

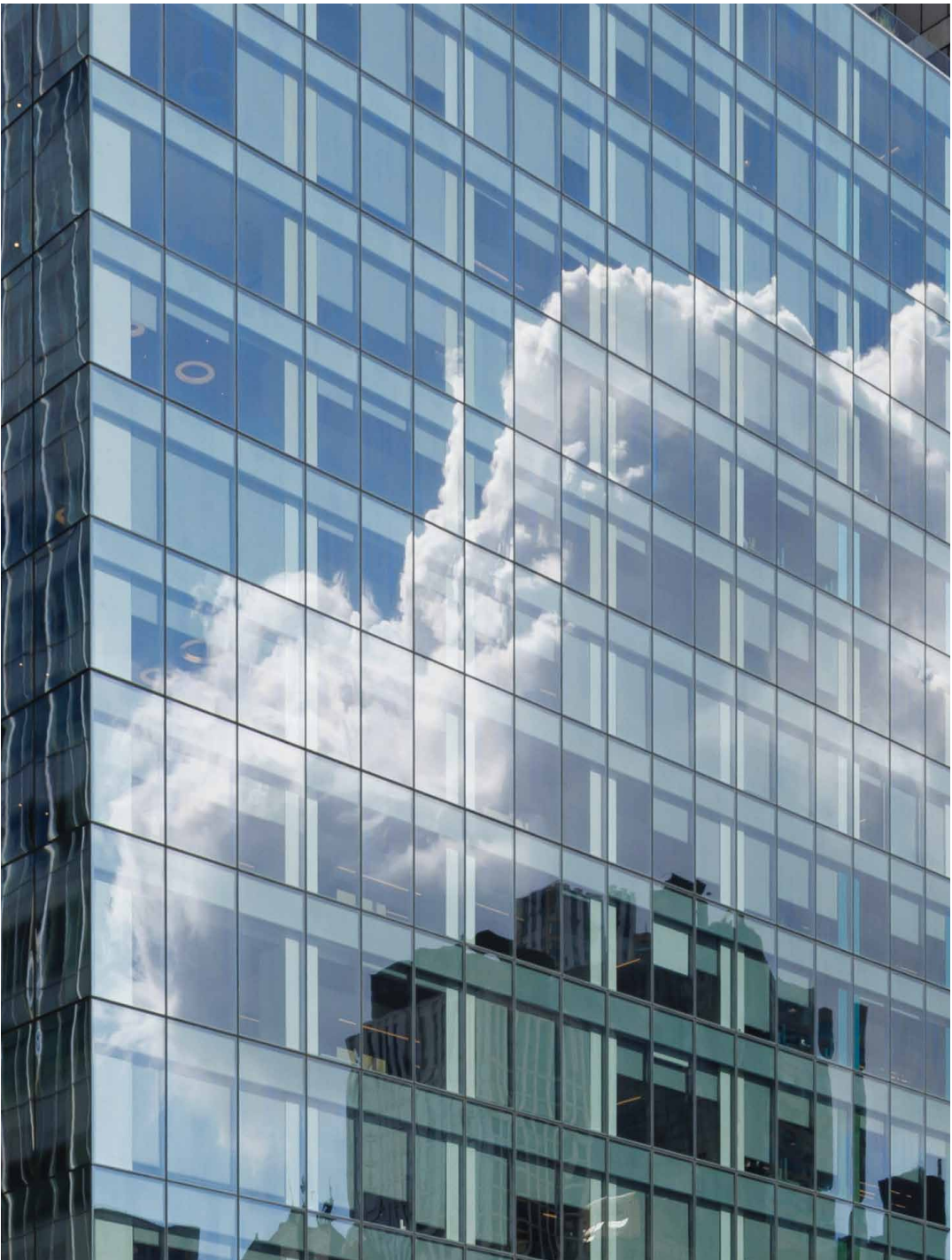
METALS IN CONSTRUCTION

PUBLISHED BY THE STEEL INSTITUTE OF NEW YORK AND THE ORNAMENTAL METAL INSTITUTE OF NEW YORK

Vol 21 2023/2024

DAVID GEFFEN HALL / RUTH BADER GINSBURG HOSPITAL /
TWO BRYANT PARK / JOHN A. PAULSON CENTER, NEW YORK UNIVERSITY /
550 MADISON AVENUE GARDEN CANOPY / PERELMAN PERFORMING ARTS CENTER /
50 HUDSON YARDS STAIR / TWO MANHATTAN WEST

1	EDITOR'S NOTE
2	DAVID GEFFEN HALL
8	RUTH BADER GINSBURG HOSPITAL
14	TWO BRYANT PARK
20	JOHN A. PAULSON CENTER, NEW YORK UNIVERSITY
26	550 MADISON AVENUE GARDEN CANOPY
32	PERELMAN PERFORMING ARTS CENTER
38	50 HUDSON YARDS STAIR
44	TWO MANHATTAN WEST
50	NEWS AND EVENTS
52	INFORMATION



Cover: Connie Zhou/JBSA, courtesy Davis Brody Bond; above: Colin Miller Photography, courtesy MdeAS

Copyright ©2024 by The Steel Institute of New York and The Ornamental Metal Institute of New York

Published by The Steel Institute of New York and The Ornamental Metal Institute of New York

The information contained in this magazine is merely general and illustrative in nature. The Institutes assume no responsibility for either the design or actual cost of any structure resulting from the use of the information contained herein, nor should anything herein be construed as either an endorsement or disapproval of any systems or designs indicated. Anyone relying upon or making use of this information does so at his or her own risk and assumes any and all liability or consequences resulting therefrom.

Above The newly transparent curtain wall of Two Bryant Park, which was replaced in a renovation designed by MdeAS Architects.

Cover An NYU student uses a window seat in one of the university's new dormitory rooms, which are part of the extensive program within the John A. Paulson Center at 181 Mercer Street, which was designed by Davis Brody Bond and Kieran Timberlake.

EDITOR'S NOTE

Challenging Work, Rewarding Results

IT IS UNDENIABLE THAT THE Covid-19 pandemic brought with it significant challenges for the construction industry. Labor shortages, supply-chain disruptions, and escalating material costs snarled project schedules and forced cancellations. What it didn't do was degrade the quality of work. Owing to the efforts of everyone involved, buildings and infrastructure completed during these uncertain years are more than meeting client expectations. Highlighted in this issue are some of these projects. The \$550 million renovation of **Geffen Hall**, built during the pandemic to open in 2022, two years ahead of schedule, was a skilled execution of a plan by architects Diamond Schmitt and Tod Williams Billie Tsien to transform a problematic hall into a more intimate, acoustically enriched setting for the philharmonic. The NBBJ-designed **Ruth Bader Ginsburg Hospital** faced challenges even before the pandemic, when flooding from Superstorm Sandy closed the complex. Construction carried on throughout the pandemic to give South Brooklyn a new, storm-resistant hospital restoring the delivery of high quality, all-weather care to the neighborhood. MdeAS Architects' **Two Bryant Park**, at 1100 Avenue of the Americas, challenged the limitations of pandemic constructability to take on major structural changes designed to reposition the office tower as a workplace of the future. The Covid-19 pandemic delayed the start, but not the opening, of LEED Gold-certified **John A. Paulson Center**, NYU's newest state-of-the-art academic building. Designed to foster interdisciplinary collaboration

and innovation by architects Kieran Timberlake and Davis Brody Bond, it assembles a mix of arts, athletics, and residential components to humanize the 735,000-square-foot complex. Repositioning was the order of the day for the iconically postmodern building now known as **550 Madison Avenue**. Snøhetta re-envisioned the office tower's formerly enclosed public plaza as a light-filled garden for midtown office workers. First announced in 2004, **Perelman Performing Arts Center** (PAC NYC) survived delays, disputes, and the pandemic to finally open its showcase for the arts in 2023. Ingenious solutions by REX, Davis Brody Bond and Magnusson Klemencic overcame an underground brainteaser to create the form of a simple, elegant cube. Foster+Partners' **50 Hudson Yards Lobby Stair** and SOM's nearby **2 Manhattan West** conclude this list by adding to the abundance of reasons for acknowledging the risks that workers took in building these projects during the pandemic, and for ensuring quality was not left behind.



Gary Higbee

Gary Higbee, AIA, Editor
higbee@siny.org
higbee@ominy.org

David Geffen Hall

An extensive structural-steel renovation and a theatrical redesign rectify a decades-old acoustical shortfall at Lincoln Center.

A CULTURAL LANDMARK IN MIDTOWN Manhattan, Lincoln Center's David Geffen Hall has hosted the world-famous New York Philharmonic and thousands of other performances for decades. Despite the building's prominence and prestige, it's no secret that the acoustics in the hall were below par for such a renowned venue. Originally designed for 2,400 seats by Max Abramovitz, the hall was already under construction in the 1960s when Lincoln Center succumbed to pressure to add around 200 more seats to accommodate as many patrons as Carnegie Hall. However, the designers failed to adjust the original acoustical plans for the larger venue. Unsuccessful attempts were made in the 1970s and the 1990s to fix the issue by reshaping the space and adding acoustic materials, but the problem remained due to the remaining spatial arrangements in the hall.

