2026 IDEAS AWARDS

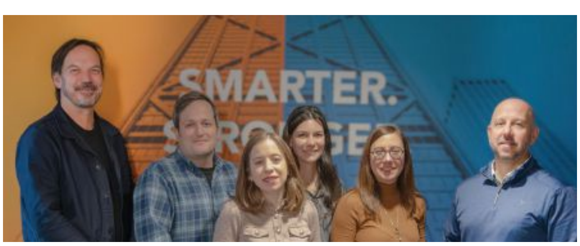
Six Big Ideas

A landmark steel reuse project, an athletic facility with a frame that appears to float over a below-grade parking structure, and a medical building that used steel's aesthetic properties to match its desert setting are among the 2026 IDEAS Award recipients.

FIVE RECENTLY COMPLETED structures and one promising research project have earned one of the structural steel industry's top annual honors: an IDEAS Award.

AISC and *Building Design+Construction* present the 2026 IDEAS Awards (formerly the IDEAS² Awards) to recognize projects that illustrate the exciting possibilities of building with structural steel. Since 1960, AISC's design awards have showcased the innovative use of structural steel in:

- the accomplishment of the structure's program
- the expression of architectural intent
- the application of innovative design approaches to the structural system
- leveraging productivity-enhancing construction methods



A six-person jury chose this year's IDEAS Award winners:

- David Barista, Editorial Director, *Building Design+Construction*
- Paul Evans, SE, PE, Structural Design Specialist, Turner Engineering Group
- Melissa Gradecki, SE, PE, Senior Engineer – Innovation, AISC
- Courtney Lilly, QA/QC and Shop Supervisor, Southern New Jersey Steel
- Thomas Robinson, AIA, Founding Principal, LEVER Architecture
- Bethany Whitehurst, SE, PE, Senior Structural Engineer, Clark Nexsen

The IDEAS Awards recognize projects that took advantage of steel's benefits—sustainability, resilience, cost, speed, and reliability—regardless of budget. Winning projects must have met these criteria:

- New buildings, expansions, and major retrofits and rehabilitations are eligible. There is also a category for sculptures, art installations, and non-building structures.
- Building projects submitted for 2026 IDEAS awards must be in the U.S. and must be completed between Jan. 1, 2024, and Aug. 1, 2025.
- A significant portion of the framing system of a building must be wide-flange or hollow structural steel sections (HSS).
- At least 75% of the steel used in the project must be domestically produced.

The six winning projects are in six different categories: excellence in engineering, excellence in architecture, excellence in adaptive reuse, excellence in constructability, excellence in sustainable design and construction, and a new award in 2026, IDEAS | next. The IDEAS | next Award recognizes innovations before they break ground; eligible projects simple need a client, a site, and a great idea.

Four of the five award-winning buildings are new structures. One is the terminal at San Diego International Airport, which used steel to meet seismic considerations, create open spaces, and save $100 million. A medical building on the University of Arizona's campus has significant exposed steel elements that serve architectural and structural purposes. An athletic facility at the University of San Francisco is designed as if it's floating above a below-grade parking structure. A Colorado fire station became a landmark material reuse project by including steel members pulled from a deconstructed former hospital building nearby—in addition to showcasing hybrid steel-timber construction.

Elsewhere, a Pennsylvania data center project scored an adaptive reuse win by repurposing an industrial building and adding the requisite load capacity. Finally, the IDEAS | next winner is a research project in Massachusetts that developed a method for steel additive manufacturing in the field to repair corroded material in hours.

"American innovation—particularly design innovation—is built on a backbone of steel," said AISC director of architecture Nima Balasubramanian, AIA, NOMA. "These cutting-edge projects represent the pinnacle of thoughtful design for a greener, more resilient future, and in some cases, they've been specifically designed for 100 years of service."

Read on to learn more about the 2026 winners.


Kirk Hostetter Photography

Excellence in Constructability

SAN DIEGO INTERNATIONAL AIRPORT TERMINAL 1

San Diego


Davis Partnership Architects

Excellence in Sustainable Design and Construction

CITY OF BOULDER FIRE RESCUE, STATION #3

Boulder, Colo.


Tyler Chartier Photography

Excellence in Engineering

UNIVERSITY OF SAN FRANCISCO MALLOY PAVILION NEW PRACTICE GYMNASIUM

San Francisco


Bradleywheelerphoto.com

Excellence in Architecture

UNIVERSITY OF ARIZONA ANDREW WEIL CENTER FOR INTEGRATIVE MEDICINE

Tucson, Ariz.


Ondra-Huyett Associates

Excellence in Adaptive Reuse

TIERPOINT TEKPARK HIGH-DENSITY ENVIRONMENT RENOVATION

Breinigsville, Pa.


Alexia Cota, Julia Westbrook

IDEAS|next

GREAT BARRINGTON COLD SPRAY DEMONSTRATION REPAIR

Great Barrington, Mass.

2026 IDEAS AWARDS

EXCELLENCE IN CONSTRUCTABILITY

SAN DIEGO INTERNATIONAL AIRPORT TERMINAL 1

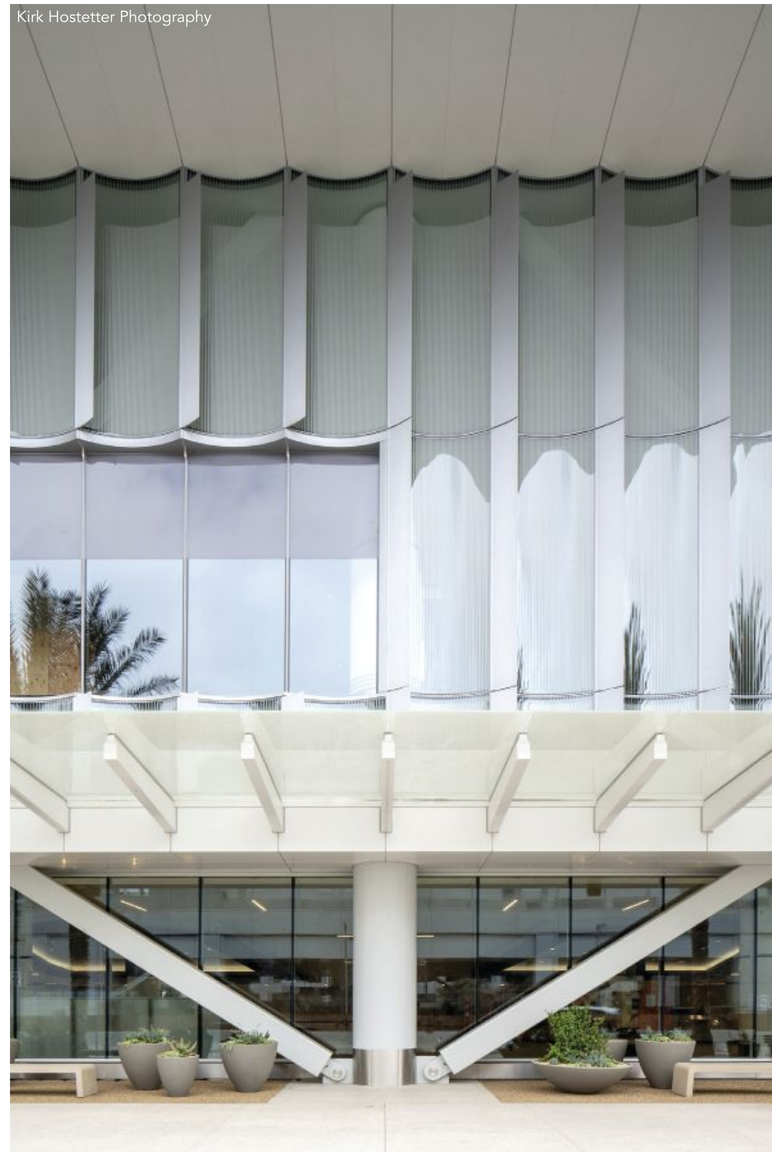
San Diego

HOW CAN A STEEL FRAME design remove columns to meet an open-space architectural vision and still satisfy seismic requirements? The frame in the new Terminal 1 at San Diego International Airport is the blueprint. The airport replaced its 1960s-era terminal with a new building that found $100 million in construction savings and achieved all goals in a speedy manner.

The new 19-gate terminal reimagines the passenger experience, combining architecture, functionality, and sustainability while maintaining operations at the nation's busiest single-runway airport. Long-span steel framing eliminated interior columns, creating open spaces flooded with light, intuitive wayfinding, and long-term adaptable resilience. The design pushes boundaries with a luminous wave landside façade that ingeniously integrates art with heat and glare reduction in the ticketing area and includes new outdoor terrace areas. Openness achieved through 27-ft-high ceilings and column-free spaces enables a comfortable passenger experience throughout the new terminal.

Two modular pedestrian bridges and a buckling-restrained bracing system accelerated the schedule and reduced construction costs by five figures. Structural solutions that refined the building grid, building height, floor loading, and seismic lateral system from the initial baseline design helped reduce steel tonnage by 40%. In addition, a whole building life cycle assessment (WBLCA) measured embodied carbon reductions and Environmental Product Declarations (EPDs) emphasizing sustainability features that helped achieve a 30% reduction in global warming potential (GWP). The structure was designed to achieve a 100-year lifespan with minimal maintenance.

Gensler + Ema Peter Photography


Kirk Hostetter Photography

Material Selection

Structural steel offered the strength-to-weight ratio, speed of construction, economy, and the sustainability profile necessary to optimize performance. The project team leveraged steel's ability to meet stringent seismic codes, blast requirements, and strict vibration criteria. In addition, an early design pivot from a baseline steel moment frame lateral system to buckling-restrained brace frames (BRBs) offered seismic resilience, resulting in the removal of more than 100 columns from the ticketing hall and airside concourse that create the open feel, a 40% tonnage reduction, and a 30% embodied carbon reduction.

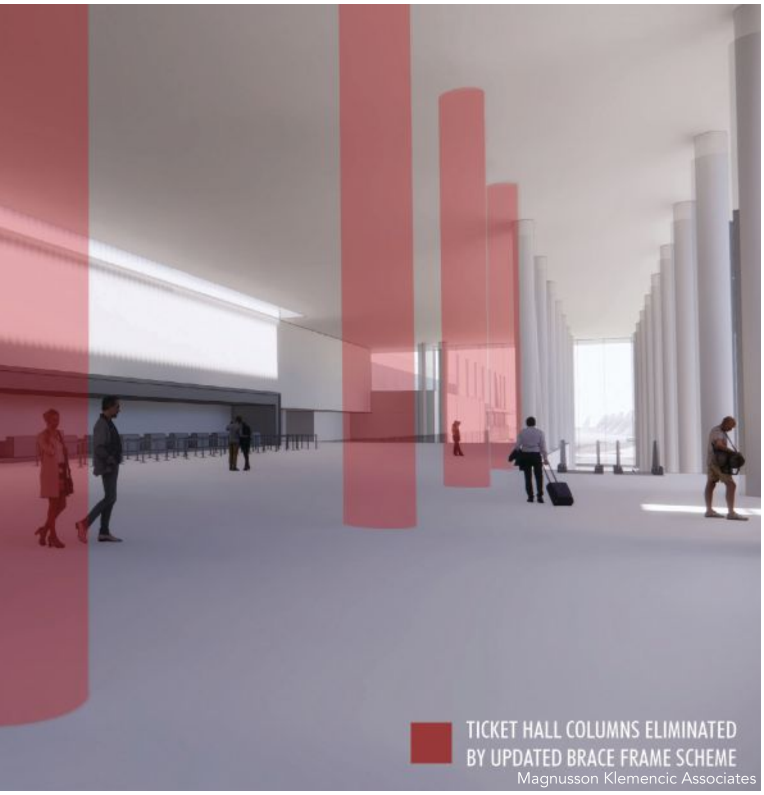
Equally important, steel offered unparalleled constructability. Preassembled modular bridges, BRBs, and roof trusses all contributed to speedy and seamless steel erection. The structural designers and steel fabrication team ensured that constructability was integrated into each major steel component. The curbside facility for bag drop and boarding pass printing along the upper roadway was modified from reinforced concrete to structural steel, providing a lighter, more economical, and more efficient solution.

