. The natural questions that arise for building professionals of all kinds: After 30 years, how are we doing? Where is the industry on its journey to battle climate change?

"The answer to this question is very different in different parts of the world," says Matthias Hollwich, founder of HWKN Architecture. "In Europe, sustainability is becoming mandatory, and clients are competitive in making buildings more sustainable. In the U.S., it still feels more like it's 'nice to have', and in the Middle East it's just starting to become a thing. We are seeing progress. In London, we're working on a reduced-carbon building, using a fascinating combination of material and geometry that generates efficiencies. What's concerning is we are just not fast enough, and existing buildings are a big problem."

"We need to give credit where credit is due to the green-building industry. LEED has been a foundational tool to initiate the conversation, and it's really pushed things forward in terms of energy efficiency," says Rachel Deradoorian-Beaudoin, sustainability engineer with Buro Happold. "What I love to see are more specific targets and frameworks coming to fruition; for example, MEP 2040 or Structural Engineers 2050. Having discipline-specific

MICHIGAN CENTRAL STATION, CORKTOWN, MICH., IS BEING RETROFITTED TO BE PART OF THE FORD PORTFOLIO OF OFFICES WITH ASSISTANCE FROM BURO HAPPOLD.

IMAGES: ////

goals related to embodied carbon and other issues encourages those who are technically specialized to recognize their role, set more accurate targets and have an increased level of accountability."

"People in the design and construction industry know how to reach sustainability and climate mitigation goals," says Lotte Schlegel, executive director at the Institute for Market Transformation, a Washington, D.C.-based nonprofit that seeks to advance public policy to improve U.S. buildings. "Corporate goals themselves have become more common among real-estate companies, real-estate investors and major tenants, and public policy is driving higher levels of performance, as well. All these demand drivers add up to a business case for high-performance buildings through the value chain. Now it's a matter of bringing it all together."

The Good

Progress is being made in many different areas. Industrywide, there is a greater emphasis on performance, carbon impact and materials transparency through environmental product declarations, for example. There are more tools in the toolbox than ever before to support a culture that is paying much more attention to the efficient use and reuse of materials and buildings themselves.

Additional initiatives, such as Architecture 2030, Living Building Challenge and PassiveHouse, have gained momentum and given industry professionals a path to drive progress forward. Will is not lacking in the design and construction community, and there is growing acceptance of the role the industry plays and the responsibility it carries.

"One of the critically important things is that we're finally seeing real discussion about embodied carbon, materiality and supply chains," Deradoorian-Beaudoin says. "We recognize the severity of the impact the AEC industry can have and already has had on the global climate crisis. We're now viewing ourselves as climate stewards via the built environment."

THE MORE-THAN-100-YEAR-OLD TRAIN STATION NOW WILL BE USED TO CREATE FUTURE MODES OF TRANSPORTATION.

"We are seeing improvements in existing buildings via changes and renovations, not just in new construction anymore," Schlegel says. "These range from tremendously ambitious renovation projects that dramatically reduce energy-use intensity, maximize onsite strategies for water and energy, and increase the reuse of materials to simple changes in commissioning existing building systems. There is always room for improvement, but we have a good start. For example, as of 2022, more than 300,000 buildings in the U.S. were benchmarking their energy and water performance using ENERGY STAR Portfolio Manager."

The Bad

There are things to celebrate; thinking about where the industry is today compared with 30 years ago would indicate an incredible amount of progress. The trouble is that it doesn't line up with the magnitude of the problem and where things need to be.

"We are just not fast enough," Hollwich admits. "Existing buildings are a big part of the problem. We need a new attitude toward sustainability that uses minimal technology; optimizes materials; and prioritizes things, like longevity. We should make sure new buildings last 'forever,' and design buildings that convert

HWKN ARCHITECTURE IS WORKING ON A REDUCED-CARBON BUILDING IN LONDON. THE PROJECT USES A FASCINATING COMBINATION OF MATERIAL AND GEOMETRY THAT GENERATES EFFICIENCIES.

PHOTO: COURTESY HWKN ARCHITECTURE

between different building programs over time."