Finally, in 2015, entertainment mogul and philanthropist David Geffen contributed generously to a fundraising campaign to fix the acoustics once and for all. Lincoln Center commissioned NYC-based studio Tod Williams and Billie Tsien Architects (TWBTA) to redesign the building's communal areas and circulation spaces. The Canadian studio Diamond Schmitt Architects undertook redesign of the performance hall, which was renamed Wu Tsai Theater after Clara Wu Tsai and Joseph Tsai, a Lincoln Center



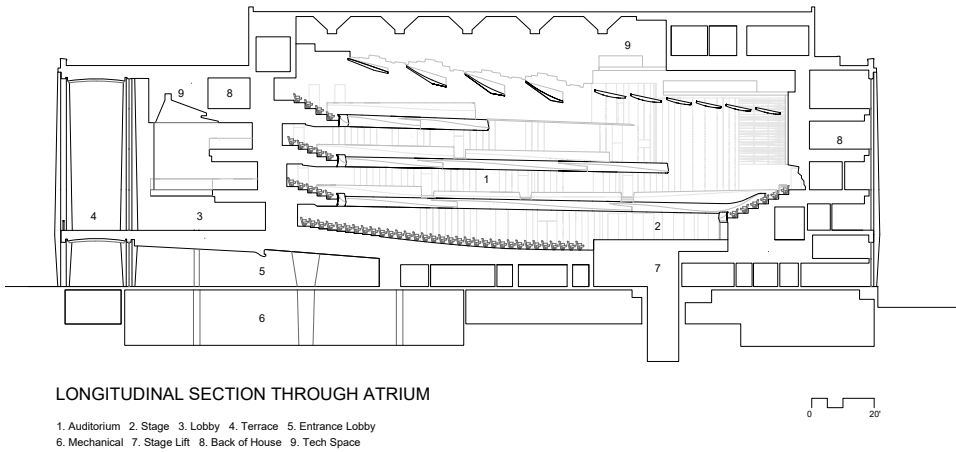
A rehearsal in the hall as seen from house right. The space was transformed from a rectilinear shoebox into a curvilinear concert venue with superlative acoustics and sightlines.



board member, made a donation to accelerate construction in 2020 during its pandemic closure. The hall reopened as the home for the New York Philharmonic in October 2022, nearly two years ahead of schedule.

As anticipated, the project was no small task. The solution involved fully re-gutting and rebuilding the interior structure to optimize the hall's volume to better reflect sound, while adjusting the clarity and blend in the space. The design and engineering team, which included structural engineer Thornton Tomasetti, decided to reprofile the side walls in the performance space, reshape and extend the rear and side balconies, re-rake the auditorium floor, and relocate the orchestra stage toward the center.

"Shifting the stage forward required relocating the lifts for the front of the stage and modifying the underlying hall floor," says Eli Gottlieb, managing principal at Thornton Tomasetti. "The revised stage and rear-stage access also had to be modified, requiring installation of new transfer walls to pick up the back-of-house



space while the rigging grids and catwalks over the hall were reconstructed and expanded to create greater flexibility and capacity within the hall." Shifting the stage 25 feet forward introduced a space to be used as a choir lift or for seating, to create a more intimate setting between the performers and the audience.

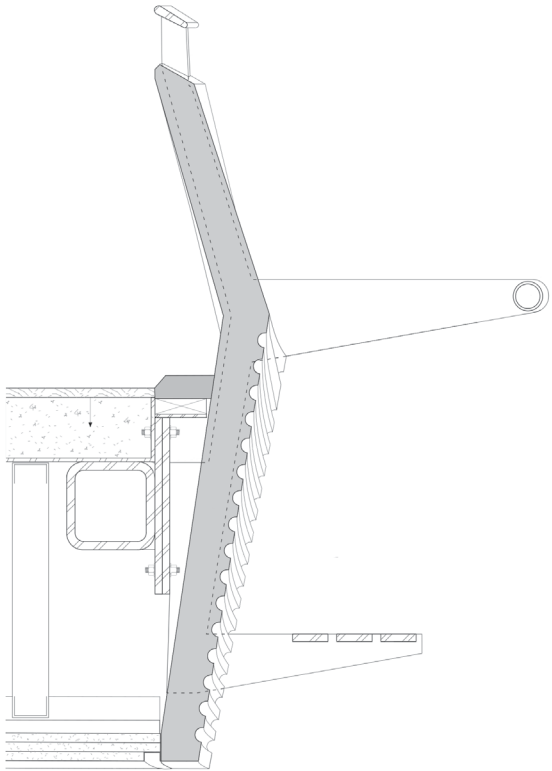
One notable acoustic challenge was the lack of height and volume needed to provide bass

response and reverberance. According to Graeme Reed, senior associate at Diamond Schmitt Architects, balconies create "pockets" that affect how sound reaches the side and back walls and is then reflected back into the room. "By removing the thick balcony structure and hangers and replacing them with thin, cantilevered orthotropic decks, we were able to maximize the vertical clearance between

Top David Geffen Hall construction, view looking out from a new choral loft and audience seating behind the stage.

Above A longitudinal section through the hall's atrium.

Facing The structural configuration of the hall's new curved balcony seating maximizes acoustic wall space while offering concertgoers ideal sightlines.



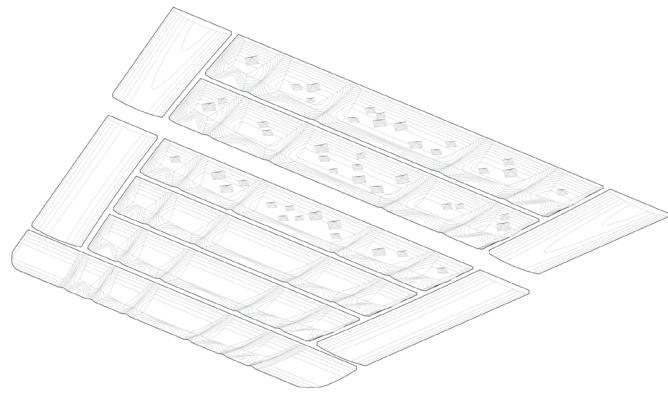
balconies, thereby maximizing the amount of reflective wall while maintaining optimal sight lines," he explains. "The balcony fronts are heavy by design to reflect and disperse sound, so the new thinner, cantilevered balcony slabs had to be engineered to support these."

Highly flexible, the new hall can accommodate orchestras, chamber groups, soloists, choirs, pop musicians, dance performances, and film screenings. More than a dozen motorized stage lifts and 10 motorized acoustic reflectors are designed to tune the hall to various modes. "Six of these run across the stage and are designed to blend and project sound out to the audience, and to balance how much energy gets returned to the musicians to help them hear themselves and each other," explains Paul Scarbrough, principal of the acoustic consulting firm Akustiks. "The four acoustic reflectors flanking the stage are primarily used to help musicians hear from one side of the stage to the other. Each of the 10 reflectors can be adjusted independently."

Northeast Stage, a stage rigging and curtain contractor, undertook acoustic panel erection with ironworkers from Local 580. Nick Vogelpohl, a project manager at Northeast Stage, says that due to the reflectors' large size, the specific load path from the truck to the stage was discussed and measured with the general contractor and consultants. When it came time for installation, however, the team discovered that the construction of several new walls now obstructed the intended loading path to the stage area.

After extensive discussion, the team realized that the only way to bring the reflectors into the building was to remove one of the hall's windows and crane them in. Due to a lack of space for staging the panels, one crew brought in two or three reflectors each day, and a second crew installed them at night to make room to receive the next batch. "This was an incredibly long week, but I'm very proud of the work our team did to make this happen as safely and effectively as possible," reports Vogelpohl.





As for the other acoustical design elements, Scarbrough's team designed a "sound-transparent" hand-bent steel grid that presents as a mesh with a clover pattern overlaying the ceiling. Upholstered fabric with a fallen-petals pattern on the chairs further enhances acoustics and aesthetics. A carefully detailed interior wood paneling improves the hall's resonance, particularly at bass frequencies. The team carefully evaluated wood species and ultimately selected beechwood to line the walls encircling the hall.

Some of the woodwork is flat while other portions are articulated or shaped to promote acoustical diffusion, according to Scarbrough. The percentages of flat to articulated areas, and the wavy pattern designed for the articulated sections, were carefully calibrated through close collaboration among the design team. The team also reduced the number of seats by 500 to strike the optimal balance between aesthetics and capacity. "To ensure that the walls would be suitably massive to support bass sound in the concert hall, the masonry support walls were first plastered to provide a smooth substrate for the wood," says Scarbrough. "The wood panels were then bonded to the wall using a system of French cleats and a thick coat of adhesive over the entire back side of each panel."

Regarding the building's role in supporting the acoustics, Scarbrough explains, "The structural design plays a crucial role in ensuring that the envelope of the room has the mass necessary to

sustain the bass frequencies in the concert hall, and to exclude unwanted noise from the outside world—both the public lobbies and the busy traffic on Columbus Avenue and Broadway."

Overall, Thornton Tomasetti's engineering work involved a series of surgical interventions and a focus on three primary areas: the hall itself, the attic catwalks and rigging grid, and the front of house space. Altogether, 785 tons of steel in 5,500 pieces were added to the building.

Due to the complex layout required to double the catwalk capacity and expand the rigging to account for the needs of contemporary performances, 40% of the steel pieces were used for this aspect of the project. To rebuild the hall's interior structure, a new steel skeleton was inserted into the cavities inside the architectural walls. This structure works around air-plenum requirements hidden inside the balconies' volumes, and is posted down on existing concrete girders. "This load path reversal required strengthening and cambering up the existing structure, which was too weak to independently carry the load, but too stiff and stubborn to let the new steel reinforcement do the job alone," says Gottlieb.

To resolve this incompatibility issue, the team jacked up existing concrete girders at selected locations and locked them in place against the new structural-steel reinforcement. They reconstructed balconies on new steel transfer girders that were put into place to load balance with the existing concrete girders under the hall. "The balconies are built of steel torsion tubes and a thin inverted

Left A drawing of the hall's acoustic reflectors.

orthotropic deck-like assembly," Gottlieb explains. "This minimizes the structural dimension of the balconies while achieving the concrete mass required for acoustical performance."