The team briefly considered a timber roof but ultimately rejected mass timber due to higher costs, durability concerns, and misalignment with the terminal's architectural language. A reinforced concrete structure was also studied but would have required shear walls, larger foundations, and higher embodied carbon—unsuitable for a fast-track schedule and a sustainable design.

Delivering a three-story terminal under tight budget and time constraints after the COVID-19 pandemic required an aggressive schedule and early bid packages. Steel procurement began at 30% design, with fabricator design-assist ensuring constructability and cost certainty. The Turner-FlatironDragados joint venture, the project's general contractor, reported approximately $100 million in savings, primarily from the design's reduction in material quantity. Early design-assist also resolved complex connection details before fabrication, enabling smooth field erection.

Braced for Impact

Most of the 238 BRBs used in the terminal's structural system were longer and larger than had been physically tested by U.S. manufacturers. BRB core areas ranged from 4 sq. in. to 50 sq. in., with lengths exceeding 56 ft. Seismic Bracing Company, the BRB manufacturer, had qualified testing for up to 24-sq.-in. core areas. The project team used nonlinear finite element analysis calibrated



Magnusson Klemencic Associates

Magnusson Klemencic Associates

to known test results and extrapolated the larger, longer sizes to meet Section K3.3 of the AISC *Seismic Provisions for Structural Steel Buildings* (ANSI/AISC 341).

The models included initial imperfections due to manufacturing tolerances, modeling of weld lines, and assessment of potential fracture at the core-to-connection-plate interfaces. Two independent peer reviewers evaluated the BRB modeling approach and concurred that it was justifiable. The rigorous analysis has established a new benchmark for BRB design and is informing the industry of viable changes for the next version of the *Seismic Provisions*, including the explicit allowance for modeling instead of physical testing and rethinking requirements such as the restriction on splices in the steel core.

Project structural engineer Magnusson Klemencic Associates (MKA) collaborated with Gensler, the architect, to integrate the BRBs into the façade vision. The BRBs were laid out symmetrically to frame the center of the new ticketing hall. Casing shapes were matched, gusset plates coordinated with architectural column encasements, and pin connections were used to showcase the seismic load-resisting system. The team also optimized the lateral system by revising grid spacing, reducing building height with efficient steel shapes, and optimizing floor loading to meet the program needs. All contributed to the $100 million total savings.

The new terminal is adjacent to the active Spanish Bight fault and built on liquifiable soil, which led to using pile caps with BRBs to meet Seismic Design Category D requirements for a Risk Category III structure.

Nonlinear finite element analysis performed by the contractor allowed MKA to increase the BRB sizes beyond the limits permitted by qualified testing, provide resilience by reducing drift to half the code-permitted limit, and simplify the foundation design. Sea-level rise and tsunami scenarios were also included in the hazard envelope.

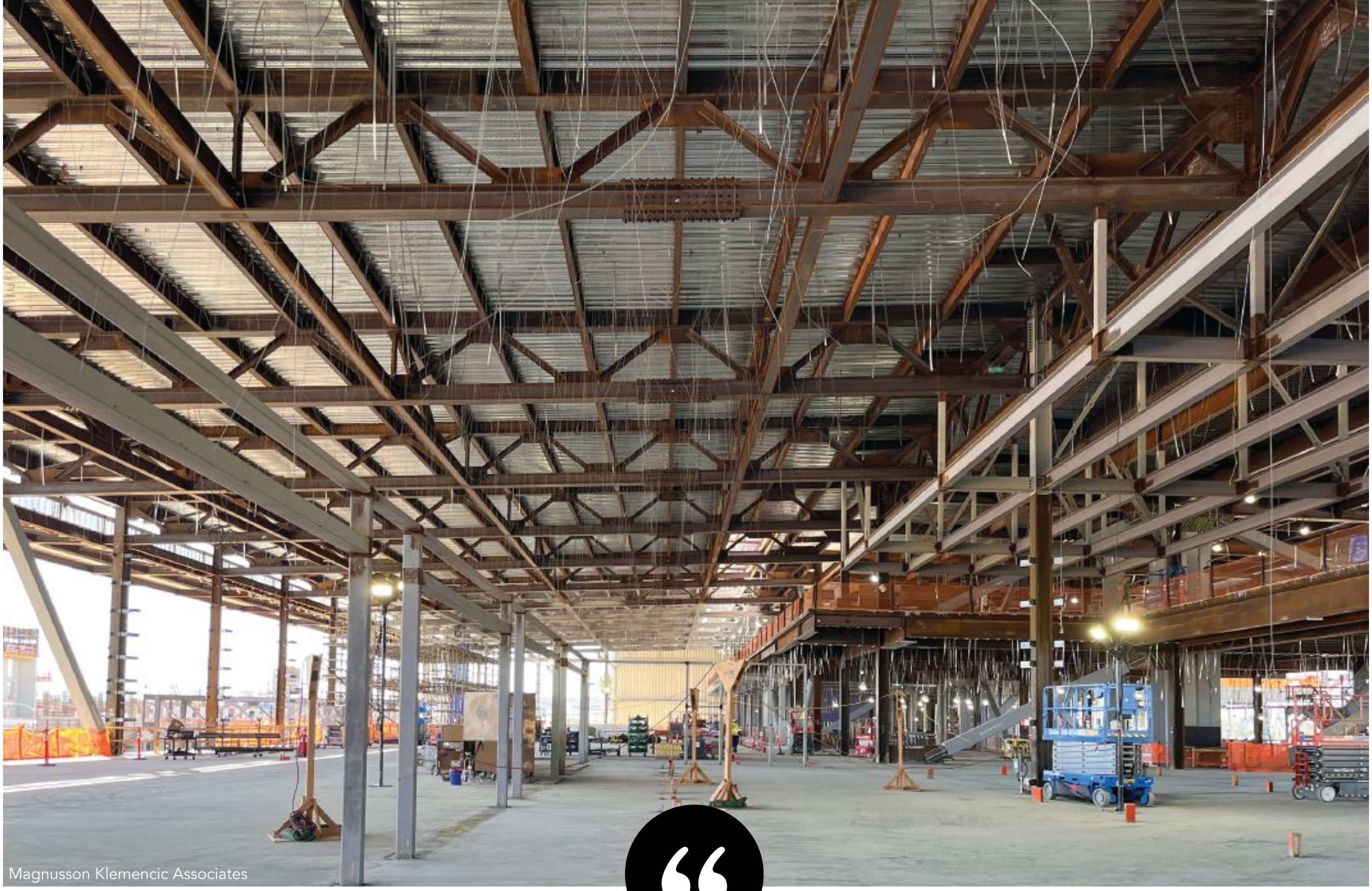
Collaboration Breeds Constructability

The constructable design and efficient steel erection schedule would not have been possible without strong collaboration between the architect, structural engineer, fabricator, and construction teams long before any work began on the jobsite. The team embraced fabricator design-assist early and engaging steel partners early to optimize tonnage, refine connections, and streamline erection sequences. All told, 9,600 tons of steel were erected in six months at an active airport site.

The wave wall façade along the landside roadway integrates structure, architecture, sustainability, and art, maximizing daylight harvesting, reducing reliance on artificial illumination, and lowering operational energy demand by reducing heat gain. MKA worked closely with Gensler and the exterior wall supplier to provide structural steel support for the façade by way of stiff roof members to hang the wall and limit deflection, cover plated steel columns to support the out-of-plane lateral loads, and a sophisticated steel canopy to complement the base of the wall. MKA and steel fabricator W&W|AFCO also collaborated on detailing the slab edge bent plate at the ticketing level to match the interior curved profile of the wall, enabling a matching joint between the wall and the superstructure.

The design incorporates expressed steel components, most notably two pedestrian bridges where CAST CONNEX castings replaced traditional bolted or welded gusset plates. These 100-ft structures, each comprising two Warren trusses, were prefabricated and lifted into place, serving as functional connections and architectural features.

Strict vibration criteria for the concourse and pedestrian bridges followed AISC Design Guide 11: *Floor Vibrations Due to Human Activity* (download or order at **aisc.org/dg**). Parametric studies right-sized criteria to meet performance without unnecessary cost.



Magnusson Klemencic Associates

"Having structural designers and the steel fabricator team up at the beginning of the project ensures innovative constructability. Designers addressing difficult connections in advance and the fabricator using programs such as Tekla helps avoid any possible issues for rework or additional work in the field."
—Courtney Lilly, Southern New Jersey Steel

