

WINTER 2025

# retrofit *Home*

## *Stone Mill Lofts:*

One of the Northeast's  
Most Energy-efficient  
Apartment Developments  
Is a 179-year-old  
Building



**DESIGN** *vibes:*  
Universal Design

IMPROVING YESTERDAY FOR TODAY



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COVER PHOTO:  
Ed Wonsek

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Architect **David Phan** is president and principal of New Work Studios Inc., a multidisciplinary architecture firm rooted at the intersection of art and architecture. Phan brings the technical expertise and rigor of institutional design to residential and commercial clients and their projects. As such, he writes about the transformation of a Sacramento, Calif., garage into an accessory dwelling unit, using universal design techniques that allow his client to care for her mother on her property. Read "DesignVibes", page 8.



**Susan Jenks** is a freelance writer based in Chicago. Her 20-year career encompasses real estate, home furnishings, manufacturing and more. In "Townhouse", page 20, Jenks shares the story of a claustrophobic 1980s townhome in Austin, Texas, that was opened to reveal a spacious modern home, overlooking Lake Austin and the distinctive Pennybacker Bridge.



**Ken Shallcross** is vice president of the Modern Architecture + Design Society, for which he has shined the spotlight on some of the best residential projects across North America through writing and the signature Modern Home Tour event series. Among his spotlight projects is Sugarloaf, which had been haphazardly modified several times creating multiple structural deficiencies. Read about the challenging remodel of this Mid-century home, which frames inspiring views of the San Francisco Bay, in "Mid-century House", page 26.



**Scott Maenpaa** is a project manager with The Architectural Team Inc., an award-winning firm based in Chelsea, Mass. With more than two decades of experience in preservation and adaptive-reuse initiatives, Maenpaa tells the story in "Multifamily", page 32, of Stone Mill Lofts, a deep-energy retrofit that has transformed the oldest mill building in Lawrence, Mass., into a mixed-income residential complex with 86 apartments.

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## PUBLISHER

**JOHN RIESTER**

john@retrofitmagazine.com

## ASSOCIATE PUBLISHER/EDITORIAL DIRECTOR

**CHRISTINA KOCH**

christina@retrofitmagazine.com

## DIRECTOR OF OPERATIONS

**BECKY RIESTER**

becky@retrofitmagazine.com

## CONTRIBUTING EDITOR

**JIM SCHNEIDER**

## ART DIRECTOR/DIGITAL DESIGN DIRECTOR

**ERIKA NYGAARD**

## CIRCULATION MANAGER

**LYN URE**

lyn@retrofitmagazine.com

## WEB ENGINEER

**DEREK LEEDS**

## SOCIAL MEDIA MAVEN

**ROBIN GRABER**

## ADVERTISING SALES

**JOHN RIESTER**

john@retrofitmagazine.com  
(919) 641-6321

**BARRETT HAHN**

barrett.hahn@gmail.com  
(919) 593-5318

**BETH EMERICH**

beth@retrofitmagazine.com  
(781) 710-4745

**MIKE GILBERT**

treblig2023@gmail.com  
(847) 867-9615

## EDITORIAL ADVISORY BOARD

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# A GREENER *Path*



BEFORE



BEFORE



BEFORE PHOTOS: courtesy The Architectural Team Inc.



# At Stone Mill Lofts, the Past, Present and Future of Adaptive Reuse Meet in Unexpected Ways

By Scott Maenpaa



PHOTOS: Ed Worssek unless otherwise noted



For decades, historic adaptive-reuse projects have offered a crucial means for architects and their clients to embrace sustainability—by preserving existing structures and their embodied carbon and by reducing demolition and construction waste, among other benefits. Yet as ever-more stringent energy codes push the industry toward higher levels of operating efficiency and building performance, the sustainability balance might seem to be tipping toward new construction. Right? Not so fast: The good news for retrofit teams is that industry leaders are finding fresh ways to help old buildings learn new tricks.

In fact, one of the Northeast's most energy-efficient, all-electric new apartment developments isn't actually a new building at all: It's 179-years old. Called Stone Mill Lofts, this recently completed conversion and deep-energy retrofit has transformed the oldest mill building in Lawrence, Mass., an Industrial Revolution powerhouse 30 miles north of Boston, into a mixed-income residential complex with 86 apartments. Remarkably, this project—the first of its kind in Massachusetts—meets today's most ambitious energy codes, as well as the National Park Service's (NPS') stringent historic preservation guidelines.

And as the dual crises of affordable-housing shortages and climate change converge across the country, diving into the details of Stone Mill Lofts offers a valuable case study in how architects and other retrofit teams can prioritize sustainability and decarbonization—both embodied and operational—while preserving landmark building assets and enhancing housing affordability.

## A Forward-looking Approach to Energy Efficiency, Catalyzed by Tragedy

The 149,220-square-foot, 4-story building now called Stone Mill Lofts was constructed between 1845 and 1848. The building utilized the local Merrimack River to manufacture tools, machinery for other factories, water turbines and millwork for the textile factories that made this region the center of America's Industrial Revolution. Despite the storied past, like many such industrial properties, the building had sat empty for years by the time current owner WinnDevelopment purchased the site in 2021, bringing long-time design partner The Architectural Team (TAT) Inc. on board as architect.