At the same time, the team's objectives of achieving a thin profile for the side balconies' premier front rows, guaranteeing the desired height ratio between the stacked tiers, and avoiding the sound being either trapped or dispersed too quickly meant they could not utilize typical steel to construct the front portion of the balcony structure. Instead, they used a continuous steel-plated deck filled with concrete. "The concrete provided the right stiffening mass, while the plated deck connected back to torsion steel tubes spanning between post-propped cantilevering beams," says Gottlieb. "To accomplish the perfect tridimensional dance of the architectural components, the steel framing, which was expected to moderately deflect while the hall was being built, was strategically cambered, monitored, and adjusted during construction."

A key design change required to support the extension—as well as to reshape and re-rake the rear balconies to create curvilinear seating with significantly improved sight lines—involved targeting points in the structure at which to add light steel construction. "Built-up steel reinforcement was added at the existing concrete cantilevers, and a large portion of tier three was demolished and rebuilt," says Gottlieb.

DAVID GEFFEN HALL

Location: **10 Lincoln Center Plaza, New York, NY**

Owner: **Lincoln Center for the Performing Arts, New York, NY**

Architects: **Diamond Schmitt Architects, Toronto, ON; Tod Williams Billie Tsien Architects, New York, NY** (original architects: **Max Abramovitz, Wallace Harrison, Philip Johnson**)

Structural Engineer: **Thornton Tomasetti, New York, NY**

Mechanical Engineer: **Kohler Ronan, Danbury, CT**

Construction Manager: **Turner Construction Company, New York, NY**

Structural Steel Fabricator: **Walters Group, New York, NY**

Structural Steel Erector: **Metropolitan Walters, Paterson, NJ**

Facing The stage was relocated 25 feet forward and the proscenium eliminated, allowing seating to wrap around the stage and bring the audience and performers closer together.

According to the structural steel contractor, Walters Group, the project's most challenging aspect was working around the existing segments and space restraints in the attic. In particular, the ironworkers had limited access to that space while welding steelwork. To address this, the team developed a solution to design connections and through-bolts to securely join the structural steel to existing concrete beams.

The public space renovations designed by TWBTA include a new lobby, nearly twice the size of the original, with a monumental suspended staircase; a Sidewalk Studio for classes, lectures and small performances; and two large promontory balconies suspended on hanger rods from the building's roof. The project team delivered a radical transformation of the existing hall in just 18 months, less than two years ahead of schedule.

While working in an empty building during the pandemic hastened the project's timeline considerably, the project team emphasizes that material choices played a key role in the workflow as well. As Gary McCluskie, principal architect for Diamond Schmitt, told the magazine *Advantage Steel* in 2022, "The ability for elements of the structural components to be prefabricated off-site and brought to the construction site as partially completed solutions was instrumental in achieving the timelines of the schedule." It's a strategy that will pay off for delighted audiences now and far into the hall's stellar-sounding future.

Tom Urban Photography Inc. This page and facing, images courtesy Diamond Schmitt





Ruth Bader Ginsburg Hospital

Courtesy NBBJ

Above A view of the hospital, looking south on Ocean Parkway. The FEMA-funded project includes a 10-story, 360,000-square-foot addition along with 40,000 square feet of interior renovations, a new floodwall encircling the campus, and the demolition of structures damaged during Superstorm Sandy.

Top An aerial view of the hospital, looking north on Ocean Parkway, showing the perimeter floodwall.



The design of the new NYC Health + Hospitals/South Brooklyn Health Ruth Bader Ginsburg (RBG) Hospital is a story of resiliency and highly coordinated planning to protect the flood-prone campus.

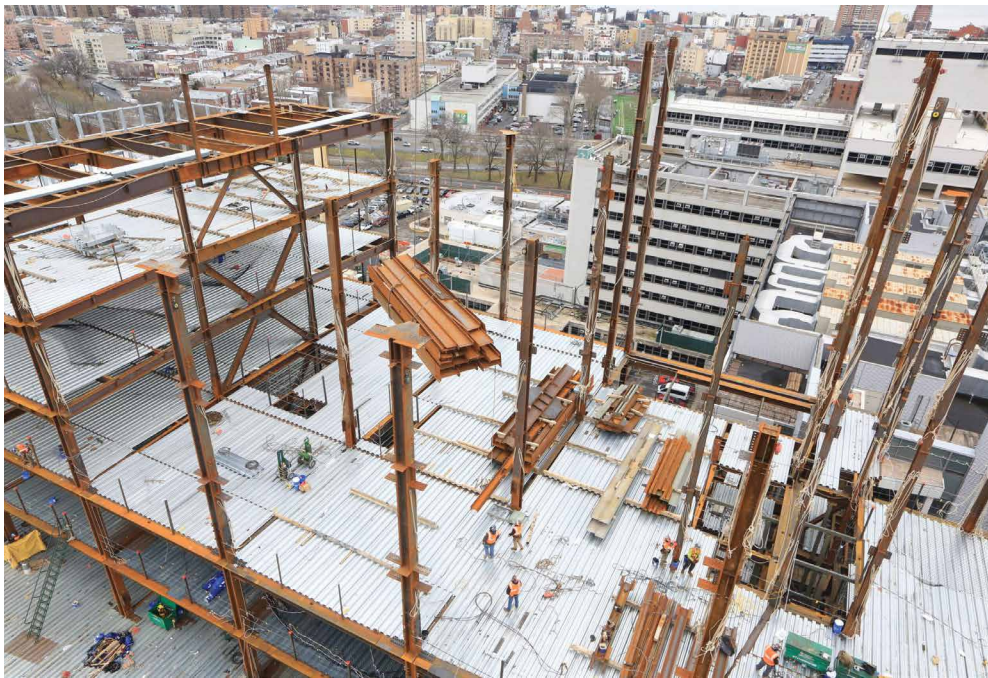
IN AUGUST 2011, HURRICANE IRENE forced the evacuation of 272 patients from Coney Island Hospital, which serves close to a million residents in southern Brooklyn. Then, in October of 2012, during Superstorm Sandy, floodwaters poured into the hospital, located less than a mile north of the Atlantic Ocean, damaging critical infrastructure and forcing a full evacuation. The situation was so extreme that fish were found swimming in the emergency room. The facility was devastated and had to be closed permanently.

In response, the Federal Emergency Management Agency (FEMA) allocated a \$923 million grant to NYC Health + Hospitals/South Brooklyn Health (SBH) to clean up the campus and build a new 11-story tower to house critical services and provide a second-floor emergency department, imaging unit, pharmacy, and labs. The program also included the design and construction of 1,720 feet of flood walls, flood doors, and a sliding flood control device. The new Ruth Bader Ginsburg (RBG) Hospital, designed by NBBJ, is a resilient facility built to withstand a 500-year flood event and transform care for the surrounding community.

The lowest level of the RBG building is protected to 4 feet, 6 inches above the finished floor, and to 10 feet above the floor for the elevators and critical infrastructure, both accommodating the FEMA 500-year flood level, with an additional allowance for future sea-level rise and wave action. The entire existing SBH health campus is protected to the FEMA 100-year flood level by a 4-inch-tall concrete site wall, which also incorporates steel sliding and self-rising flood-control devices. In addition, a new oxygen farm is protected by a 14-foot-high wall, a resilient enclosure designed to accommodate the larger oxygen tanks. A sliding gate protects the main entrance, a swing gate serves as a secondary means of egress, and a slab on piles supports weight and groundwater uplift forces. A flood-wall protection system winds through the hospital's Critical Services Structure building footprint, protecting critical lobby and support spaces while still allowing the exposed-to-air parking areas to accept floodwaters from a 500-year event.



Top and center Stonebridge Steel Erection erected the podium's structural steel during the height of the pandemic.
Bottom Integration of steel framing and concrete flood walls at the lobby level.



This page: Top and center: Courtesy Stonebridge Steel Erection. Bottom: Courtesy NBBJ

This page and overleaf: Courtesy NBBJ

To protect against the impact of future flooding, the architects placed less-critical program space in the lowest level, which includes an entry lobby, a community meeting room, and support spaces. Ambulances gain access to the second-floor emergency department via a vehicular ramp that leads to a patient drop-off zone.

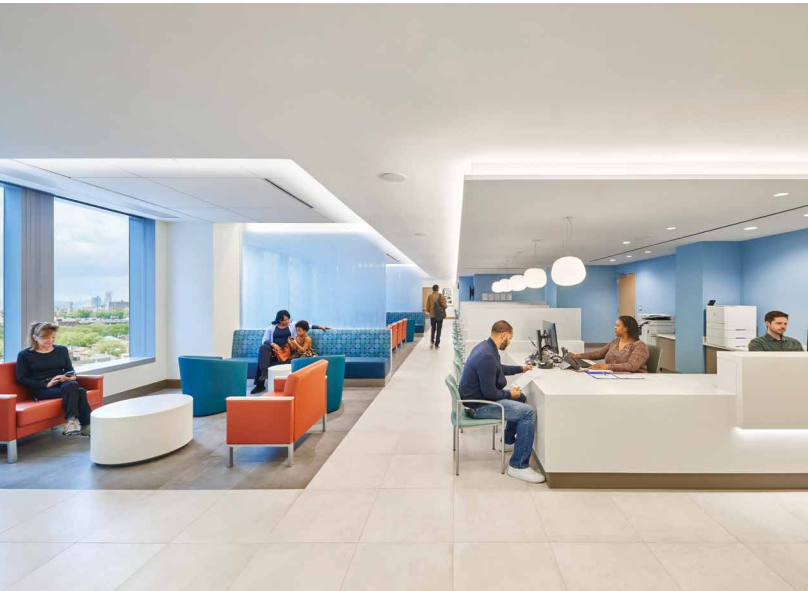
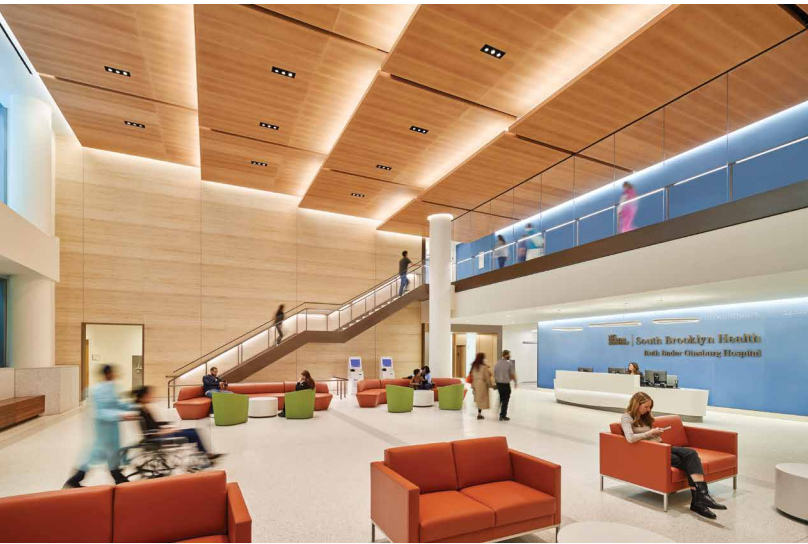
The new 346,785-square-foot building's structural steel frame was designed with minimal column transfers, which enabled the patient bed tower to be positioned above the raised podium. "The steel structure was organized so it could be erected first directly from the pile caps, and then allow the ground-floor concrete structure for the flood walls and slabs to be cast around the steel columns and bracing later, so as not to impede the critical path of the schedule," says Doug Gonzalez, a partner with LERA, the project's structural engineer. Stonebridge Steel Erection performed the project's structural steel installation.