Kirk Hostetter Photography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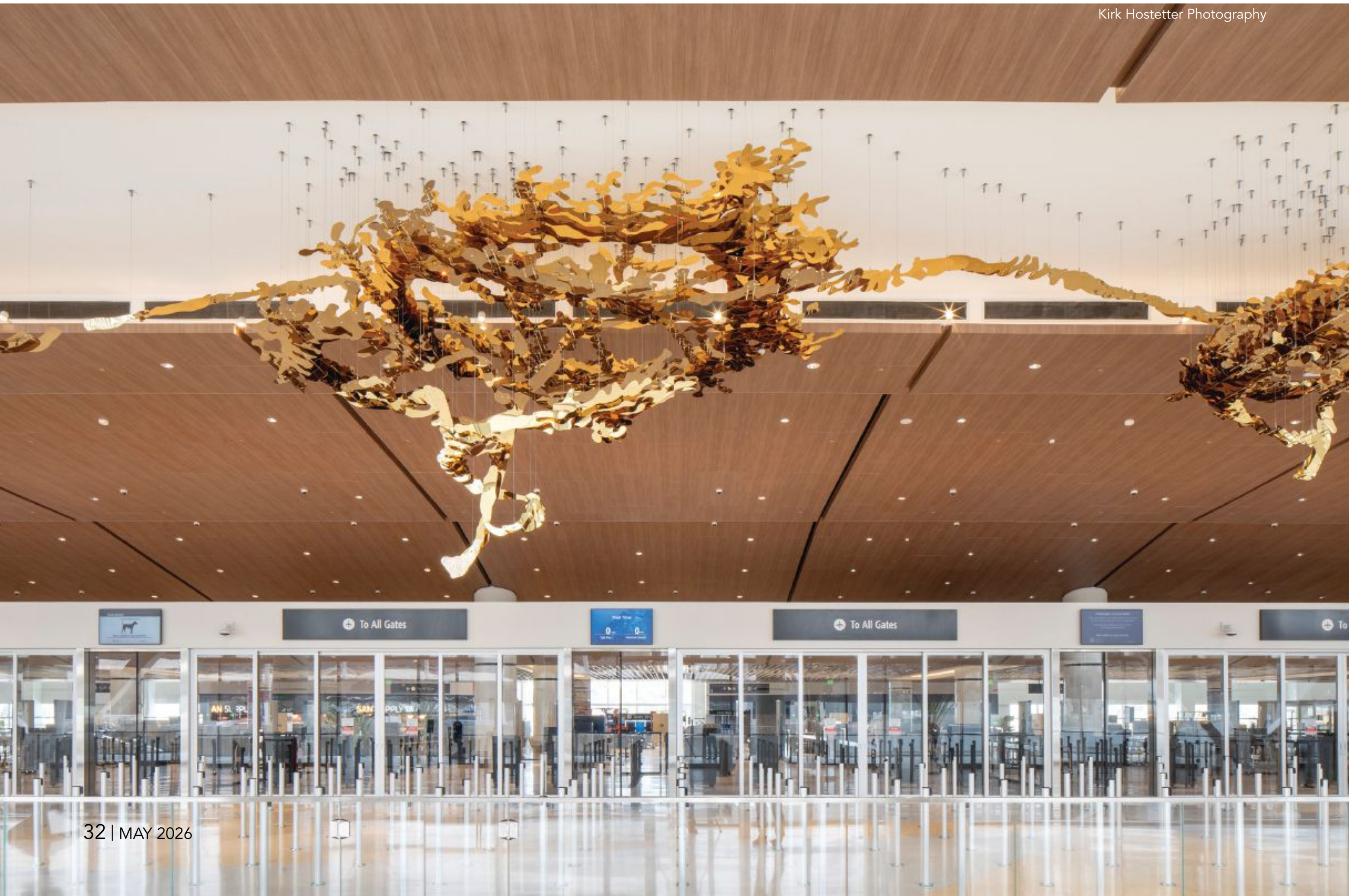


Kirk Hostetter Photography

MKA engineered support structures for the signature PTFE smart curb canopies, coordinating with the canopy supplier to analyze the two steel systems as a vertical combination. A capacity approach based on the BRB structure limited the seismic demand on the steel special cantilever column system above.

Fabricators developed Tekla models early, which helped inform MKA's design to weave in connection details, including intricate BRB base connections. To maintain continuous airport operations, the project was sequenced as Phase 1A—built before the existing Terminal 1 could be demolished—followed by Phase 1B, which minimized passenger disruption, maintained gate capacity, and enabled continuous construction.

Modular and prefabricated strategies were essential for constructability and erection speed. Bridge components and long-span roof trusses were fabricated onsite and erected with minimal disruption to active roadways. Unitized façade panels sped up installation while achieving the project's unprecedented scale. These façade panels, at 30 ft tall, represent one of the largest unitized curtain wall systems ever constructed.

The steel itself enhanced constructability. Its light weight, reduced seismic and foundation demands, and adaptability allowed for phased erection strategies that maintained full passenger operations. Casting large concrete components or integrating mass timber would have required major closures and longer build times.

Advanced modeling of BRBs, vibration criteria, and lateral systems enabled precision design and reduced rework. Coordination ensured the structural frame seamlessly integrated with architectural, baggage handling, and MEP systems.

Sustainability Success

Steel tonnage reduction also helped achieve the project's goal of LEED Gold status. All steel and concrete suppliers were required to provide EPDs. The WBLCA tracked six impact categories, establishing baselines using tools such as EC3, Tally, and NRMCA, and refining them with project-specific supplier data. Material efficiency was achieved by changing the baseline lateral system from moment frames to BRBs, revising grid spacing, optimizing loading, and selectively eliminating beams, which also reduced column sizes. These measures ensured that reductions in GWP could be tracked and verified.

Bidding language required EPDs to be provided and subcontractors to provide the lowest embodied carbon product options at no additional cost to the project. Steel contractors were required to use domestically produced steel, which tends to have lower embodied carbon. Through these material strategies, in addition to pursuing revised grid spacing and long-span solutions, the design reduced overall GWP while maximizing space.

The project had a second sustainability victory with an adaptive reuse effort. A historic United Airlines hangar from the 1920s was located within the footprint of the new terminal structure. Instead of demolishing the structure and recycling its steel, the hangar was meticulously disassembled, moved, and reassembled at a different site on the airport's property. The work included refurbishing the steel hangar doors, re-glazing, and installing a new lateral system to meet current wind and seismic performance requirements.

The original hangar was primarily steel, with steel columns and trusses supporting a wood roof. Although its original lateral system was unclear, the new lateral system has code-compliant special steel cantilevered columns to provide seismic resistance while still honoring the original steel hangar structure. Steel's adaptability was essential in relocating and retrofitting the hangar. Its ability to splice, reinforce, and extend existing elements allowed the design to seamlessly tie old with new. Where past architecture had to remain, steel provided the flexibility to blend it into the terminal's cohesive form.

The new Terminal 1 opened in September 2025, at which point the original Terminal 1 was closed and demolished. A second phase of the project that will add 11 new gates—bringing Terminal 1's gate total to 30—is scheduled for completion in 2028.

Owner
San Diego County Regional Airport Authority, San Diego

Managing Architectural Firm
Gensler, San Diego

General Contractor
Turner | FlatironDragados joint venture, San Diego

Primary Structural Engineer
Magnusson Klemencic Associates, Seattle

Additional Structural Engineer (Substructure)
Saiful Bouquet, Los Angeles

Civil and Geotechnical Engineer
Kleinfelder, San Diego

Civil Engineer
Latitude 33, San Diego

Steel Team

Fabricator/Detailer/Erector
W&W | AFCO Steel, San Angelo, Texas (AISC Certified Fabricator)

Additional Detailer
Pro Draft, Inc., Surrey, B.C. (AISC Detailer)

BRB Supplier
Seismic Bracing Company, Salt Lake City

2026 IDEAS AWARDS

EXCELLENCE IN SUSTAINABLE DESIGN AND CONSTRUCTION


Paul Brokering, Davis Partnership Architects

CITY OF BOULDER FIRE RESCUE, STATION #3

Boulder, Colo.

A NEW FIRE STATION in Boulder, Colo., is the primary product of a never-before-done type of steel reuse.

The project team behind Boulder Fire Station #3 could have sourced steel members for a hybrid steel-and-timber design from a mill or service center. Instead, the building has reclaimed steel from a city-owned decommissioned hospital building that, by city ordinance, had to be deconstructed rather than demolished.

Taking down the hospital was one of the first U.S. commercial deconstruction projects, and the fire station was the first commercial project to designate steel from a deconstructed building for use in a new one during design. Those choices were a direct result of the City of Boulder's vision, the availability of material for reuse, and the city's climate goals.

Reusing salvaged steel brought several specific challenges, each requiring effective collaboration and teamwork. It also demonstrated that with strategic planning, collaboration, and technical innovation, structural reuse can be feasible and financially beneficial.

Fire Station #3 is a 28,370-sq.-ft facility designed to exceed the city's energy conservation goals (CoBECC) and to have a 100-year service life. It includes four drive-through apparatus bays for fire, EMS, and water rescue equipment—along with specialized areas for bunker gear storage, a negative-pressure decontamination room, and a breathing apparatus testing and repair space.

It is an all-electric station with an expansive roof that serves as a beacon of safety while maximizing photovoltaics to offset an estimated 65% of its annual electric consumption. The structure creatively incorporated glue-laminated timber columns and the reclaimed steel beams from the former hospital. Large high-efficiency windows provide abundant daylighting, and native and drought-tolerant landscaping is integrated with stormwater

Davis Partnership Architects

Thomas Ellis, Davis Partnership Architects

detention to create tranquil garden areas. Low-volatile organic materials and finishes are featured throughout the interior.

Familiarity Boost

Although secondhand steel was readily available (wait times for material are often a barrier to reuse), there were high front-end costs for designing with and prepping each member for installation. Special consideration had to be given to the quantity, consistency, and size of the members to fit within the design. Additionally, the team had to address the absence of industry standards for testing reclaimed steel, uncertainty around logistics and cost, and the need for detailed documentation and cleanup.

Project structural engineer KL&A addressed these reuse challenges by developing custom protocols for deconstruction, testing, and inventory management. KL&A and the city began working together when planning the hospital's deconstruction and cultivating the market for its reused members, giving the firm familiarity with the steel before it was even pulled from the building.

Despite the complexity, the fabrication and installation processes had zero added costs or delays. The steel was provided at no cost, resulting in net savings. The project demonstrates that circular construction can be seamlessly embedded into conventional design workflows. It redefined material sourcing as a design opportunity, aligning sustainability with structural and

Thomas Ellis, Davis Partnership Architects

Thomas Ellis, Davis Partnership Architects

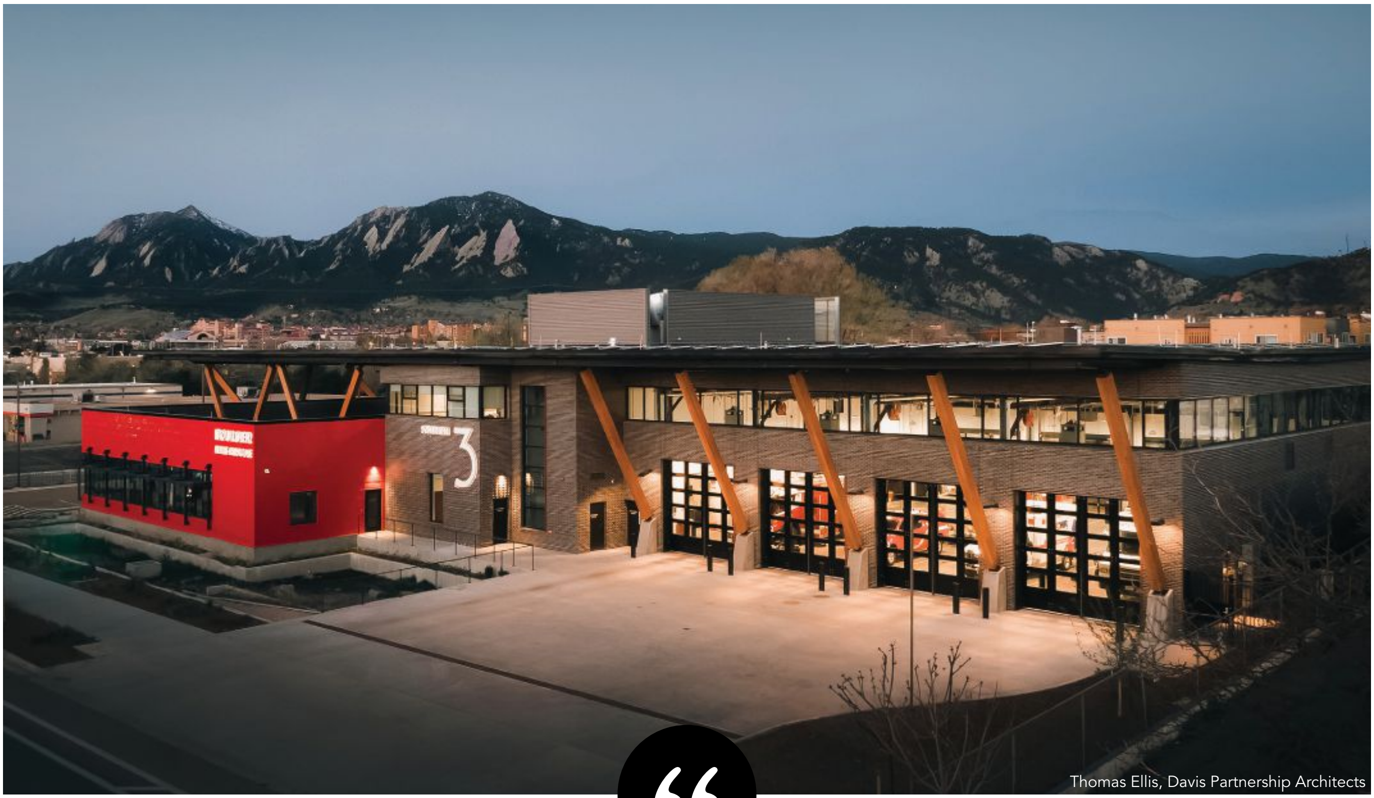
architectural intent. (Read more about the hospital deconstruction and material reuse efforts in the "Ambitious Reuse" story in the August 2024 issue at **modernsteel.com/archives**. A similar reuse project is featured in the "Members on the Move" article in the September 2025 issue).