Crucially for the project's sustainability outcomes, this potential revitalization coincided with an important shift within the community. In 2018, a gas explosion rocked Lawrence and the Merrimack Valley region, leading to the creation of the public-private Merrimack Valley Renewal Fund, which, through its Building Excellence Grant Program, was seeking pilot projects for innovative electrification initiatives. Stone Mill Lofts became the first large-scale development to participate in the program with additional funding from local, state and federal government sources and private investors.





The project team chose a double-hung, triple-glazed window unit with low-emissivity coatings that exactly matched the form and dimensions of the original windows.

With funding now in place, the challenge became delivering on the electrification goals while meeting stringent NPS preservation guidelines. From the design team's perspective, tightening the building envelope was the first—and absolutely essential—priority. The approach centered on maximizing insulation at the walls, roof and first-floor slab, limiting the amount of uninsulated wall area overall and finding ways to extract the highest possible performance out of NPS-mandated historic-replica windows.

## Strategically Layering in High-performing Elements

The Stone Mill Lofts building was especially well-suited to a Passive House-influenced approach. Unlike many historic mills where the interior walls are simply raw stone or masonry, in this case a substantial amount of interior area had originally been finished with plaster walls. This existing condition

encouraged NPS to sign off on the project team's proposed solution, which called for retain-

ing exposed stone in first-floor common areas and amenity spaces and adding insulated furring within the residential units and accessory use areas on upper levels.

Moving full-speed ahead, for the newly insulated wall areas, the project team chose a framing system based on 1-inch offset wood studs, which substantially reduced thermal bridging compared to light-gauge metal framing. Next, the team applied continuous 2 1/2-inch high-density closed-cell foam insulation directly to the stone walls and behind the studs. In addition to functioning as an air seal and moisture barrier, the specific depth is vapor-permeable, which eliminates the







Onsite amenities include an expansive resident lounge and kitchen, billiards room, a fitness center with interactive equipment and a yoga nook, children's playroom and more.

potential for freeze-thaw cycles to heave the existing and new mortar joints. It is also reversible, as required by NPS standards. Ultimately, the combination of framing and insulation allowed these walls to achieve an impressive overall R-22 with R-18 being continuous insulation. Similarly, the project team installed high R-value thermal barriers at the attic floor and slab-on-grade assemblies.

In managing this preservation and performance balancing act, windows proved to be one of the project's more challenging aspects. NPS requirements meant the project team had to match the appearance, size, configuration, proportions and profiles of more than 400 old windows while achieving the energy model's desired U-Factor of 0.28. This figure was crucial because it would in turn influence the size of the Variable Refrigerant Flow (VRF) HVAC systems and other key downstream systems-level decision-making.

After its first choice was rejected by NPS, the project team chose a double-hung, triple-glazed window unit with low-emissivity coatings that exactly matched the form and dimensions of the originals. While this solution allowed greater air

infiltration, the levels were still acceptable and proved a reasonable compromise. The project team also replaced nearly 40 historic skylights with low-emissivity-coated, double-sealed insulated panes, broadening the building's reduced energy consumption.

With the new insulation and windows in place, the project team was able to right-size mechanical systems and specify highly efficient heat pumps to provide heating, cooling and hot water. The HVAC solution comprises a dedicated outdoor air system (DOAS) and energy recovery ventilator (ERV). Utilizing these in concert allowed the project team to improve indoor air quality while reducing heating and cooling costs because these systems provide continuous, fresh outside air

The design team sought to preserve the building's historic character and bring it into the present to create a compelling apartment community that will last for another 100 years.





while harnessing the energy from exhausted air to condition incoming air. Ultimately, the fossil-fuel-free design is expected to use 46 percent less energy and emit 33 percent fewer greenhouse gases than a typical gas-fired multifamily structure, saving 177 metric tons of avoided greenhouse gas emissions each year.

### From a Derelict Shell, Crafting an Inspiring Residential Environment

At the same time as the project team worked to meet Stone Mill Lofts' ambitious performance goals, a parallel aim was preserving the building's historic character and bringing it into the present to create a compelling apartment community that will last for another 100-plus years.

This work took several forms. Some of it was infrastructural. Given the flood-prone riverfront location, the project team raised the ground-floor slab 1 foot to avoid potential



Amenity spaces were strategically placed at subterranean locations, so the exterior stone wall could be left exposed with limited energy loss.

**Remarkably, this project—the first of its kind in Massachusetts—meets today's most ambitious energy codes, as well as the National Park Service's stringent historic preservation guidelines.**

damage from severe weather events. The sloping nature of the site also allowed for amenity spaces to be strategically placed at subterranean locations along the west side, so the exterior stone wall could be left exposed with limited energy loss. Inside the building, the original structural columns, beams, trusses and decking were restored and left exposed to the greatest extent possible. Outside, the fieldstone exterior façade was gently cleaned, removing decades of soot and urban pollution, to restore the stones' subtle pink and red tints. The project team raked and repointed mortar joints to minimize possible water infiltration during rain events, and

the original roofing slate was replaced, using locally sourced tiles quarried in Vermont to exact size specifications.