Gonzalez explains that RBG's steel structure consists of strategically located braced frames around the services core and podium perimeter, which are supplemented by moment frames, organized mainly within the massing of the patient tower footprint. "This allowed for the clinical spaces to be unimpeded by structure, while maintaining structural economy," he says. The floor systems are primarily slabs on composite decks, supported by composite steel beams.

"The structural steel design also allowed the building floors to efficiently cantilever to the existing adjacent tower building, and allowed for corridor connections to be made after the RBG building was operational," explains Gonzalez. The structure provides support from the perimeter floor slabs and spandrels for the building façade's unitized curtain wall system of precast panels and extruded aluminum vertical sunshades. "However, at tall stories—such as at the mechanical floor—additional perimeter steel beams spanning between columns are added halfway between floors," notes Gonzalez. "The building structure for a hospital, which is designated as an 'essential facility' structure, is required by code to meet higher standards and criteria, including hurricane-resistant wind loading."

The structural steel design also allowed for the construction of concrete flood walls around the building columns and bracing, as well as connectivity between the flood-resistant system and the campus flood protection strategy. This involved the design and construction of a concrete site wall incorporating both sliding and self-rising flood control devices, to the FEMA 100-year flood level, with an additional allowance for future sea-level rise and wave action. "Existing storm and sanitary lines were retrofitted with backflow prevention devices to prevent water incursion, should the area outside the perimeter site wall become inundated with floodwaters," explains John C. Flanagan, a director at NBBJ.

The design also incorporates a number of interior floor-control devices. Gasket aluminum plank systems are installed in channels that are an essential part of the building. Moreover, concealed horizontal and vertical coiled fabric flood barriers are stored in a floor or wall coiling assembly. "Once deployed, the barriers are anchored to plate assemblies that are an integral part of the building



Top The new hospital's entry lobby and reception area.
Above A reception area for a fourth-floor endoscopy suite.

structure," Flanagan explains. "Self-rising flood barriers are a flood-control device," he adds. "They utilize the incoming floodwaters to deploy themselves, and flood doors are reinforced gasketed steel doors that use the water pressure itself to insure a watertight seal."

The building egress stairs all have "up and over stairs" to allow egress at all times, even if the flood-control devices are deployed. In selecting and designing the optimal flood mitigation systems for the project, the design team worked closely with resiliency consultant Arcadis to develop the most logical and cost-effective solutions for the campus.

The site conditions also posed challenges for setting the stage for the new building's construction. Located inside a flood zone, the site has a very high water table of less than 2 inches below grade. In addition, the geology of the site includes a fill layer of several feet of organic soil from former swamp deposits and sandy, glacial soil, with bedrock 500 to 600 feet below grade.

"This made any excavation on the site a complicated and costly shoring and dewatering effort, which necessitated a foundation system that included



16-inch-diameter displacement auger cast piles of varying lengths, 40 to 60 feet deep,” says Flanagan. “This supports concrete pile caps with a concrete spanning slab to create the lowest building level.”

Site conditions also informed the integration of utilities and infrastructure. The domestic water and fire water storage tanks were constructed as above-grade concrete tanks supported by auger cast piles, and the electrical transformer vaults were elevated to the fifth floor for both resiliency and constructability. “In addition,” says Gonzalez, “the proximity of the new RBG building to the adjacent tower building required the new pile foundations to be shifted away from the tower building footprint and the structure above to cantilever out.”

Flood mitigation and the site itself were not the only factors that informed RBG Hospital’s design. With lots of equipment, extensive MEP systems, and sensitive machines, hospitals carry greater structural requirements, explains Gonzalez. For example, the floor structure needs to satisfy hospital code requirements for limiting vibration response from occupant walking to ensure all medical equipment operates correctly. “This typically results in deeper floor systems with more material,” he adds.

Operating rooms and procedure spaces also require substructures to support ceiling-suspended medical equipment and anchorage for large-scale, floor-mounted medical imaging equipment. That equipment, along with the location and protection of critical hospital infrastructure, is the hospital’s endeavor to protect what matters most—the community it serves. Though it is not a question of if, but when, the next flood will come, patients and providers at the hospital know that this time, the facility will weather the storm.

Above A view of the Emergency Department ambulance ramp looking west on Avenue Z.
Facing A rendering of the hospital’s entry. The elevation will be visible from Ocean Parkway once the existing Hammett Pavilion is demolished and a new plaza completed.

RUTH BADER GINSBURG HOSPITAL

Location: **2601 Ocean Pkwy, Brooklyn, NY**
Owners: **New York City Economic Development Corporation (NYCEDC),**
New York, NY; New York City Health + Hospitals/South Brooklyn Health,
New York, NY
Architect: **NBBJ, New York, NY**
Structural Engineer: **LERA Consulting Structural Engineers, New York, NY**
Mechanical Engineer: **BR+A Engineers, New York, NY**
Program Manager: **STV, Inc., New York, NY**
Construction Manager: **Turner-McKissack Joint Venture, New York, NY**
Curtain Wall Consultant: **Vidaris, New York, NY**
Structural Steel Erector: **Stonebridge Steel Erection, South Plainfield, NJ**
Curtain Wall Fabricator and Erector: **Island Exterior Fabricators, New York, NY**





The renovated curtain wall as seen from a plaza to the building's south.

Two Bryant Park

Adapting a serially renovated building to meet today's energy requirements and upgrade occupants' experience at a prominent site, MdeAS Architects implemented a progressively conservative principle—"never demolish"—through highly transparent recladding instead of replacement.

Had a few decisions gone differently, or had a different era's priorities remained unchanged, the mid-rise building overlooking Bryant Park from the northeast corner of 42nd Street and Sixth Avenue might have disappeared. Thanks to the combination of zoning requirements and the foresight of its owner and architects, the structure now stands as an example of resilience and resistance to the intertwined temptations of overscaling, indulgence, and waste. Two Bryant Park (1100 Sixth Avenue) is something New York could stand to see more of these days, a mix of technical creativity and common sense.

The building already had a long and varied history. It began as a six-story, E-shaped, steel-framed masonry office building in 1906, gaining nine more stories in a 1926 expansion. In 1984 it transformed into Home Box Office's 330,000-square-foot headquarters by Kohn Pedersen Fox, expanding to its property line abutting a courtyard, shedding the masonry for a dark green curtain wall, and adding a two-story mechanical bulkhead. With a prime location, shadowed by Gordon Bunshaft's concave W. R. Grace tower next door on 42nd and Cook + Fox's One Bryant Park (the Bank of America Tower) across Sixth, the implicit question "Is this enough building for its site?" made it a potential candidate for demolition and replacement.

Today, however, more developers and architects agree with 2021 Pritzker laureate Anne Lacaton



Above W&W Glass uses a hydraulic actuator to test the curtain wall anchor assembly fastened into the floor slab for combined tension/shear load. In some areas, a new slab structure was attached for strength reinforcement of the original structure.
Left and facing Installation of the curtain wall by W&W Glass.
Facing, renderings Details of the facade's slender mullions.

(of Lacaton & Vassal) that one should “never demolish. Never subtract, remove, or replace. Always add, transform, and utilize, with and for the inhabitants.” Renovation and adaptive reuse have become well-recognized ways to address a building’s energy and emissions performance, taking both embodied and operational energy into account, offering a chance not only to keep materials out of the landfills, but to add new chapters to a building’s history. At Two Bryant Park, the latest extension of its functional life converts even the quirkiest aspects of its history into strengths.

Its new iteration by Moed de Armas and Shannon (MdeAS) Architects is very much a building of today, replacing what principal Dan Shannon, AIA, calls “the old solution to energy issues,” the darkly glazed and highly

reflective facade, with transparent glazing using three types of unitized curtain wall. It faces both Bryant Park and the privately owned public space Grace Plaza to its north, with large, dignified north and south entrances and a new double-height lobby featuring bright white Thassos marble, silver-champagne-colored aluminum, and highly polished stainless-steel furniture, connecting the two outdoor spaces in a dramatic gesture of urban unification. A central column bay and the first- and second-floor slabs were all removed to create the lobby. The changes are strategic, not wholesale, retaining viable structural components (foundations, beams, columns, and most slabs) while updating the lobby, facade, and mechanical systems.