Group Effort

By aligning design, engineering, and material recovery, Fire Station #3 showcased how reclaimed materials can be seamlessly integrated into modern building projects, advancing innovation, reducing embodied carbon, and redefining sustainable design practices. Integrating salvaged steel was a major innovation in sustainable construction. KL&A and Davis Partnership Architects collaborated early in the design process to identify opportunities to use the reclaimed members instead of new steel in the framing plan, a practice rarely executed at scale in North America.

Davis Partnership Architects guided the process to ensure the goal of incorporating salvaged steel maintained the project's aesthetics, because most steel members in the design are fully exposed on the interior and exterior of the building. The reused members were coordinated and incorporated into the 3D structural and architectural models and construction documents, and fabrication proceeded as smoothly as with new steel. The project proved that reused structural materials can meet performance, safety, and cost expectations, setting a precedent for future circular construction efforts.


Thomas Ellis, Davis Partnership Architects



Thomas Ellis, Davis Partnership Architects

"The engineers at KL&A developed methods that should be a model for future salvage and reuse in the U.S. The steel is visible and celebrates the story in its construction, and the architect reduced embodied carbon by eliminating finishes that would otherwise cover it."
—Bethany Whitehurst, SE, PE, Clark Nexsen, a JMT Company

The building also meets lofty sustainability goals by maximizing its photovoltaic capacity, which involved designing the largest roof possible for the building's footprint. A unique multi-axial steel connection was designed to link the concrete pilasters and the inclined heavy timber columns. This connection detail was an essential piece, because the structural steel connection represented the critical interface between concrete pilaster and wooden glue-laminated columns.

Temporary steel columns were used to erect the inclined heavy timber columns. Their foundations were incorporated directly into the fire station's front apron slab, a critical design decision that facilitated the complex construction and eliminated the need for separate, temporary foundations.

Delicate Design

The city wanted the fire station's design to be iconic and be a prototype for future stations. The result is the approximately 22,000-sq.-ft fire station augmented with a 6,000-sq.-ft administration space and community room. Special consideration was given to the public amenity space without compromising the security and privacy of operational spaces.

The attached administrative areas support 15 fire administration staff and include offices, conference rooms, mixed-use work areas, and break rooms. They're part of the building's distinctive "red box" that was designed as a prototype and artfully coordinated with the apparatus and operations areas. The red box can be included or excluded on future stations as needed.

Boulder Fire Station #3 is a true home for crews, designed to respect their privacy and security while balancing the community's need for access and transparency. That blend is achieved through clean-zone living, gathering, and respite areas on the second floor that keep firefighters connected, but up and away from the hot-zone operational spaces and busy street below. The building also includes a commercial-grade kitchen and dining area adjacent to a green-roof patio. It has private firefighter bunks and bathrooms intentionally located to maximize quiet and limit 90° turns so firefighters can quickly reach the apparatus bay. Additionally, a secure fitness facility is located on the first floor, connected to an enclosed outdoor exercise area with views of the Flatirons.

Owner
City of Boulder, Colo.

Architect
Davis Partnership Architects, Denver

General Contractor
Mark Young Construction, LLC, Frederick, Colo.

Structural Engineer
KL&A Engineers & Builders, Golden, Colo.

Tyler Chartier Photography

UNIVERSITY OF SAN FRANCISCO MALLOY PAVILION NEW PRACTICE GYMNASIUM

San Francisco

TIGHT URBAN SITE constraints demanded innovative engineering to fit a 16,800-sq.-ft athletic practice facility over a below-grade parking facility on the University of San Francisco's campus. The design team met the challenge with a steel frame that acts as if it's floating over the parking structure and minimizes impact to adjacent buildings.

Malloy Pavilion is an NCAA practice gymnasium with basketball courts, volleyball courts, and office space located above a below-grade concrete parking structure and attached to a mid-rise residence hall. An older gym borders it on the other side. The facility needed to be designed as seismically isolated from the parking structure to prevent triggering a mandatory seismic upgrade to the parking garage and residence hall. Those upgrades would have made the project infeasible due to cost and downtime for installation.

The chosen method for seismic isolation is a steel frame with minimal supporting columns below, almost as if it's floating above the parking structure, and positioned between a nine-story residence hall and War Memorial Gym/Sobrato Center, where the university's basketball and volleyball teams play. As requested by the university, the facility has direct access to the Sobrato

Rendering by Oculus Architects

> Site constraints meant this project needed creative engineering solutions, and this project team developed them by using steel to deliver a floating gymnasium with minimal impacts to the surrounding structures."
> —Paul Evans, SE, PE, Turner Construction Company


Tyler Chartier Photography

Center, maintains the existing code-compliant fire lane between the Sobrato Center and the parking structure, and maintains as many parking spaces (at-grade and below-grade) as possible.

Steel was chosen as the structural system for several reasons. It can efficiently span large, open areas to accommodate the open-plan gym layout. The full depth of the perimeter walls could accommodate custom steel trusses spanning up to 100 ft and supported half of the building. Steel could also be calibrated for acceptable vibration performance, which was important to the client.

Existing buildings border the jobsite on three sides, meaning trusses needed to be site-built, which steel framing could easily achieve. An efficient steel framing system limits building weight, which maintains more efficient lateral force-resisting system and foundations in a seismic region.

Floating Frame

A new building with minimal support columns that appears to float above an existing rigid structure required a holistic understanding of the university's goals on a complex campus developed over decades. The project needed creative solutions, iterative design processes, and extensive analyses of lateral systems, gravity framing, vibration performance, and foundations to address the unique project constraints.

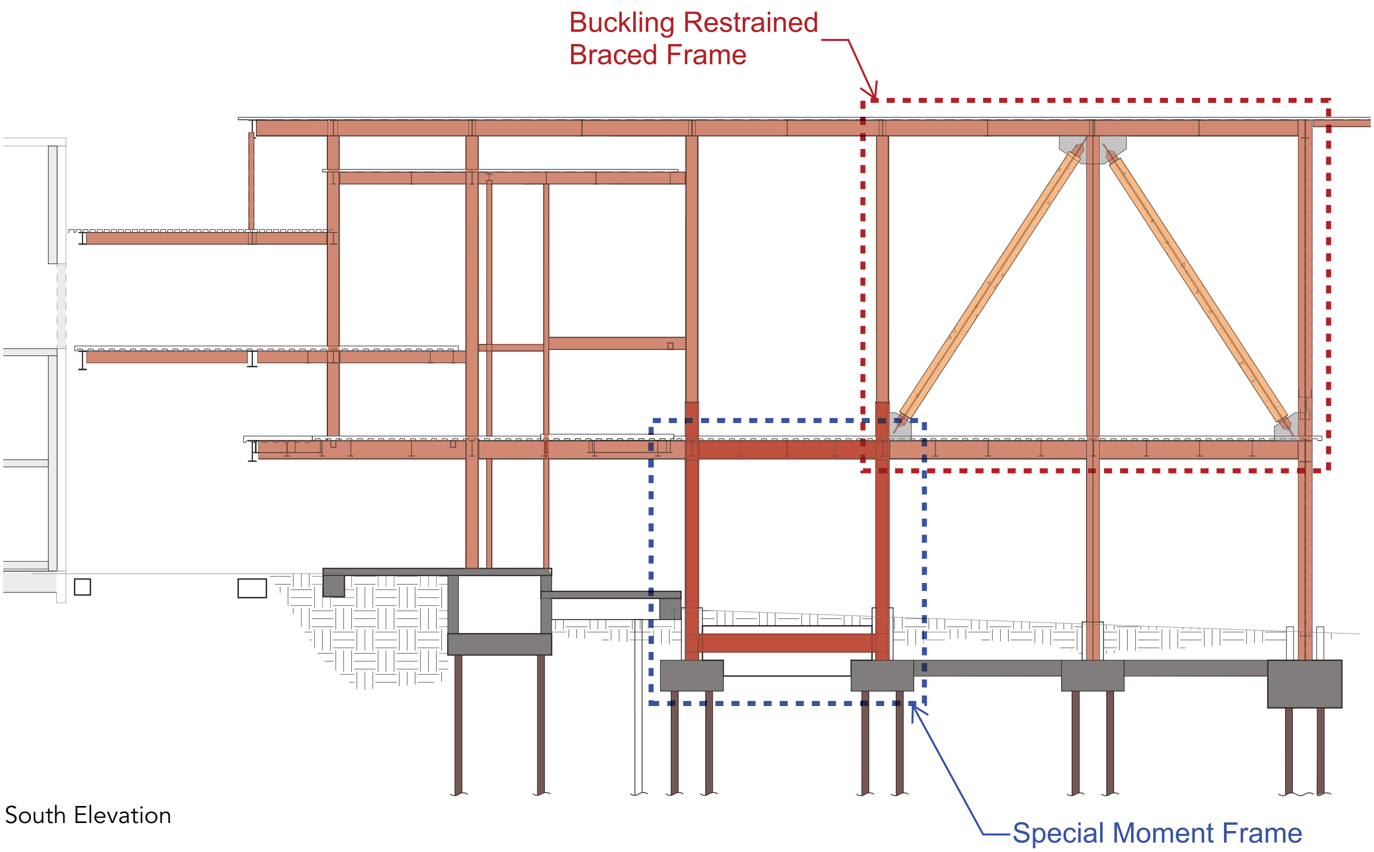
ZFA Structural Engineers' first step was to determine where supports could be located, because the building needed support over the footprint of the existing parking garage. Each parking garage level had a different floor plan, and one of the university's main goals was to maintain as much parking as possible. After aligning the floor plans for the three parking levels, only three locations were feasible for columns that could penetrate from grade level to the foundation. The column locations defined the constraints around which the rest of the building was designed. The rest of the new building's supports are located just outside the parking structure on the south and west sides.

The three interior columns defined Malloy Pavilion's spans, which included one 100-ft-long truss along the north elevation, an 80-ft-long truss with a 17-ft cantilever on the east elevation, and full-span (100-ft-long) roof trusses. Long-span floor framing was also required to maintain the surface parking area below the building's lower floor.