"We've ignored the concept of adaptive reuse for a long time and we, as designers, have ignored supply chains and materiality," Deradoorian-Beaudoin adds. "As an industry, we need to return to some broader concepts of resourcefulness and circularity. Building and construction is one of the oldest industries in the world, and when we look back to how things were constructed centuries ago, there are so many similarities about utilization of local materials and utilizing energy-efficiency practices that we try to replicate in green-building frameworks today. Moving forward, we need to look at the entire life cycle of a building instead of just focusing on its operational timeframe. All these principles should be weighed when considering either a new-construction or an adaptive-reuse project."

"While designers and builders have figured out how to build, operate and renovate buildings to very high levels of performance, in many cases at no higher cost and yielding good financial performance, our financial and regulatory systems haven't caught up yet," Schlegel says. "To move money at scale to high-performance building construction and renovation, we need to focus on shifting these systems. For example, we can provide favorable mortgage-lending terms for people when they do a major renovation since climate-focused renovations can save money and prevent losses in extreme weather. Better buildings accrue benefits not only to the building owners and occupants, but also to the wider community by being resilient and reducing the energy drain on the grid."

The Path Ahead

As the climate continues to change and sustainable design techniques improve, the industry also faces the usual challenges of use, budgets, schedules and materials. Things are always changing. Tackling all of this in a way that gets us to the climate-mitigation goals everyone agrees are necessary requires an entire new way of thinking about buildings, their impacts, value and stories.

"Trends have really changed in the post-COVID environment. We can look at beautiful new buildings that were constructed in 2019 and now are vacant," Deradoorian-Beaudoin says. "We need to start having conversations about highest and best use as opposed to simple ROI. Whether vacant land or an existing building, we need to look at assets holistically. One of my favorite projects I've worked on is the adaptive reuse of Michigan Central Station in Corktown, Mich. It was retrofitted to be part of the Ford portfolio of offices. When you think about the heritage of this more-than-100-year-old train station that will now be used for imagining future mobility, it tells a beautiful story that would not have been told if someone hadn't taken the risk to go with an adaptive reuse instead of new construction."

"We have seen success in nearly every area of the built environment," Schlegel says. "There is tremendous innovation happening everywhere in the supply chain, in every discipline. The challenge is scaling these approaches and making sure the benefits are accessible to everyone, rather than just an elite few who can afford to focus on sustainability. In 10 years, I hope the industry looks quite a bit different than it does today, and that we have alignment in our daily design, construction, operations and renovation practices, as well as in our financial and regulatory systems. Over the past decade we've been able to hold our energy consumption flat, and in some cities, like Washington, D.C., reduce our energy consumption even with economic and population growth. If all businesses and governments set targets and work to meet them, I believe we will see global change."

"I have rather ambitious goals," Hollwich admits. "Let's reward companies that go past the set targets and goals. The AI revolution should be utilized immediately to aim higher. Let's try to create even higher targets with the joined intelligence between humans and AI. We have to turn sustainability into a fun experience. And something people demand."

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AGED WOOD IS CREATED VIA A NON-TOXIC PROCESS

Coeur d'Alene (CDA) Wood is an Idaho-based brand that offers sustainable wood products to the American market. After recognizing the challenges around sourcing quality reclaimed wood, co-founder Chris Bartimioli developed a patented, non-toxic finishing process to create aged wood that is durable, affordable and chemical-free. CDA Wood exposes raw lumber to the natural elements of sun, soil, water and wind, rather than VOCs, lead paint, stains or treatments. The product is recognized by LEED and the National Green Building Standard. To reduce its overall environmental impact and waste, CDA Wood practices sustainable forestry, planting four trees for every tree used, and all wood scraps are sold to major retailers for repurposing.