Rechristened as Two Bryant Park, the building also carries the corporate identity of its sole tenant from the second story up, Bank of America (BoA). As the junior partner to BoA’s 55-story headquarters tower, it creates an institutional campus at one of the city’s central intersections. In its scale and reflectivity, it defers to the larger buildings nearby, yet its distinct identity and technical advances have made it (as of mid-2023) a building that punches well above its weight, winning both the 2022 Better Future New York Design Award

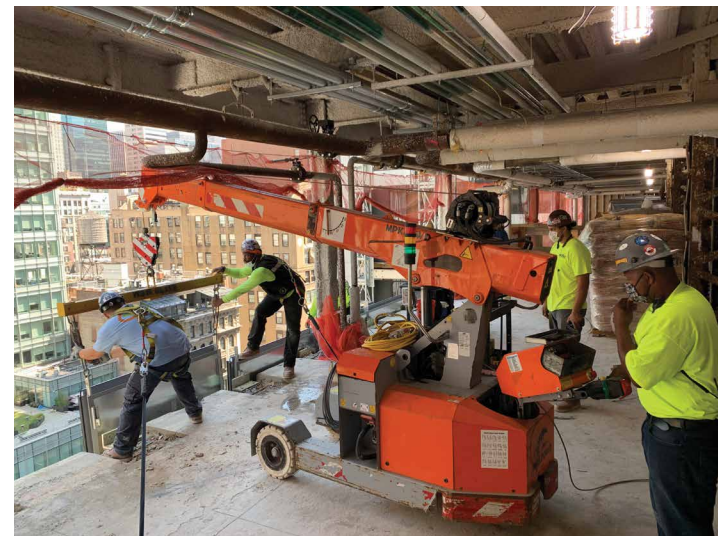
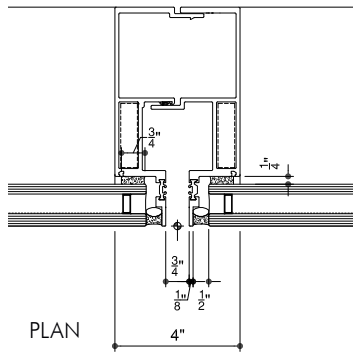
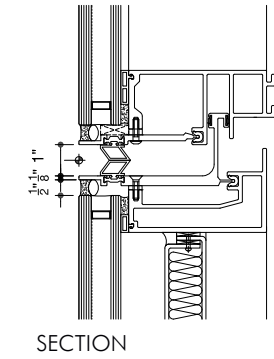
(Gold) in commercial architecture and the 2023 Pinnacle Award of Excellence in renovation/restoration from the Natural Stone Institute.

“Why would we remove a 1983 curtain wall and replace it with a 2020 one?” Shannon asks. “There are two major reasons for that: one is workplace, and the second is energy.” Originally relying on light wells for light and air in the days before reliable mechanical systems were available, he notes, today’s transparent Two Bryant Park puts the internal operations of the upper floors on display while welcoming more daylight and fresh air. A dedicated outside air system (DOAS) delivers local air within the compressed ceiling conditions resulting from the existing building’s low slab-to-slab heights.

The DOAS, used more commonly in Europe than in the U.S., efficiently supplies

preconditioned outdoor air to the interior. Advantages of a DOAS over the variable air volume (VAV) systems prevalent in North American buildings, Shannon says, include smaller ductwork requirements, greater zone flexibility, and better air quality. With New York’s Local Law 97 driving the energy metrics, he says, “the efficiency of that unit and the performance of the glass are integral to achieving compliance. One doesn’t exist without the other.”

Improvements in glazing since the 1980s, Shannon continues, allow greater clarity, larger panels, less steel and aluminum supporting them, reduced solar heat gain, and fewer gaps with unitized systems, “so that means less air and water infiltration over stick-built systems, which are a thing of the past.” Considerable work was needed at the building’s



perimeter to adapt the unitized system to the old building's irregularities and to install new steel to secure curtain-wall anchors without protruding past the property line. (Though an overclad project on a building constructed before 1968 can project four inches out, he notes, a complete reclad with complete wall removal requires tight observance of the boundary.) The extremely flat glazing units allow a visual uniformity that makes inconsistent slab-to-slab heights, inherited from the previous conditions, essentially imperceptible.

Senior director/project architect Jeff Ellerbrock points out the contributions of installer W&W Glass, which custom-fabricated the lobby's curtain wall (resembling a Pilkington Planar system) with a generous 25- by-25-foot entry wall, two Crane revolving doors, and a swing door on both ends, all glass with a horizontal tube. The Canadian firm Sotawall fabricated the unitized system used on floors 3 to 15. Trim work in the lobby, Ellerbrock says, has a satin stainless-steel base blackened by oxidation to yield "a nice hand quality," contrasting with a painted aluminum ceiling soffit. Everywhere except

the lobby front door, the unitized glazing is thermally broken with extruded aluminum, and metal trim on the face of the building is thermally broken from the structural mullions. The highly reflective metal and glass elements emphasize the space's relation to the park and plaza, enhance the experience for workers and visitors, and are consistent with high-energy performance.

With a single tenant on all upper floors, high transparency is compatible with "a harmonious and consistent look," Shannon says, comparable to the Seagram Building, and in contrast to the "possibility of a disjointed look from the outside" in multi-tenant buildings. Two Bryant Park is owned by Brookfield Properties and Swig Company, which together also own the adjoining Grace Building; this circumstance helped determine the scale of the reclad building and the decision to keep it. The owners evaluated the demolition option, Shannon recalls, before deciding that the aggregate variables of zoning, energy metrics, and air-rights conditions weighed in favor of adaptation.

"When ownership in the '70s built the Grace Tower, it took

the development rights of that building and piled them into that tower," he says. With the two-building site considered as a whole, a larger structure on the corner would have constituted an overbuild of the site, and "the only way to do that is to make a contribution to the city with regard to transportation, infrastructure, and so on, and that swayed the economics." Instead, "we never tore it down, and that for us is very important: that the building continues to make its contribution without ending up in a landfill, with an enormous expenditure of energy." Improvements to the B/D/F/M subway entrance included new lighting, tile, and surfaces rather than the extensive changes a new building would have required. Further transformations include a new roof terrace and renovations to Grace Plaza.

At this writing, the building is fully occupied except for the ground-level retail component, where floor-to-ceiling temporary BoA signage now appears on large lites of glass that will make the planned "fast casual" food and beverage spaces fully transparent. "It is all high-performance insulated," Shannon says. "We

used a slightly different thickness of glass because of the size," along with a slightly less reflective low-emissivity coating. "We certainly want that to be as transparent as possible for people to feel welcomed into the space." BoA has programmed the working floors so that open common workspaces and amenity spaces face Bryant Park, with conferencing and similar functions kept inboard; thanks to the park, the plaza, and the views from the roof terrace, BoA's workers reap the intangible benefits of the location.

Two Bryant Park appears at a moment when New York's commercial real estate market appears transitional, still weakened by the COVID-era trend toward remote and hybrid work, among other factors. Hosting a single organization, the building may be buffered from forces that lead developers elsewhere to consider residential conversions or hold off on new construction. Being one of a kind as a business entity, however, should not keep it from serving as a replicable example for other buildings whose preservable qualities are more important than their age.



Left The building's renovated lobby. **Facing** A nighttime view of 1100 Avenue of the Americas highlights the new curtain wall's lightness and transparency.

This page and facing: ArchExplorer/Pavel Bendov courtesy MdeAS



TWO BRYANT PARK

Location: 1100 6th Ave, New York, NY
Owners: Brookfield Properties, New York, NY; The Swig Company, New York, NY
Architect: MdeAS Architects, New York, NY
Structural Engineer: Gilsanz Murray Steficek, New York, NY
Mechanical Engineer: Cosentini Associates, New York, NY
Construction Manager: AECOM Tishman Construction, New York, NY
Curtain Wall Consultant: Front, New York, NY
Curtain Wall Erector: W&W Glass, Nanuet, NY



A view of the building's north elevation, on Bleeker Street, where student housing rests atop a 6th-floor terrace and the academic podium below.

John A. Paulson Center, New York University

When NYU needed not only to replace an aging gym, but also to fill in critical gaps between programs and facilities on its tight campus, this multifunction building overcame daunting structural challenges, replicating urban conditions with perimeter circulation and a high-performing crystalline facade.

Greenwich Village is a tricky location for an expanding university. New York University (NYU) is one of the defining institutions of this historic and dense neighborhood, yet its growth has exposed the limits of its physical assets, while generating a uniquely downtownish form of town-gown tensions. In 2010, the university announced a 3-million-square-foot expansion to be designed by KieranTimberlake (KT) and Davis Brody Bond (DBB). Among the problems this architectural partnership needed to solve involved the new John A. Paulson Center, a key component of the plan. Despite NYU's location in the epicenter of Manhattan's theater world and its prestigious Tisch School of the Arts and Steinhardt School of Culture, Education, and Human Development (featuring music and performing-

arts programs), the university lacked basic arts facilities. Its theater faculty "were doing most of their teaching out of rented theater spaces and studios," says DBB's partner-in-charge, Will Paxson, "and they didn't actually ever have a proscenium theater on the campus with a full fly tower." Even with the school's institutional profile rising steadily over recent decades, "NYU's square footage per student is roughly half that of its peer institutions," notes KT partner Richard Maimon.

Paulson Center aims to remedy that condition, qualitatively if not quantitatively. Opened in January 2023, it combines programs that would probably fill at least five separate buildings in a less spatially constrained university. Classrooms and study spaces, a five-story performing-arts pavilion, social and dining facilities, 13 floors of undergraduate dormitory space, and an 18-story faculty housing tower all coexist atop a subterranean athletic complex (including four basketball courts and a six-lane pool) in a 735,000-square-foot vertical campus. Only the absence of science facilities keeps Paulson from being essentially a full university in microcosm.