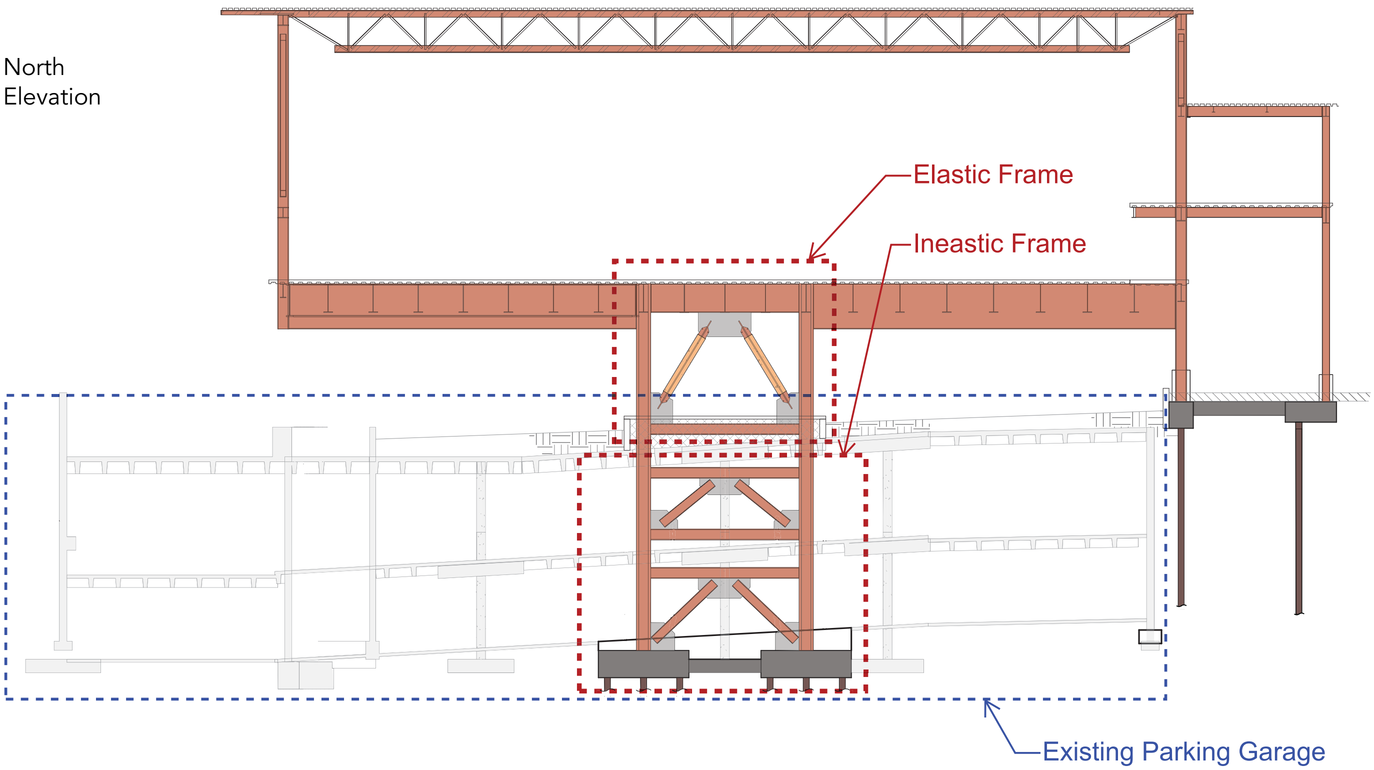
The unusual support conditions generated a variety of structural design hurdles. The gravity system involved long spans and large cantilevers, requiring full-story-height custom trusses that were 22 ft deep with spans up to 100 ft and cantilevers up to 17 ft. To avoid having these trusses act as part of the lateral system, hinges were built into the truss framing to allow lateral forces to be resisted only by the lateral frames.

Floor vibrations were a major design concern because the full-story-height trusses support the athletic court, wall, mezzanine, and roof framing. The vibration analysis used a 3D model and a modal analysis to simulate how loads from the athletic court affect other areas of the building. Rigidity was then added to select framing members to provide acceptable vibration performance.


Tyler Chartier Photography



South Elevation



Go North

All elements of the building—gravity framing, lateral systems, vibrations, foundations, and construction—were unique and largely structured around the minimal support locations over the majority of the floorplan. One particularly challenging element was supporting the building laterally along its north elevation.

The lateral frame on the north elevation was inset from building's perimeter and directly over the existing parking garage. A buckling-restrained brace (BRB) frame was used at grade level, but below it, the columns go through two parking levels before terminating in new foundations. This arrangement made the lateral frame 40 ft tall compared to the 18-ft-tall special moment frame on the south elevation. To minimize disturbance to the garage, the frame columns were located between the garage floor pan joists, which left limited clearance for seismic movement. To control displacements at the garage's concrete floor levels and force all inelastic deformation to the top level of the frame, the two below-grade stories of the frame were designed and detailed to remain elastic.

The design of this frame was based on the nonlinear analysis demands to determine the size of the BRBs. The elastic frame was then designed for the capacity-limited seismic demand, based on the expected strength of the BRBs. Finally, the seismic drift of the below-grade frame was checked to ensure that the frame deflection would not exceed the enlarged openings in the garage slab. The columns specified were W14×455 wide-flanges with 1½-in. plates on each side to form a closed box section and meet the required strength and deformation limits. Foundations under the frame included a pile cap with 12 micropiles that extended to bedrock.

Constraints Emphasize Constructability

The design's complexity mandated coordination with existing site conditions and thoughtful sequencing. The project team worked with trade partners to maximize workflow efficiency and reduce downtime, accomplished by holding planning sessions well in advance of construction. The project avoided significant schedule delays as a result.

The site's space limitations and the required construction activities made the top level of the existing parking garage a storage site for construction materials and a temporary support for the new structure. These temporary loading conditions required shoring at all levels of the underground parking structure. Shoring posts were installed in a grid throughout each level in the storage areas.

Shoring posts were installed below exterior wall lines to provide temporary support for the new structure, allowing the wall trusses to be erected and field-welded piece by piece. These shoring posts were also required to be installed at each level of the garage below to transfer loads to the supportive soil below. Once all the components of the wall trusses were installed, fully welded, and inspected, the shoring posts were removed to allow the superstructure to support itself as designed.

The construction team identified long lead items well in advance of construction and worked with the university to obtain early authorization to order these materials. In some cases, materials were stored onsite for months. These proactive measures reduced the risk of escalation and delays in material procurement.

Owner
University of San Francisco, San Francisco

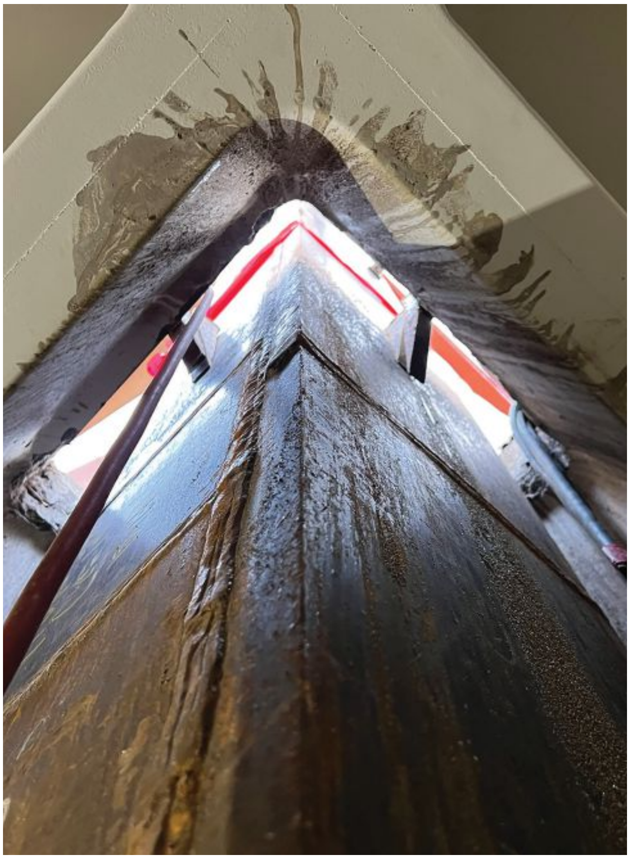
Architect
C + A Architects, Inc., Mill Valley, Calif.

General Contractor
Cahill Contractors LLC, San Francisco

Structural Engineer
ZFA Structural Engineers, San Francisco

Tyler Chartier Photography


Tyler Chartier Photography



2026 IDEAS AWARDS

EXCELLENCE IN ARCHITECTURE

Bradleywheelerphoto.com

UNIVERSITY OF ARIZONA ANDREW WEIL CENTER FOR INTEGRATIVE MEDICINE

Tucson, Ariz.

EXPOSED STEEL'S STRUCTURAL and architectural properties shine in a medical building that matches its desert setting.

The Andrew Weil Center for Integrative Medicine (AWCIM) and its plentiful steel components unite environmental stewardship and flexibility to accommodate health-focused programming in light, open spaces. It transformed a parking lot into a restorative environment connected to the University of Arizona medical district, and its unified design makes it a place of work and a living example of integrative health in practice.

The three-building project incorporates the seven domains of integrative health—sleep, resilience, environment, movement, relationships, spirituality, and nutrition—into its spatial configuration and daily operations. Organized around courtyards and shaded walkways, the buildings create a restorative sequence of indoor and outdoor spaces that foster collaboration, quiet reflection, and engagement with the surrounding Sonoran Desert.

The curved geometry of the buildings embodies continuity and flow, embraces outdoor courtyards, and captures mountain views. By shaping shaded gathering areas and channeling breezes through the site, the form itself becomes part of the building's passive strategies for comfort and wellness. High-performance glazing, deep overhangs, and integrated shading systems reduce heat gain while maintaining daylight and visual connection to nature.