cdawood.com

SARGENT PE80

DEVICES LAST UP TO 30 YEARS

ASSA ABLOY has launched two next-generation exit devices: the PE80 Series by SARGENT and the PED4000/PED5000 Series by Corbin Russwin. Engineered for an extended lifespan to withstand heavy usage and to reduce the need for frequent product replacements, the SARGENT and Corbin Russwin exit devices are designed with the next 20 to 30 years in mind. They are built to resist abusive conditions and have sloped, flush surfaces to eliminate catch points and minimize damage related to impacts from carts. Plus, the reinforced mounting brackets ensure the end caps never fall off from excessive contact. Users will find improved delayed egress functionality and enhanced motorized electric latch retraction, including electric latch retraction on FEMA-certified devices. In addition, they feature a 5-pound pressure latch release option on all rim and concealed vertical rod models to comply with California building codes.

www.assaabloy.com

LVT COLORWAYS HAVE UNIQUE STORIES

The popular Van Gogh collection from Karndean Designflooring just added nine new colorways, culminating in 26 distinctive styles, which are available in gluedown and rigid core for installation. Like the rest of the Van Gogh collection, each new look is inspired by wood from around the world, lovingly crafted to capture the unique colors, tones, textures and grain details that make it unique with none of the maintenance required for hardwood flooring and the durability and performance of luxury vinyl. From painted-oak floorboards found in a Holland farmhouse to cedar planks salvaged from a private school in San Diego, every Van Gogh colorway has a unique story. The Van Gogh collection features a 20-mil wear layer on 48- by 7-inch planks.

www.karndean.com/about vangogh

CUSTOM ATTACHMENT SYSTEM IS SUITED FOR RAINSCREEN APPLICATIONS

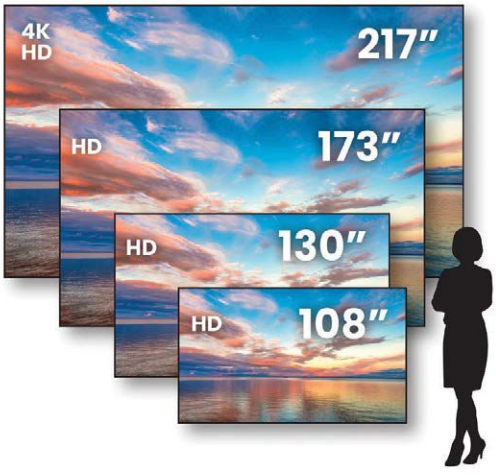
Grad Concept USA and Tantimber USA jointly have introduced a custom attachment system for Tantimber's range of ThermoWood decking and cladding products. The new system, custom-built upon Grad's proprietary rail fasteners, enables Tantimber customers to save on time and overall installation costs. Sourced from FSC- and PFEC-certified forests, Tantimber decking and cladding products are produced using the Thermowood manufacturing process, transforming the timber into stable and durable finished wood products standing up to extreme environments. Tantimber products meet International Thermowood Association standards and are distributed through a premier list of wood distributors throughout the U.S. The Grad system, introduced to the U.S. market in 2020, includes an award-winning attachment solution for cladding, suited for rainscreen applications. Grad's attachment components are virtually maintenance-free, offering maximum resistance to rot and promoting greater ventilation to help prevent cupping.

us.gradconcept.com

SEALANT OFFERS PRIMER-FREE BONDING TO MOST SUBSTRATES

Sto Corp. has launched StoSeal STPE Sealant, a premium, low-odor, isocyanate-free, one-part hybrid sealant with a VOC content of 8 grams per Liter. StoSeal STPE Sealant is durable, flexible, resistant to moisture and weathering, and tested to perform per ASTM C920 class. It meets Federal Specification TT-S-00230C Type II and AAMA 808.3 (Type 1) Exterior Perimeter Sealing requirements and has been tested in accordance with ASTM C1382 for use with EIFS systems. StoSeal STPE Sealant is packaged in 20-ounce sausages that minimize construction waste and provide efficient installation. It is available in eight standard colors with more than 300 custom colors available upon request. StoSeal STPE Sealant can be top-coated with elastomeric coatings to suit most color requirements.