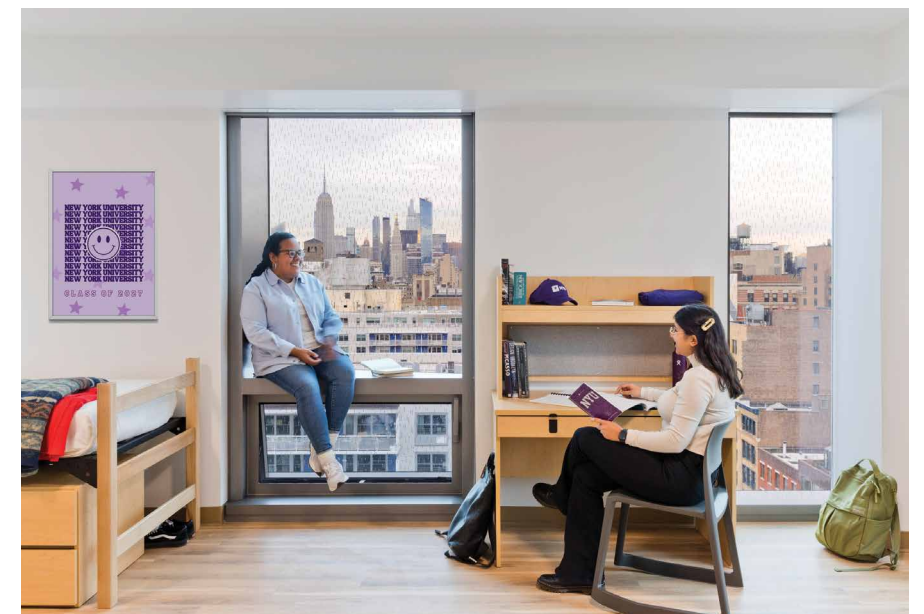
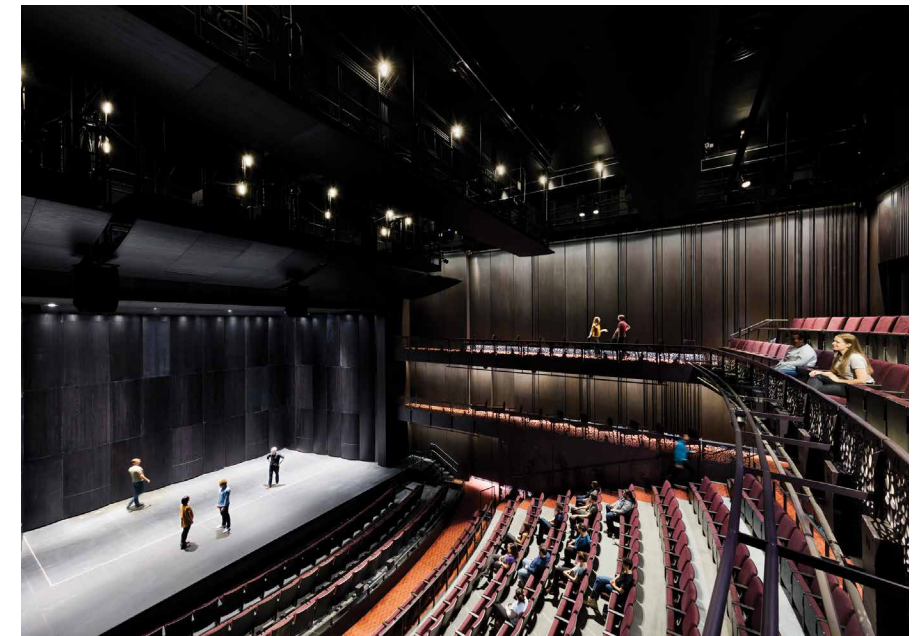


The southeast corner as seen from Hudson Street. The building's steel superstructure topped out in late 2020.

Paulson includes three theaters, the 350-fixed-seat Iris Cantor proscenium theater, and two roughly 150-seat graduate acting spaces with variable configurations, the African Grove Theatre and Warehouse Theatre. The proximity of the musical and theatrical spaces to Houston Street's subways, amid loose soil, made acoustic separation and vibration isolation essential; the southernmost two-thirds of the building has foundations on an isolation layer, along with false floors and double walls. Both residential towers use a Girder-Slab system with steel beams laid into precast decks. "It was lighter, like a concrete-on-metal deck system would be," Falconer reports, "and allowed us to fit more floors in the same amount of height for the building." The faculty tower, an important instrument for NYU's recruitment and retention of scholarly talent, has a separate amenity area and roof terrace, and is accessible only by a dedicated entrance at Houston and Mercer; Houston's width, Maimon notes, makes this large massing appropriate within the allowable zoning envelope.

"This site is large enough that we were able to get more space between the faculty tower and the southern end of the student housing blocks," Paxson says. "In the original approved master plan, the student tower could have been significantly closer; we more than doubled the distance between them," sparing faculty and students the privacy concerns of

From top A 6th floor "sky lobby" connects with student housing and a cafe. The Tisch & Steinhardt Schools Iris Cantor Proscenium Theatre has a 350-seat auditorium. Student housing features dormitory window "wedges" to provide additional space inside rooms.



This combination creates unusual structural conditions within the spatial constraints. Paulson arose on the site of NYU's obsolete one-story Coles Gymnasium, whose preexisting north and south basement walls are integrated into an earth-retention system. This includes a new water-excluding bathtub, since the groundwater table is 25 feet below grade, and supporting caissons that had to be drilled through some 50 to 60 feet of soil to reach bedrock. The large-volume arts and sports spaces call for long spans—the basketball courts alone need column-free sightlines and movable seating for varsity

games—and major load transfers, while the programs above them (particularly the residences) create substantial dead and live loads. The pivotal engineering challenge, says Brian Falconer, principal at Severud Associates Consulting Engineers, was, "How do you put a performing arts center on top of four basketball courts, and then a student housing tower on top of that?"

Paulson has a hybrid structural frame with 14,690 total tons of steel columns and beams (four trusses account for 1,400 tons, along with 85 plate girders totaling 2,400 tons, and three columns over 50 tons each) plus a plank system with 225,000 total square

feet of precast concrete. On the north side, 135-foot trusses over the courts support the arts center; three deep trusses are concealed between the first and second floors, and floors two through four are hung off the fourth truss at the fifth floor, creating the large ground-floor north lobby. The south side uses a cruciform arrangement with columns in the corners, Falconer reports. "We snuck those columns all the way down beside the proscenium theater and then beside the pool into the basement," he says, "so we shortened up the transfers on that side as much as we could, instead of making a really large transfer area."

open facing windows. Even with the diverse program elements, Paulson's envelope is slimmer and some 20% smaller than the city's approval process allowed.

A building that blends publicly accessible areas with residential zones and their security considerations needs distinct, unconfusing internal neighborhoods. Intuitive wayfinding, Maimon says, was a high priority in a decision to invert a customary spatial pattern. "The linchpin in our design work was reversing convention and putting circulation at the perimeter of the building, so rather than dark hallways between program spaces in the public parts of the building, in the first five floors you're effectively walking the perimeter," he explains. "It's naturally lit, it affords views, and it gives a sense of your placement in the city. It's like a city unto itself in the building." (This arrangement also centralizes heavier structural loads, Falconer adds.)

Paulson's transparent, glare-reducing curtain walls offer external observers a rhythmically varying texture of angled wedge panels, whose south-facing portions are opaque to optimize solar control. The crystalline, rectilinear geometries of the exterior create deliberate contrasts with curvilinear components in the interior, particularly the sweeping panels of lightly finished, FSC-certified American ash in the Commons space, which is curved in both plan and section. The academic podium, student housing, and

Previous spread and facing: Connie Zhou/JBSA Images courtesy Davis Brody Bond. This page: Jonathan Morefield Photography



faculty housing elements each have different curtain-wall systems, all contributing to Paulson's impressive energy metrics, with different U values for wall components. These range as low as 0.165 BTU/sf/hour/°F for the opaque spandrel area in the student tower (comprising 60% of its surface area), while the entire project's roof, benefiting from multiple green roof areas and terraces, has a U value of 0.032 BTU/sf/hour/°F. Energy use intensity for the building is 130 kBtu/sf/year. With NYU's cogeneration plant two blocks away, Paulson has no need for boilers, chillers, cooling towers, or emergency generators; reuse of waste heat for its desiccant dehumidification system adds efficiency and aids indoor air quality, a particular concern with an athletic facility during summer. The building achieved LEED Gold certification and puts NYU ahead of the game in compliance with the city's stringent Local Law 97.

The western facade, across from NYU's Silver Towers, gives the Village a new pedestrian gre-

enway, a privately owned public space dubbed the Greene Street Walk, reconnecting Bleecker and Houston streets. Soft lighting, designed by specialist Suzan Tillotson, spares neighbors and passersby the visual disruption of excessive nocturnal brightness. Frit patterns of varying density across all glazing on lower parts of the building not only aid in solar-gain control but are visible to birds, reducing bird strikes "well ahead of New York City adopting that as a requirement," Maimon points out.

All these details add up to more than a forward-thinking building for a high-profile institution that pays increased attention to its historically tense relations with its community. The project also offers a model of how architecture can help a university integrate its contrasting functions internally rather than leaving them siloed. In Paulson, the athletes, musicians, thespians, faculty members, and event goers from outside the school will all cross paths, and the quality of those encounters will benefit from the building's purposeful order.



Left A view of the building from the southwest corner of Houston Street shows (from left) the faculty housing tower, academic podium, and student housing towers.
Above A full building section, looking west.

Courtesy Davis Brody Bond

Connie Zhou/JBSA Images courtesy Davis Brody Bond

“It’s naturally lit, it affords views, and it gives a sense of your placement in the city. It’s like a city unto itself.”