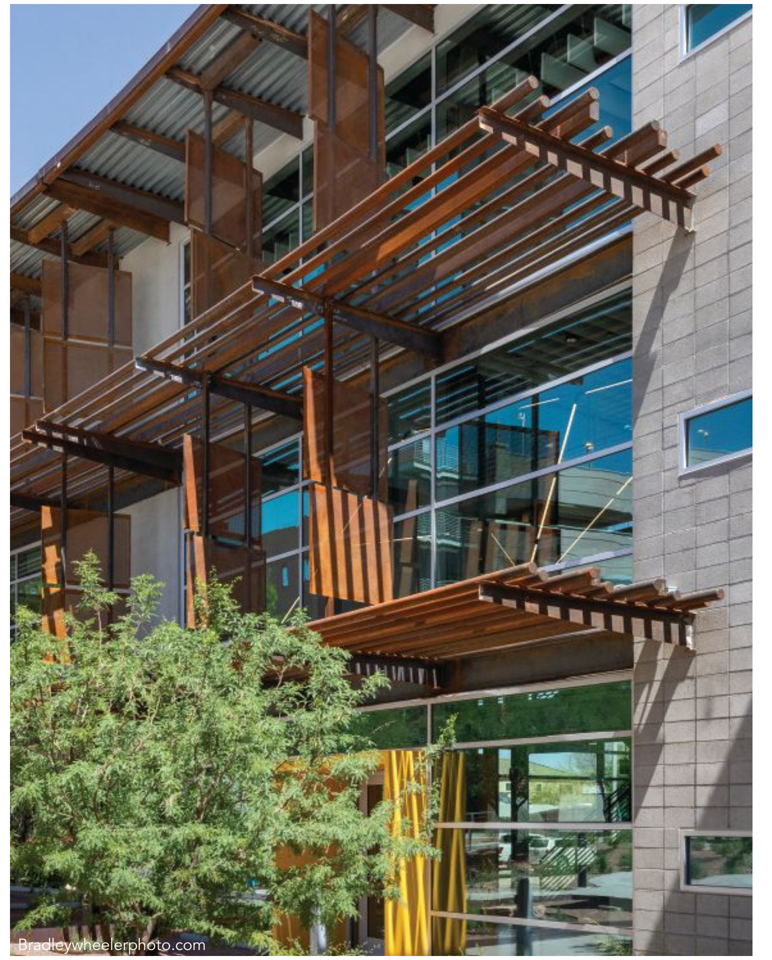
Structural steel was chosen for the project because it best helped the design express the AWCIM's mission. The AWCIM needed spaces that feel light and open while performing in desert conditions. Steel achieved that goal by enabling rooflines that visually link the three buildings and extended 30-ft canopies to provide deep shade and comfortable outdoor spaces.

Steel's ability to span large distances without interior support allowed interior spaces to remain flexible and adaptable for a range of research, educational, and community uses. Its precise fabrication enabled crisp, complex roof geometries to align with passive strategies for daylight, ventilation, shading, and integrating climate performance directly into the architecture.

Steel components are also part of architectural expression. The structural frame is intentionally exposed, making its function visible and reinforcing the AWCIM's values of material honesty, resilience, and craftsmanship. The visible structure illustrates efficiency and balance in the built environment.

Other systems, including cast-in-place concrete and heavy timber, were explored but could not achieve the required combination of long-span performance, slender profiles, and durability within budget restraints. Steel offered the opportunity to unify architectural expression, environmental response, and long-term adaptability in a single system, ensuring the center remains functional and inspiring well into the future.

Line and Space



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Steel as the Centerpiece

Steel is the medium for balancing geometry, constructability and resilience across AWCIM's three buildings and 34,000 sq. ft. The main building employed a sequencing strategy rarely used at this scale: steel framing was intentionally designed to be erected only after all masonry walls were complete. Inverting the typical workflow reduced tolerance conflicts, ensured clean connections between dissimilar systems, and allowed the masonry shear walls to be optimized for lateral resistance. The result was a hybrid system that blended steel moment frames with masonry walls to deliver efficiency.

The 13½-ft story height created significant challenges for routing mechanical, plumbing, and electrical systems. Corridors were framed with reduced-depth steel beams, a precise yet critical adjustment that preserved necessary clearances for MEP piping while maintaining structural performance.

The foundation design demonstrated ingenuity. An existing utility easement led engineers to pair drilled piers with conventional spread footings, creating a hybrid system that preserved site conditions and efficiency. A 3-in. separation joint at the main lobby accommodated building length, diaphragm ratios, and differing lateral systems, while reduced-depth beams provided spatial efficiency and programmatic flexibility.

In the conference center, structural steel enabled a continuous radius and a consistent roof slope. Aligning the framing along this curvature required meticulous digital coordination through modeling, ensuring that roof elevations, beam slopes, and ductwork routing were fully integrated.

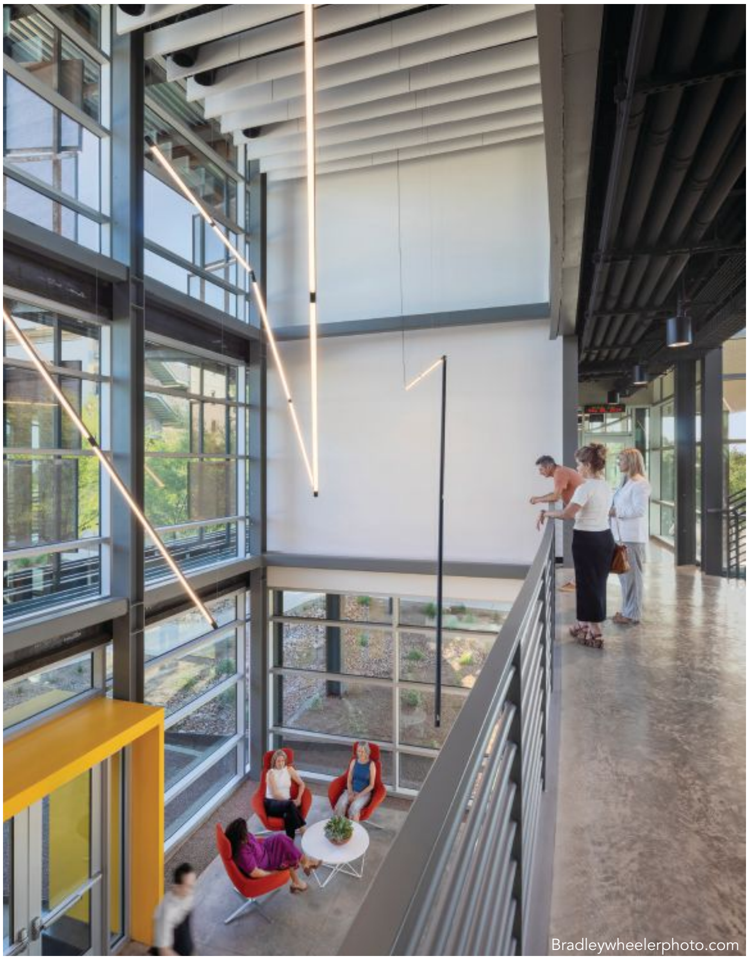
In response to desert conditions, the 30-ft canopies used tapered steel box beams and concealed connections, combining strength with slenderness. A lifted edge frame created a clear span over a pedestrian path, preserving connectivity and framing views.

These strategies reveal an engineering mindset centered on integration, where sequencing, coordination, and material efficiency allowed architecture, systems, and structure to work as one.

The building was designed and delivered with a strong emphasis on constructability, performance, and precision. Early coordination among the design team, structural engineer, and steel fabricator optimized steel member sizing, connection detailing, and erection sequencing to ensure design integrity while streamlining construction within the constraints of an active university campus.

Prefabricated structural steel elements were fabricated regionally to reduce transportation emissions and support the project's commitment to local sourcing and sustainability. These components were delivered in carefully sequenced stages, minimizing site congestion and allowing parallel work streams to continue efficiently across the three-building campus. The efficiency of steel erection reduced overall construction time and helped maintain progress during the COVID-19 pandemic-related supply chain disruptions.

Steel canopies, shading structures, and exposed framing were modeled in coordination with architectural and MEP systems to eliminate clashes and reduce field modifications. This digital coordination ensured that steel cleanly interfaces with masonry, glazing, and building systems, allowing for clean architectural expression and improved constructability.



The project's precision in steel detailing also supported sustainable outcomes. By reducing reliance on applied finishes and maximizing the performance of exposed materials, the building minimized embodied carbon and maintenance over time. The clear articulation of structure supports the project's emphasis on wellness and environmental responsibility.

Although drones and immersive tech were not primary tools on this project, digital visualization and early 3D modeling of steel assemblies played a vital role in client communication and construction planning. This process-forward approach ensured the building could be delivered with clarity, efficiency, and long-term resilience, demonstrating that constructability is an essential extension of design excellence.

The building's curved geometry meant traditional surveying methods could not achieve the accuracy required for anchor bolt and foundation placement. In response, the team used a robotic total station to lay out foundations and anchor bolts, ensuring perfect alignment with the steel superstructure. The result was a smooth erection process with zero layout discrepancies, demonstrating the value of technology-enabled constructability.

The former parking lot site created one significant challenge. On the site's west end, new drilled foundations had to be placed directly over a dense network of existing utilities. To avoid costly disruptions, the project team performed hydro-vacuum excavation to as-build every utility line before drilling caissons. This proactive coordination allowed foundations to be strategically located without a single utility strike, preserving campus infrastructure and maintaining the schedule.

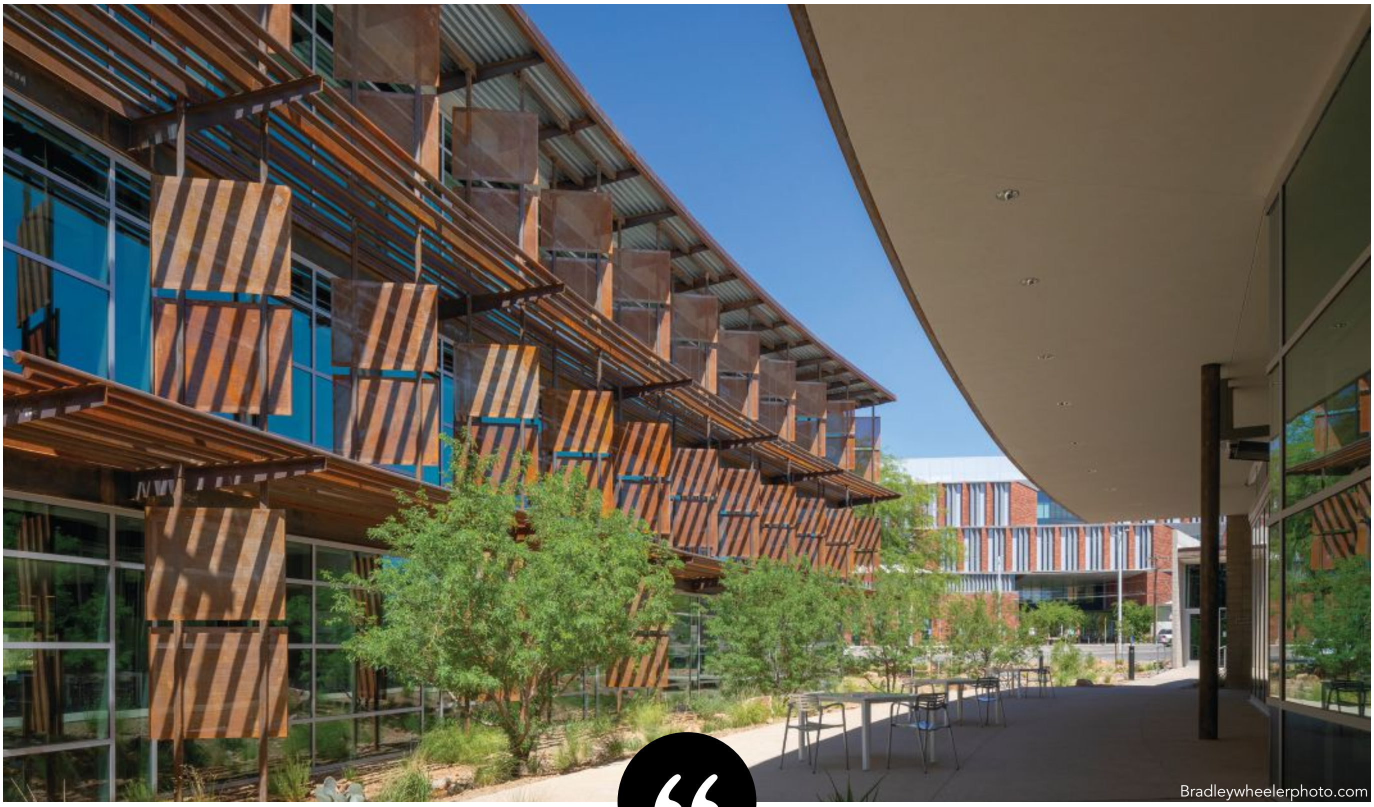
Emphatic Expression

Steel was also central in shaping a restorative architectural experience rooted in health, nature, longevity, and adaptability. The three buildings are unified through a network of steel-framed canopies, deep overhangs, and long-span volumes that allow light, air, and views to define the character of each space.