www.stocorp.com/stoseal-stpe-sealant



STREAMLINE PURCHASE AND INSTALLATION OF LED DISPLAYS

Neoti, a manufacturer of LED video displays, has released the Neoti Complete Series, an all-in-one bundle featuring easy-to-assemble LED displays, built-in controller, and ADA-compliant mounting and trim systems. This new, competitively priced solution streamlines the purchase and installation process, making it a solution for AV integrators and end-users who value quality and ease of installation. Neoti's Complete Series doesn't have complicated mounting components and comes with a user-friendly guide that takes the guesswork out of self-installation. Its enhanced image technology allows for improved grayscale and color performance, making it a suitable choice for low brightness environments. Neoti Complete Series bundles are available in five panel dimension sizes, ranging from 108 to 217 inches, and include HD and 4K options. Neoti's standard three-year product and workmanship warranty applies.

www.neoti.com

EASILY TEST A SPRINKLER SYSTEM

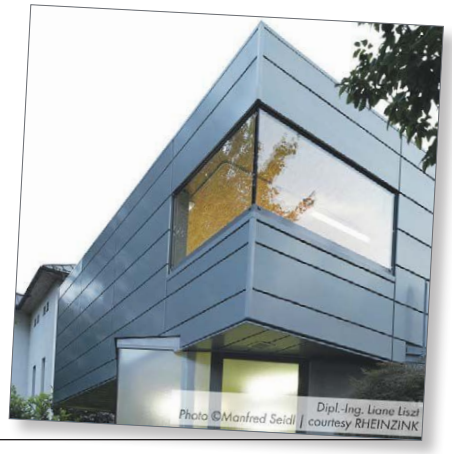
AGF Manufacturing has updated its 3011A Inspectors-Test Valve. The design features an integrated sight glass and relief valve drain access port to combine features from the 3011A and 3011ASG valves, plus the new 7000L Pressure Relief Valve. By integrating the sight glass and drain port into a single fitting, AGF Manufacturing has eliminated extra pipe fittings and the need for a separate sight glass, providing a more streamlined and efficient solution for testing and maintenance of fire-protection systems. By including the 7000L Pressure Relief Valve, the fitting now offers a lockout feature for hydrostatic testing and is available in 175, 200, 225 and 300 psi. This combination provides customers with a comprehensive and integrated solution for fire-protection systems, ensuring optimal maintenance and testing.

www.agfmfg.com/inspectorstest

ZINC SINGLE-SKIN CASSETTE PANELS ARE ENGINEERED FOR FAÇADES

RHEINZINK and its partners offer a choice of architectural zinc materials fabricated into single-skin large-format cassette panels and engineered for installation on façade and wall cladding systems. Projects benefit from the natural metal's sustainably processed, infinitely recyclable material and a lifespan of up to 100 years or more. The zinc surface responds to its environment with a dynamic patina that evolves through the decades. At the end of its use on a building, the zinc material is 100 percent recyclable, maximizing cradle-to-cradle benefits. RHEINZINK's product range for cassette wall panels includes RHEINZINK-GRANUM basalte and skygrey, RHEINZINK-PRISMO color-pigmented options, and RHEINZINK-prePATINA ECO ZINC blue-grey and graphite-grey architectural zinc materials. Cassette wall panels are manufactured with 20-gauge 1.0-millimeter or heavier gauge, sustainable zinc alloy. Larger format panels utilize 16-gauge 1.5-mm RHEINZINK architectural zinc material. The cassette wall panels are manufactured to fit the structure, which saves labor in the field and eases the installation process.