Brian Falconer, Severud Associates Consulting Engineers

JOHN A. PAULSON CENTER, NEW YORK UNIVERSITY

Location: **181 Mercer St., New York, NY**
Owner: **New York University, New York, NY**
Architects: **Davis Brody Bond, New York, NY; KieranTimberlake, Philadelphia, PA**
Structural Engineer: **Severud Associates, New York, NY**
Mechanical Engineer: **Bard, Rao + Athanas Consulting Engineers, P.C., New York, NY**
Construction Manager: **Turner Construction Company, New York, NY**
Curtain Wall Consultant: **Heintges Consulting Architects Engineers, P.C., New York, NY**
Structural Steel Erector: **W&W Glass, Nanuet, NY**
Curtain Wall Fabricator: **Permasteelisa North America Corp., Bloomfield, CT**
Curtain Wall Erector: **Tower Installation, LLC, New York, NY**



The design team transformed an existing but underutilized Privately-Owned Public Space into a year-round garden.

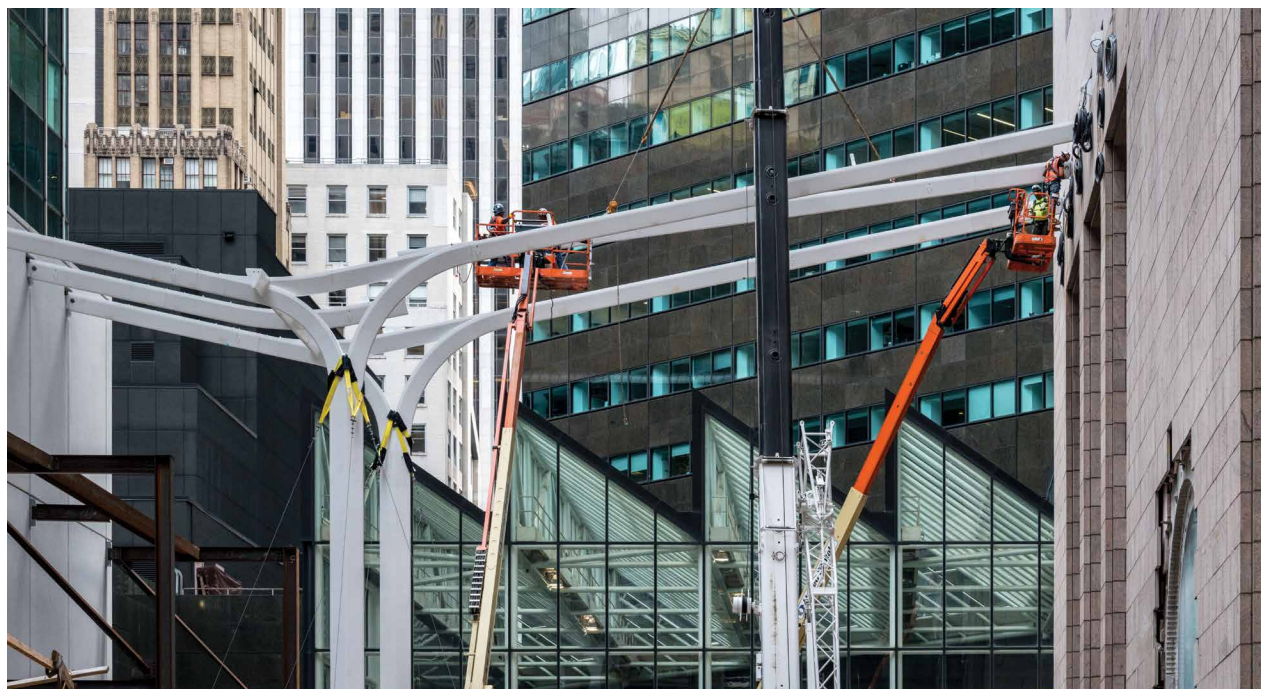
550 Madison Avenue Garden Canopy

At the base of the 1980s landmarked tower in Midtown, an existing but underused Privately-Owned Public Space has been transformed into a year-round garden protected by a nearly 70-foot-tall glass and steel canopy.

An elegant lean-to canopy topped with glass has replaced the greenhouse-like enclosed public space behind the original Philip Johnson and John Burgee-designed AT&T building, now known as 550 Madison. Designed, fabricated, and installed by a collaborative team from Snøhetta, Thornton Tomasetti, and Josef Gartner, the fluid, white steel structure rises from the garden as a series of largely self-supporting columns reinforced by a Vierendeel truss, eliminating the need for cross bracing and enhancing the courtyard's feeling of openness. Rounded blond-wood tables, benches, concrete planters, and a coffee shop in the garden echo the structure's flowing form.

Snøhetta designed the initial concept around two parameters: first, a New York City planning requirement that a percentage of the space be sheltered with glazing and, second, a desire to extensively plant the ground area with greenery and to filter natural light and hydration to the garden. "We really tried to return that sense of openness and exterior feel to the garden as much as we possibly could," says Snøhetta project leader Jake Levine, "but we were very specifically required to provide a certain amount of coverage."

The design also played off the neoclassical rounded features of the Madison Avenue facade and lobby, and its original white half-barrel vault courtyard canopy. The 1984 Johnson/Burgee entrance had been conceived as a hypostyle vault in which pedestrians passed through from Madison Avenue to the public space beyond the lobby. In the heady



This page and opening spread: Barret Doherty; facing page: Jonathan Morefield Photography

Facing page Construction of the garden's canopy support structure in August 2021.

Above The garden unfolds across the width of a block as a series of interconnected, rounded rooms.

rhetoric of the time, Johnson claimed Brunelleschi's Pazzi Chapel as a reference. The garden also had been open at both ends of the block. In 1991, when Sony leased the building, the company enclosed the lobby and replaced the barrel-vaulted canopy with an orthogonal enclosed atrium. "Some of the conceptual challenges we saw were how to create a unified design ideology for the canopy that complements the existing tower, references the half-barrel vault that was there from the original design, and also works well with the garden design below it," says Snøhetta project leader Jake Levine. "That's where we were starting from."

Thin, fluidly shaped steel beams form a diamond shape at the ground level, then branch out into two triangular tree columns above. The 68-foot height of the canopy allows the tall apertures of the 1984 building's lobby to be fully expressed below. Designing as narrow and minimal a structure as possible presented one of the main technical challenges. "The garden doesn't receive a ton of daylight during the day," Levine says. "It's only a few hours in the summer. Keeping the canopy as light and open as possible was definitely a big design consideration and an early conceptual idea that we

wanted to ensure was there throughout any of the variations we studied."

All the vertical columns attach to 550 Madison on one side through a pin connection to prevent the structure from falling over, and on the other, by resting atop a concrete party wall. But the structure gets most of its stability from the mutually reinforcing columns of the Vierendeel truss. "There's a little bit of a hidden system there," said engineer Marcin March, associate principal at Thornton Tomasetti. "A series of these members is tied together across the whole roof; once you do that, you essentially have a big grid that is nice and stiff. It stabilizes the structure as if it were a concrete deck, and that is tied to the adjacent building."

The canopy was built in sequence, with two initial tree columns and the Vierendeel truss on top already creating a stable system. Then the adjacent columns and frame were put on top, and next the next section. The diaphragm over which the glass fits creates a still horizontal frame, preventing the entire assembly from tipping and falling like dominoes. Then the glass attaches to the top with butterfly clips. "It was built up in sections from front to back," says March. "It was self-stable once you get in the three main

pieces, the posts, the beam, and the frame over the top. That self-stabilized the new bay.”

March emphasizes the importance of the collaboration among the architects, engineers, and fabricators in the design to achieve a high-quality result. The beams were prefabricated in the shop and then bolted in the field, so there was no welding on-site except for minor touch-ups. “It wasn’t one particular voice that was speaking louder than the others,” March says. “Any architectural intent that came through was adapted into the engineering and design, but if anything wasn’t quite working, the architecture adapted to it.”

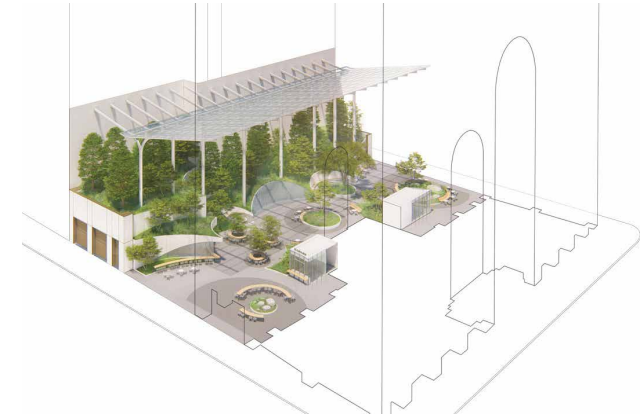
Squishy elastomeric rubber bearings allow some free rotation of the columns on the ground for earthquake safety. Conduits run inside the upper part of the beams to feed electricity to the light fixtures bolted to the outside. Drainage is also hidden within the lower section of the beams, with internal gutters capturing water from the roof for irrigation. The structure sits atop the existing steel structure of a multistory, below-grade car park,

which was also under renovation as a part of the larger Gensler-led office rehab project. The design team supplemented the existing network with some new steel supports.

The fluid white steel forms were all custom designed and manufactured by facade specialist Josef Gartner, which also took responsibility for the glass, leading to a seamless production and delivery process. As a result, Gartner could simplify the variables and focus on the connection of the beams into the building and slab at ground level, rather than potentially having to coordinate thousands of variables between the glass and the steelwork.