Steel's slender profiles enable wide spans and column-free interiors, fostering visual clarity, spatial flexibility, and direct engagement with the Sonoran Desert landscape. These open interiors support wellness-focused programming and research, allowing spaces to adapt to shifting needs over time without compromising structure or form.

On the exterior, exposed steel is expressed through canopies, overhangs, and shading fins. Steel framing is integrated with concrete masonry and glass and extends into shaded courtyards, covered walkways, and outdoor gathering spaces, creating seamless transitions between indoor and outdoor environments. These hybrid zones are essential for biophilic engagement and passive climate control, reducing energy demand while enriching the user experience.

Coordination among trades was critical because many finishes were intentionally left raw, including exposed CMU, sealed concrete floors, open ceiling spaces, and visible structural steel. Protecting and respecting these materials during construction required a consistent culture of care to preserve architectural vision in the final product. Structural steel frames were aligned with masonry walls for thermal mass benefits, and high-performance glass is nested within steel openings to maximize daylighting and preserve



> It's all steel, all exposed, and incredibly elegantly designed and detailed. It's not just one building, it's a conversation between multiple buildings. The façade is uncoated weathering steel, but it's used in a way to deal with shading and has its own expressive qualities."
> —Thomas Robinson, Lever Architecture

solar control. The visible detailing of these junctions reinforces material honesty and underscores the building's philosophy of integrated wellness.

Sustainable Design

The project's sustainability goals extend beyond operational performance to include structural optimization, low-impact material selection, and long-term resilience. Structural steel helped achieve them by enabling efficient spans, minimizing material waste, and supporting architecture grounded in adaptability and durability.

Steel framing was optimized through early digital coordination among the architect, engineer, general contractor, and fabricator, allowing member sizes to be calibrated for performance and efficiency. Long-span structural bays reduced the number of columns and foundations required, lowering overall material consumption and allowing for greater spatial flexibility to support evolving research and wellness needs.

All steel was fabricated regionally and includes high recycled content, minimizing transportation emissions and aligning with LEED and university sustainability targets. The building's exposed steel components, framing, overhangs, and canopies were detailed to eliminate unnecessary cladding or finish layers, reducing future maintenance requirements.

Durable, recyclable components, such as structural steel, support a long building lifespan with minimal maintenance. Because recyclable components can be disassembled or adapted for other uses in the future, they support circular design principles and reduce demolition waste.

Additional sustainability strategies include capturing all rainwater and HVAC condensate for landscape irrigation, restoring the previously paved site with native desert plantings, and reducing energy loads through integrated shading and daylighting. Structural elements like steel overhangs are not merely aesthetic; they are fundamental to the building's passive performance and its broader environmental ethic.

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2026 IDEAS AWARDS

EXCELLENCE IN ADAPTIVE REUSE

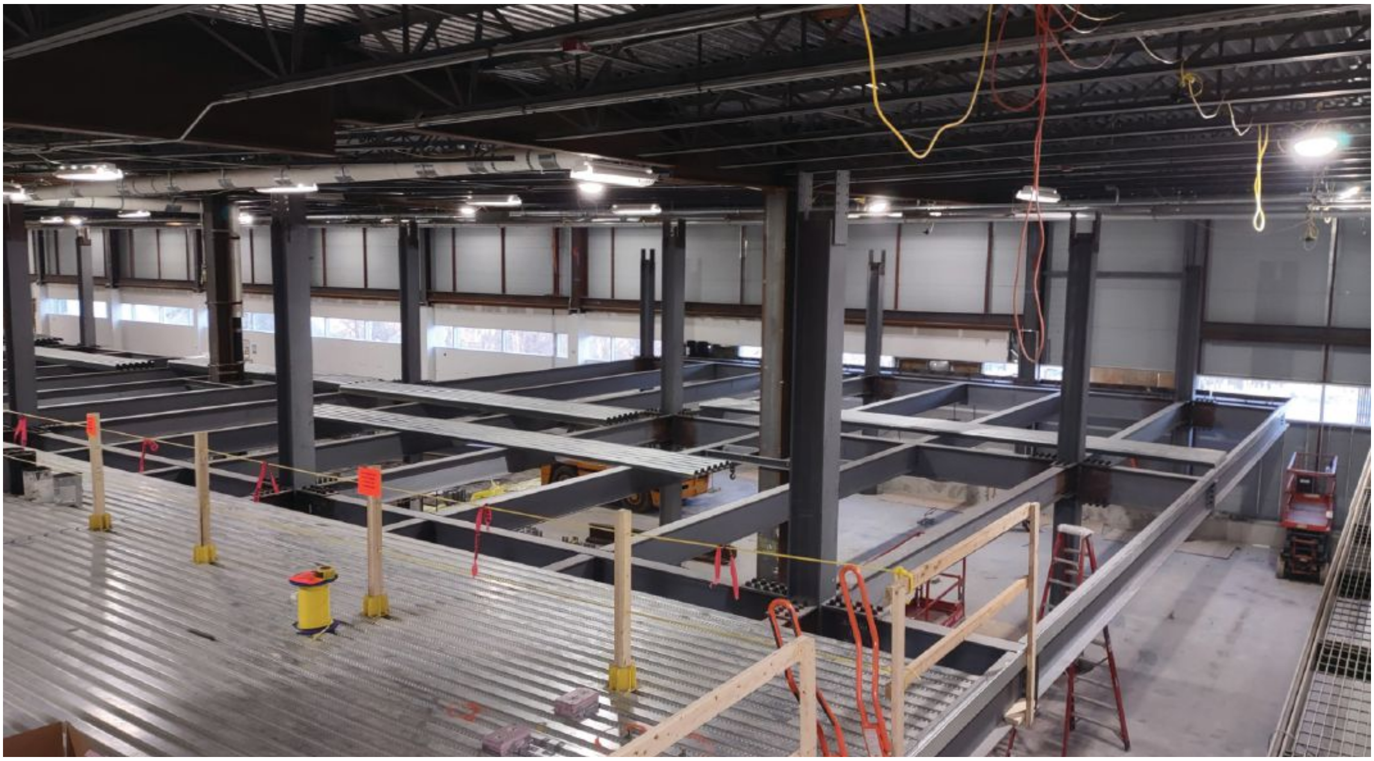
all photos of TierPoint Tek Park by Ondra-Huyett Associates

TIERPOINT TEKPARK HIGH-DENSITY ENVIRONMENT RENOVATION

Breinigsville, Pa.

A THREE-STORY data center in Pennsylvania's Lehigh Valley region proved that the data center construction boom can include adaptive reuse.

TierPoint, a hybrid IT solutions company, opened the TekPark Data Center in Breinigsville, Pa., made use of an existing industrial building by retrofitting it to accommodate the necessary gravity and wind loads for data center design and creating 71,000 sq. ft of new data center space constructed within the footprint of an existing building. The company purchased TekPark, a 137-acre industrial park and former corporate headquarters, to convert a 142,000-sq.-ft steel building into a data center. The original building contained LH joists, moment frames, bay sizes of 40 ft by 48 ft, and a 25-ft typical roof height. The new structural steel additions are a mezzanine entirely constructed within and protected by the existing envelope, and a new dunnage platform above the original roof.



A new slab-on-grade and new footings were constructed within the footprint of the existing building, and the new building grid is offset from the prior grid to allow for the footings to be constructed between existing footings.

The existing hung mezzanine, constructed with steel grating and strut channels, was removed to allow for the construction of the new mezzanine. It was the only original structural component to be removed and would have interfered with the construction of the new mezzanine. It was also the primary reason the original building lacked the capacity to support data center equipment. Additionally, demolishing it allowed for the existing reserve roof strength capacity to be repurposed for hanging conduit and chiller piping.

The new slab-on-grade is 16 in. lower than the existing slab-on-grade and supports batteries, switch gear, and the associated conduit and cooling systems. The new mezzanine has an elevation of 9 ft, 2 in. above the existing slab-on-grade. It houses 324 server cabinets, 108 transformers, additional equipment, cabling, piping, and more, creating a 150-psf average live load.

Elsewhere, the dunnage platform is approximately 6 ft above the existing roof at an elevation of 31 ft, 8 in. above the existing slab-on-grade elevation. It supports 15 dry coolers (weighing 21,000 lb each) and 15 chillers (19,000 lb each), all of which cool the servers and their supporting equipment within the building.

The new structure is composed primarily of wide-flange beams and columns with bolted moment connections for lateral load

> Structural steel played a critical role in repurposing this industrial building, and the project team developed a simple yet elegant solution to accommodate the sensitive equipment. The result is a model for data center developers looking to add capacity in urban and dense environments."
> —David Barista, *Building Design+Construction*

resistance. The mezzanine floor is a concrete slab-on-steel deck, and the dunnage has open steel grating for a walking surface. The dunnage steel is galvanized because it is exposed to the weather above the existing roof.

Typical bay sizes are 24 ft by 28 ft, and the new frame added about 50 new columns, mostly W12×79s. The mezzanine structure uses W16 purlins with W21 girders and is designed as non-composite to allow for any future slab removal as required. The dunnage platform is primarily constructed using W18 beams with horizontal WT bracing as a diaphragm.