www.rheinzink.us/products/cassette-system

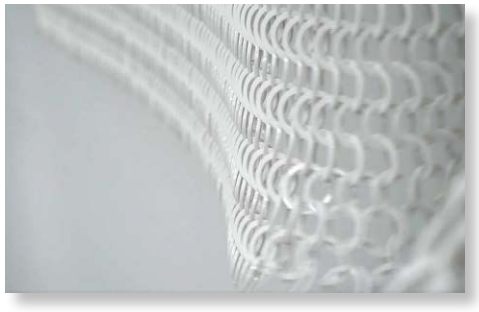


MANAGE SECURITY CAMERA SYSTEM IN THE CLOUD

Hanwha Vision has released SolidEDGE, a serverless camera system with onboard Solid State Drive storage and an embedded WAVE VMS server. This cloud-managed solution addresses the need for efficient, scalable, and cost-effective surveillance solutions for security operations requiring multi-camera recording, remote access and on-premises security system management. The SolidEDGE camera is available in two models—the PNV-A6081R-E1T (1TB onboard storage capacity) and PNV-A6081R-E2T (2TB)—which deliver high-quality, reliable video surveillance without a complicated setup. Each SolidEDGE camera can connect and record up to five additional cameras, bringing the total number of cameras in a system to six, including the original SolidEDGE camera's video stream. Users can also merge up to 30 SolidEDGE systems through WAVE Sync. The WAVE Sync feature also keeps systems up to date with regular software and security updates.

hanwhavisionamerica.com

ARCHITECTURAL MESH CONTAINS BIOMASS



Kaynemaile, a global designer and manufacturer of architectural mesh for commercial, residential and public buildings, has shifted from fossil-based raw materials to biomass content. Kaynemaile's new RE8 Architectural Mesh will deliver an ISCC PLUS-certified sustainable share of up to 88 percent of its architectural product. Moving Kaynemaile's production away from traditional fossil-based materials to a bio-circular-attributed polycarbonate will offer a reduction of the carbon footprint of the polymer material by up to 80 percent, cradle-to-gate, including biogenic uptake. The significant advance in sustainable performance is attributed to the Makrolon RE product from Covestro, a global producer of advanced polymers. Makrolon has been a consistent material solution for Kaynemaile for 20 years. Scientific advances by Covestro and its suppliers have enabled the release of a high-performance polycarbonate, consisting principally of biowaste and residues, that is 100 percent chemically identical to its incumbent fossil equivalent. RE8 Architectural Mesh retains the same physical, mechanical, thermal, optical, fire-retardant and weathering properties as traditional polycarbonates.

www.kaynemaile.com

MOSAICS ARE HANDCRAFTED IN VIRGINIA

New Ravenna has introduced the Counterpoint Collection, designed by Paul Schatz. The nine classic designs in the collection are handcrafted in Virginia from natural stone and Basalto Orvieto that has been honed to a soft matte finish or Venetian honed to create a pillowed surface. Each inter-locking geometric design is available in multiple colorways, and the mosaic techniques include hand-cutting and waterjet. All the mosaics can be installed on walls and floors, indoor and out. Inspired by his travels to Portugal, Spain and Morocco, as well as ancient Roman architectural materials, interior designer Schatz has conceptualized a timeless collection that contrasts symmetry and urban grid patterns with dramatic color and calm neutrals.

www.newravenna.com

INTROSPECTIVE, A HAND-CUT AND WATERJET MOSAIC SHOWN IN HONED KAY'S GREEN, LAVIGNE AND BASALTO ORVIETO.

FLASHING STOPS MOISTURE FROM PENETRATING DOOR, WINDOW OPENINGS

APV Engineered Coatings has made available BLOCKSEAL, a water-based, waterproof liquid flashing that seals window and door substrates in new and existing residential, commercial and industrial applications. It meets and exceeds AAMA 714-19, "Voluntary Specification for Liquid Applied Flashing Used to Create a Water-Resistive Seal around Exterior Wall Openings in Buildings". BLOCKSEAL Liquid Flashing is a low-VOC, fast-drying acrylic adhesive. Its high-resin content provides adhesion to the substrate, eliminating any possibility of moisture penetration. BLOCKSEAL can be applied to weathered wood, shakes, plywood, clapboard, primed metal, galvanized metal, urethane, polyester, adobe, brick, stucco, masonry, slate and slab. It also can be installed on concrete, including green concrete that has set but has not appreciably hardened.