In terms of its residential program, Stone Mill Lofts now holds 86 rental apartments. Of these, 58 units are reserved for households earning up to 60 percent of Area Median Income (AMI); 11 apartments are set aside for those earning up to 30 percent AMI; and the remaining 17 apartments are rented at market rates. The development team chose this particular unit mix to offer opportunities for a wide range of possible residents, from younger people to families to empty-nesters. Each of the units benefits from large





window openings and the thoughtful integration of existing historic elements, such as exposed, original wood-beam ceilings; shiplap; and historic wood trim.


Onsite amenities include an expansive resident lounge and kitchen, billiards room, a fitness center with interactive equipment and a yoga nook, children's playroom, indoor and secure bicycle parking, resident storage lockers, work-from-home pods, secure package room, nicely landscaped outdoor areas and a patio. Perhaps the most special moment comes in the first-floor elevator lobby's viewing window, where residents are surrounded by the newest technology and yet can look at what appears to be an old black-and-white photo but is, in fact, a direct view into the original water-intake room for the turbines. It's a window back in time that allows people to appreciate the building's past by seeing the height of technology from when the mill first opened its doors.

## A Rewarding Project, an Example to Follow

From the development and design team's perspective, one of the most exciting aspects of the Stone Mill Lofts project is that it truly pushes the envelope for what preservation efforts could look like in the future. With the right partnerships and local, state and federal funding incentives, it's possible to provide cutting-edge affordable housing that exceeds all



What appears to be an old black-and-white photo is, in fact, a direct view into the original water-intake room for the turbines—a window that allows people to appreciate the building's past.

expectations as to what affordable housing is supposed to look like. And for retrofit teams everywhere, that the adaptive reuse of a pre-Civil War-era building is leading the way for all-electric, energy-efficient housing is an achievement to celebrate. If Stone Mill Lofts is any indication, the past still has a future. 

### Retrofit Team

**Architect and Interior Designer:** The Architectural Team Inc. (TAT), [www.architecturalteam.com](http://www.architecturalteam.com)

**Owner:** WinnCompanies, [www.winncompanies.com](http://www.winncompanies.com)

**Historic Consultant:** Public Archaeology Lab Inc., [www.palinc.com](http://www.palinc.com)

**Sustainability Consultant:** New Ecology Inc., [www.newecology.org](http://www.newecology.org)

**General Contractor:** Keith Construction Inc., [keithconstruction.net](http://keithconstruction.net)

**MEP Engineer:** R.W. Sullivan, [www.rwsullivan.com](http://www.rwsullivan.com)

**Structural Engineer:** Odeh Engineers, now WSP, [www.wsp.com](http://www.wsp.com)

### Materials

**Windows:** Series 1060 Commercial Triple Pane DH Window from Universal Window and Door, [www.universalwindow.com](http://www.universalwindow.com)

**Exterior Walls / Roof Deck Air Barrier Spray Foam:** XtremeSeal 2.0 LE from Mass Green Group, [massgreengroup.com](http://massgreengroup.com)

**Interior Walls Thermal Batts:** EcoBatt from Knauf, [www.knaufnorthamerica.com](http://www.knaufnorthamerica.com)

**Roof Blown Cellulose:** FRM 100 from Greenfiber, [www.greenfiber.com/products/frm-100](http://www.greenfiber.com/products/frm-100)

**Outdoor VRF Heat Pumps (PURY), Indoor VRF Fancoils (PEFY/PLFY), Indoor VRF Air-handling Units (PVFY) and Branch Circuit Controllers (CMB):** Mitsubishi, [www.mitsubishicomfort.com](http://www.mitsubishicomfort.com)

**DOAS/ERV:** Pinnacle Series from SEMCO, [www.semcohvac.com](http://www.semcohvac.com)

**Hot-water Heat Pump:** Lync AEGIS 500 from Lync by Watts, [www.lyncbywatts.com](http://www.lyncbywatts.com)

**Hot-water Heaters/Storage Tanks:** PVi Durowatt from Watts, [www.watts.com](http://www.watts.com)

**Glycol:** DowFrost Heat Transfer Fluids from DOW, [www.dow.com](http://www.dow.com)

**Electric Fireplaces:** Scion from Heat n' Glo, [www.heatnglo.com/fireplaces/electric/built-in/scion-electric-fireplace](http://www.heatnglo.com/fireplaces/electric/built-in/scion-electric-fireplace)

**Light Fixtures:** Terrain and Vapor Echo PET from Luxxbox, [www.luxxbox.com](http://www.luxxbox.com)

**Plumbing Fixtures in Unit Bathrooms:** Wynford from Moen, [www.moen.com](http://www.moen.com)

**Rubber Base:** Pinnacle from Roppe, [roppe.com/pinnacle-rubber-base](http://roppe.com/pinnacle-rubber-base)

**Roofing Slate:** North Country Black from New England Slate, [newenglandslate.com](http://newenglandslate.com)

**Skylights:** FCM Fixed Skylights from VELUX, [www.veluxusa.com](http://www.veluxusa.com)