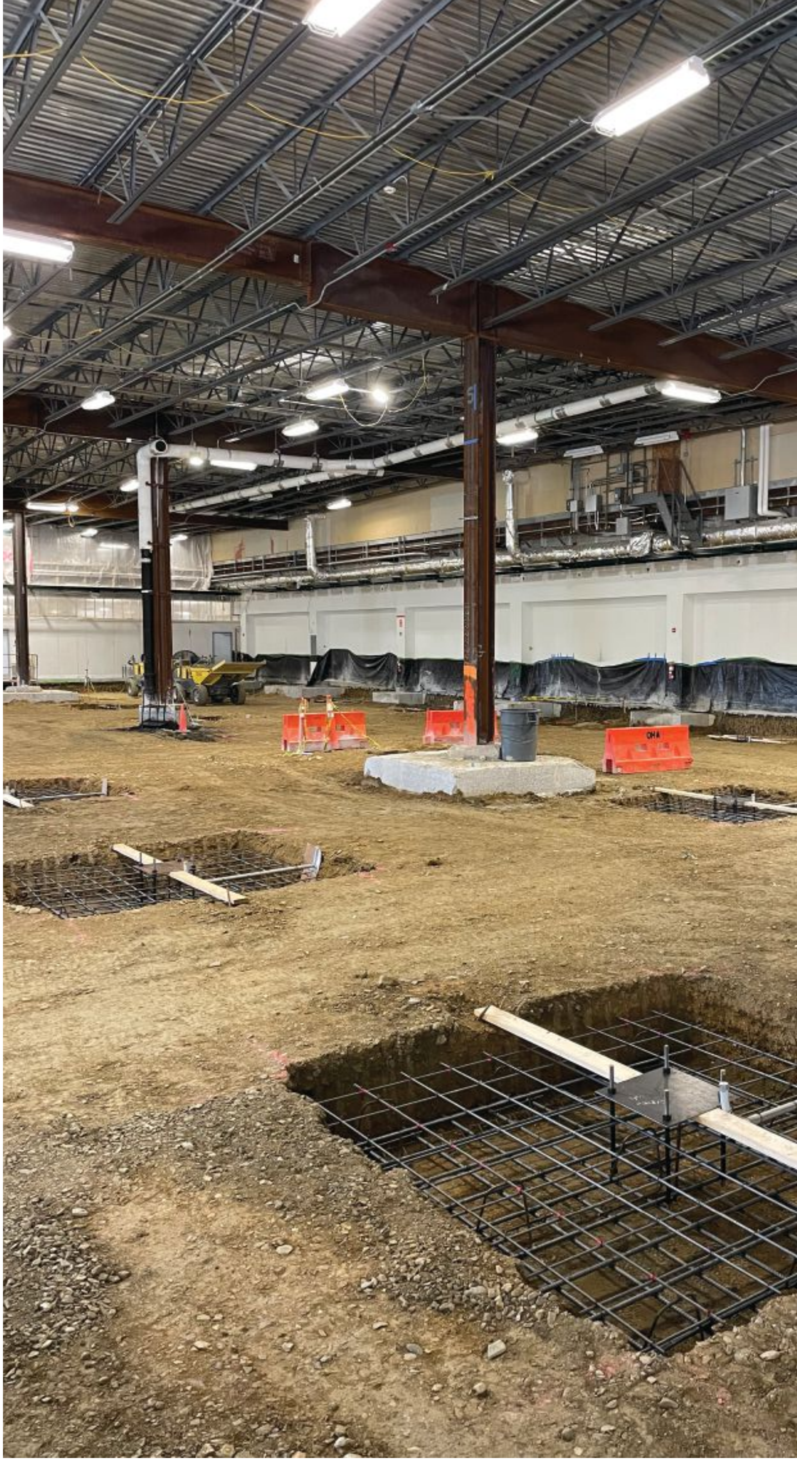
The mezzanine columns extend through the existing roof to support the new dunnage. The new dunnage and its extensive equipment are associated with significant wind loads. Because the existing structure lacked residual lateral-load resisting capacity, the new structure was built as an entirely independent structure with independent gravity and lateral-load resisting systems. Expansion joints are at each spot where the new structure abuts the existing.

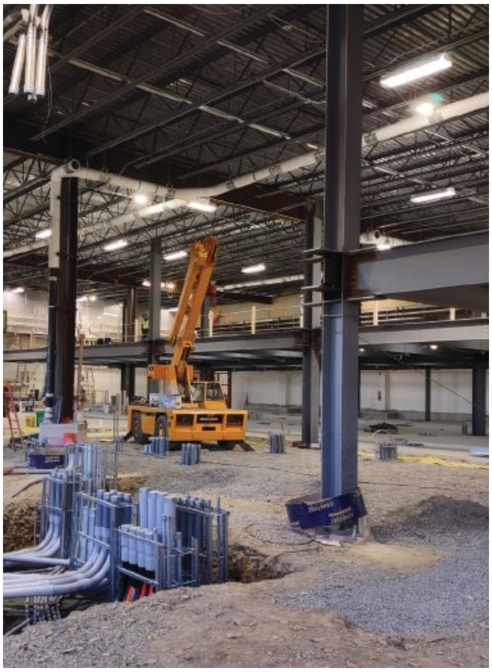
As is common with steel building adaptive reuses, the simplicity of integrating old and new when both are the same material made steel an easy choice for the new structural components. Using steel also allowed prefabricated pieces to be brought within the existing building envelope and for new structural components to be erected below the existing roof. Steel columns could be erected from above by threading them through a small roof opening to be spliced with the lower section of column.

Fabricating bolted connections allowed for steel members to be delivered to the site and constructed within and above the existing building. Additionally, they facilitated speedier steel erection and protected the existing structure from damage.

The new building columns were erected in two segments: a lower segment was brought into the building through a large wall opening, while an upper segment was lowered through a hole in the existing roof structure and spliced with the segment below. A roof curb was created to provide an expansion joint between the existing roof and the new columns and to maintain the watertight roofing system.

Mezzanine beams were brought into the building through the same large wall opening, which was closed when the





original wall finishes were restored. The mezzanine slab and deck are constructed around existing columns with expansion joints at the perimeter of all existing columns.

Before opting for reuse, the project team considered demolishing the existing structure and constructing a new building in the prior structure's footprint. That choice, though, would have meant complete demolition and disposal of steel, roofing, and walls, plus constructing a new building envelope.

Reuse avoided energy expenditures required to recycle steel and the disposal of wall and roof elements in a landfill. Maintaining the existing structure and envelope made the project a sustainability win while providing the same benefits as a custom-built new data center.

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Steel Team

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Steel Detailer
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all photos by Alexia Cota, Julia Westbrook

GREAT BARRINGTON COLD SPRAY DEMONSTRATION REPAIR

Great Barrington, Mass.

CONSIDER THE SIGNIFICANT time and convenience impact if spray-on corrosion repair for steel bridge members in the field became possible. A research team from the University of Massachusetts-Amherst and the Massachusetts Institute of Technology is on the path to developing it and thereby finding another breakthrough in steel additive manufacturing.

In May 2025, the team conducted the first-ever field deployment of cold spray additive manufacturing on a steel highway bridge. The ambitious project aimed to show that engineers can restore a bridge's cross-section by selectively printing back the lost steel with the cold spray in place of costly and disruptive current practices. The demonstration paired high-resolution 3D scanning with precision deposition to create a fully digital, targeted repair workflow. It was conducted on the Red Bridge in Great Barrington, Mass., which became a living laboratory to prove that corroded structural steel can be rebuilt in place and onsite in a matter of hours.

With no historical data for field cold spray on highway bridges, agencies needed assurance that this endeavor was more than a demonstration. Repaired segments will be recovered after the bridge's scheduled demolition and subjected to fatigue, bond, and structural testing—creating a dataset that will anchor future guidelines.

The cold spray method has been effective for corrosion repair in submarines, airplanes, and ships. Unlike those movable objects, bridges cannot be brought to a 3D printer. Rather, the repair device must be usable in the field. If scaled for bridges, this technology could transform bridge maintenance from a reactive, replacement-driven model to a proactive, additive model—reducing costs and disruption while extending the life of critical infrastructure.

Sophisticated Spray

Depositing steel back onto corroded steel using cold spray is not a patch, but a true restoration of the original member. The resulting composite behaves as a single unit, with continuous load-carrying capacity and no dissimilar material interfaces. Cold spray avoids heating the substrate, eliminating concerns about residual stresses, metallurgical softening, or distortion. The process delivers particles at supersonic velocities, causing them to bond mechanically and plastically to the surface without melting—creating a metallurgically sound layer with minimal heat input.

Other approaches were considered and found inadequate. The project aimed to validate a field-deployable structural solution, not a cosmetic or temporary fix. Moreover, selecting steel in powder form enabled precision and scalability. Material could be applied only where needed, reducing waste and creating cost-effective, repeatable repairs. Using a conventional structural-grade powder also demonstrated that the solution is practical—not an exotic, expensive alloy that would limit implementation.

Corrosion creates deep pits and irregular topography, which can threaten poor adhesion. The project team overcame the adhesion risk by using cold spray and following a protocol that prepared the surface with the same equipment use for later deposition, permitting steel to be printed back with surgical precision. The field also brought variable humidity, temperature, and access constraints. The cold spray parameters were tuned onsite, layer by layer, while real-time inspection confirmed thickness. This iterative approach ensured success despite environmental uncertainty.

The cold spray is like a prescription for an individual bridge. The UMass and MIT teams developed an approach to scan corroded beam surfaces and determine material deposition profiles. Rather than replacing steel members or welding plates, the project team designed a 3D fill volume, layer by layer, that reconstituted the original beam's cross-section. This approach introduced a data-driven, geometry-specific design language for repair. Instead of thinking in terms of standard plate sizes, the design was tailored to the beam's unique corrosion map. Every millimeter of deposition was intentional, representing a perfect marriage of digital modeling and structural engineering judgment.

The project reframes what design means in bridge preservation. It introduces the notion that repair can be additive rather than subtractive, and that it's possible to re-insert original capacity with precision rather than overdesigning with conservative replacements. This option could reshape how federal, state, and local agencies think about rehabilitation projects in the future.

Quick Strike

The entire workflow was conceived to fit within a single short-duration site visit, with minimal traffic disruption. Stationary lab-scale technology was adapted into a mobile configuration to stage at the bridge site, powered by portable compressed gas and powder feed systems, and operated safely in a confined work zone.

Layer-by-layer deposition allowed real-time checks, reducing the risk of wasted material or defective bonding. Digital repair planning ensured efficient nozzle paths, reducing operator fatigue and minimizing time under the bridge. Repair trajectories were planned to minimize worker repositioning and avoid nozzle collisions with stiffeners and flanges.

The bridge remained in full service during the demonstration, requiring tight coordination with local departments of transportation to secure work windows, lane closures, and safety barriers to allow the process to proceed without extended shutdowns. Equipment was mobilized rapidly, and work zones were contained to avoid overspray hazards. The result was a complete repair demonstration in just a few hours—a critical proof point for future scalability.

"Field deployment of cold spray additive manufacturing redefines steel preservation and restoration. It provides a structurally efficient and sustainable alternative to conventional repairs and has the potential to open the doors to other game-changing applications for any localized member restoration."
—Melissa Gradecki, SE, PE, AISC

Spray for Sustainability

The sustainability implications of this project are game-changing. Instead of discarding a corroded member and fabricating a new one—consuming energy, resources, and money—cold spray repair restores the member already in place. Widespread adaptation could drastically reduce the embodied carbon of bridge maintenance programs nationwide.

Material use was minimized because the repair was targeted. The process deposits only the necessary steel to restore capacity, avoiding waste and conserving raw material. Rapid execution also means less equipment operation, lower fuel use, and fewer hours of lane closures and detours—reducing emissions from idling traffic.

Perhaps most importantly, this project demonstrates that additive repair can extend service life, delaying costly and carbon-intensive replacements. If adopted broadly, it could shift maintenance strategy from condemn, remove, and replace to restore and extend, yielding major long-term sustainability gains across thousands of bridges. In many ways, it's also adaptive reuse. By integrating new steel with old, the project created a composite member that performs as one.

Taking an aerospace-grade technology and applying it under a live bridge for the first time was not merely an experiment in metallurgy; it was a statement about the future of bridge maintenance. By proving that advanced additive manufacturing can be brought out of the laboratory and onto real infrastructure, the endeavor opened the door to a new paradigm of rapid, non-invasive, and sustainable rehabilitation. Adaptive reuse through cold spray could become the cornerstone of a new national strategy to keep bridges open, safe, and strong without tearing them down prematurely. ■