www.apvcoatings.com

AD INDEX

JULY-AUGUST 2023

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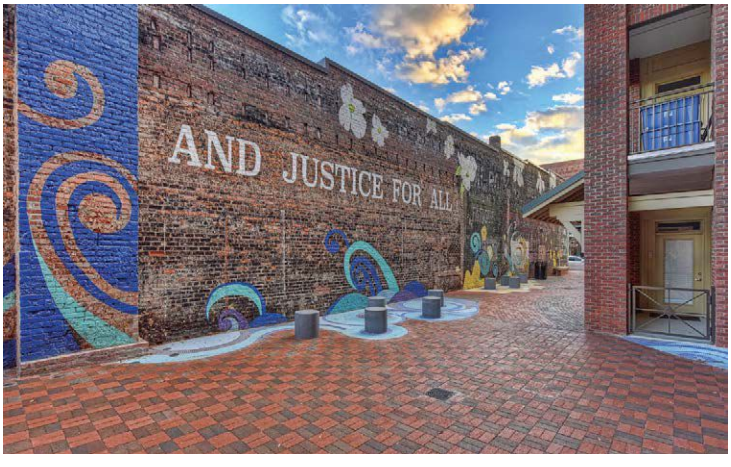
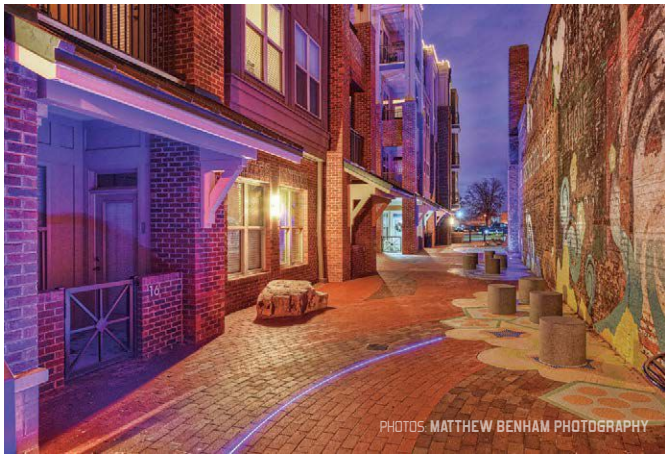
FREEDOM WALKWAY

Colorful Paver Design Tells a Story of Struggle and Triumph





PHOTOS: MATTHEW BENHAM PHOTOGRAPHY

The Freedom Walkway in downtown Rock Hill, S.C., takes its design from the Civil Rights Movement of 1960, which commemorates the sit-in, an often-used method of civil disobedience. Black college students adopted the method of going to segregated lunch counters and ordering food. When they were refused, they would not leave and would be arrested. In January 1961, the Friendship Nine—so named because eight of the nine were students at Friendship Junior College—integrated a whites-only lunch counter at the McCrory's department store in Rock Hill.

They opted to spend time in jail, rather than pay the fines of a system they believed unjust. Because the sit-ins were continuing to expand throughout the South, protesters who chose to serve time saved the money civil rights groups would otherwise have to pay for court fines. The move gained national attention.

More than 50 years later, in 2015, Judge John C. Hayes III of Rock Hill overturned the convictions of the nine, saying "We cannot rewrite history, but we can right history." A prosecutor apologized to the eight men who were still living and in court.

Laurel Holtzapple, a registered landscape architect and principal of Groundworks Studio, used the 2015 court hearing as part of the design for Freedom Walkway. The project begins at what once was a Woolworth's building, not far from the McCrory's where the Friendship Nine sit-in took place. By 2014, damage to the Woolworth's roof had left it too dilapidated to restore. A proposal to demolish the building for a mix of retail and apartments, as well as a public walkway connecting a parking lot to the business district, was approved.

An exterior brick wall covered with layers of paint from past advertisements provides a backdrop to the Freedom Walkway. A chimney from the Woolworth's building was painted dark blue, a color that has traditionally symbolized protection in the African-American community and is lighted at night as a beacon of hope.

Curving patterns of clay pavers flow through the walkway, leading visitors on a journey. The nine cylinders of gray granite represent the stools upon which the Friendship Nine sat; swirling blue spiral mosaic patterns within the field of pavers represent the turbulence of the era; the boulders within the walkway represent obstacles in the path of those seeking freedom and justice.

MATERIALS

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