“The fabrication is exquisite,” March says. “The length, straightness, and relative complexity of these profiles, and the triangles intersecting with other triangles. The architecture was very rational to begin with, not focusing on complication but on detailing. Overall, there were very few humps in the process. It was a surprisingly and refreshingly plain-sailing project. It was a great collaboration and great delivery.”

Clockwise from top The canopy’s structure consists of a series of self-supporting columns reinforced by a Vierendeel truss, granting a sense of openness. A drawing of how the garden and structural canopies are positioned next to 550 Madison. A new lobby window creates a connection with the garden and with Madison Avenue.

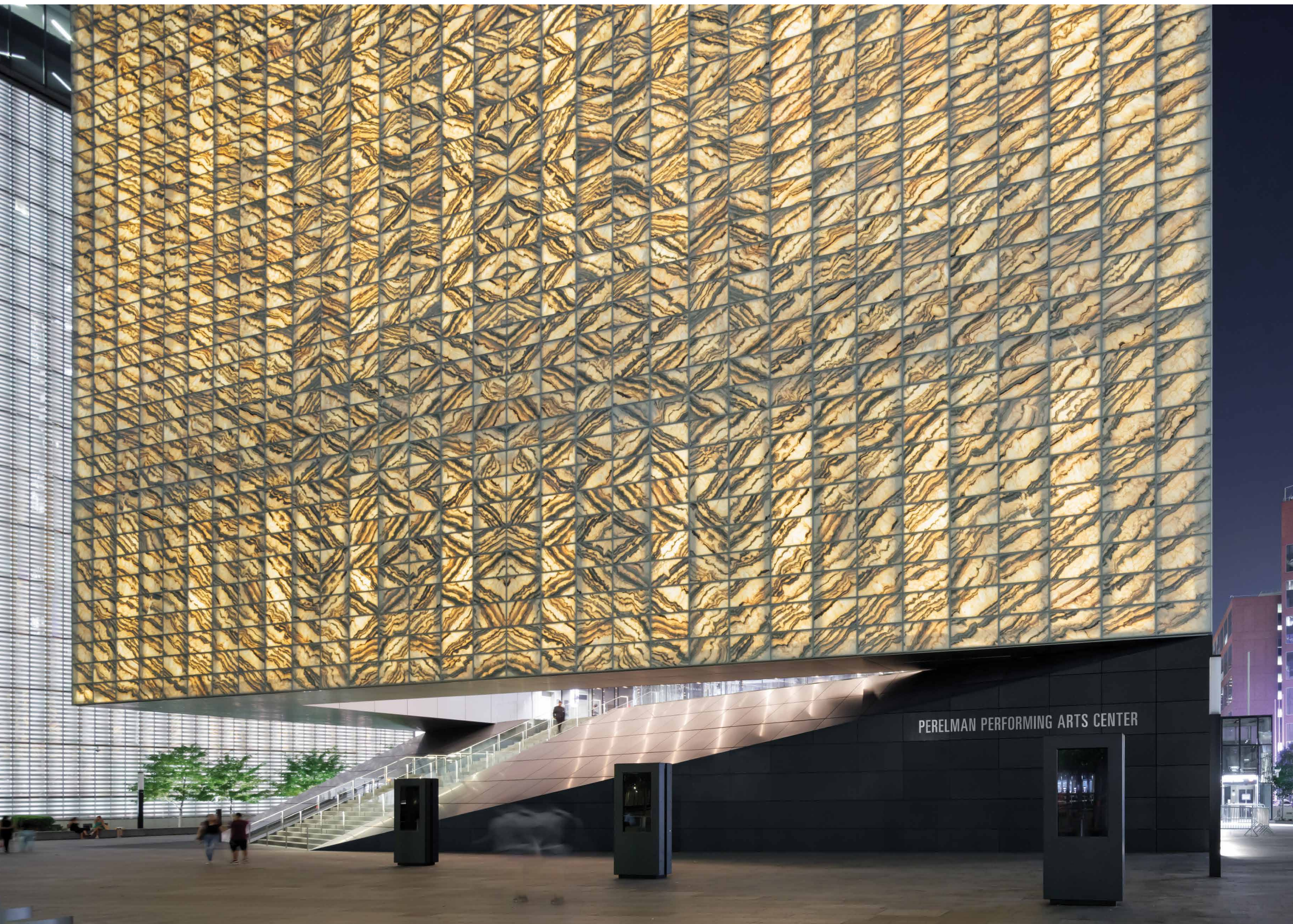


550 MADISON AVENUE GARDEN CANOPY

Location: **550 Madison Avenue, New York, NY**
Developers: **The Olayan Group, New York, NY; RXR Realty, New York, NY**
Architects: **Snohetta, New York, NY**
Architect of Record: **Adamson Associates, New York, NY**
Lobby Architect: **Gensler, New York, NY**
Landscape Architect: **SiteWorks, New York, NY**
Structural Engineer: **Thornton Tomasetti, New York, NY**
Mechanical Engineer: **Cosentini Associates, New York, NY**
Construction Manager: **AECOM Tishman Construction, New York, NY**
Structural Steel, Ornamental Metal Fabricator: **Orange County Ironworks, Montgomery, NY**
Structural Steel, Ornamental Metal Erector: **Gabriel Steel Erectors, Montgomery, NY**
Canopy Wall Fabricator: **Josef Gartner GmbH, Gundelfingen, Germany**
Canopy Wall Erector: **Curtain Wall Erector: Tower Installation, LLC, New York, NY**

Photographs, this page and facing: Barret Doherty. Drawing: Courtesy Snohetta





The glowing, raised cube is the built iteration of an idea first sketched out in Studio Libeskind's master plan for the World Trade Center disaster site more than 20 years ago.

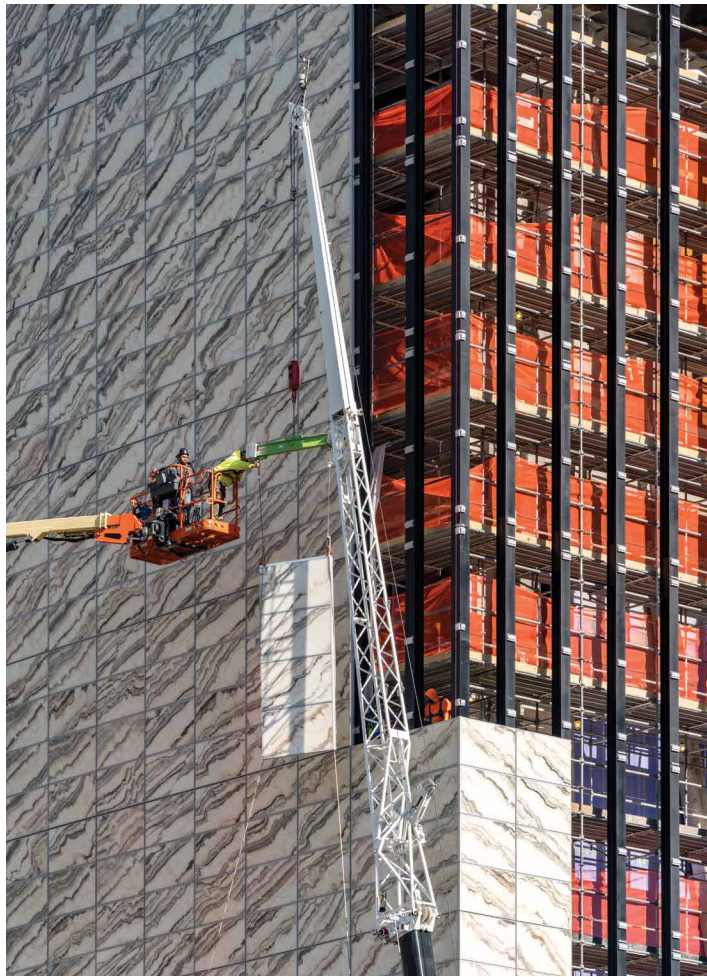
Perelman Performing Arts Center

A 138-foot-tall, cube-shaped building with a meticulously crafted marble facade brings radically flexible theater capabilities to Lower Manhattan.

THE PERELMAN PERFORMING ARTS Center (PAC) opened in Lower Manhattan last September, 20 years after being sketched out as a two-dimensional polygon in Studio Libeskind's master plan for the World Trade Center disaster site. Designed by REX with structural engineering by Magnusson Klemencic Associates, the center has a marble façade that forms a cube whose surface resembles a minimalist Agnes Martin canvas in stone. The veins diverge in the center, suggesting an extraterrestrial mouth or an artificial intelligence. The entire volume sits on seven supercolumns—six around the perimeter, one through the middle—bearing the entire weight of the structure, which is stationed above seven below-grade levels of transportation infrastructure.

Following a limited competition for the design in 2003, Frank Gehry had originally been commissioned to design the performing arts facility for the World Trade Center tower site. Taking the place of former tower six, the project was supposed to embody “culture” within the planned complex of roughly 15 million square feet of offices, transportation infrastructure, and memorials. Then-Manhattan borough planner Vishaan Chakrabarti claimed speculative real estate would be a “win-win” for the public at the Ground Zero site. But in 2014, Gehry's design was axed, reportedly because of its rising \$455 million cost and inattention to the functionality of its theater spaces, which were stacked vertically inside a splayed arrangement of boxes. After a second competition in 2015, the institution tapped Joshua Ramus of REX, former director of the OMA-NY office that participated in the 2003 competition, to offer an alternative design.

Little had been heard about the project in the succeeding years but, recently, a \$500 million



steel cube with a translucent and reflective stone facade began to appear on the site, which Port Authority construction administrators refer to as the WBVA, or World Trade Center West Bathtub Vehicular Access Transport Hub. Its primary structure uses a below-grade steel-support foundation built for the Gehry design in 2010 as a part of the PATH station construction. To distribute the load of more than 6,000 tons of steel concentrated on seven supercolumns, massive solid-steel nodes composed of stacked steel plates welded together around their perimeter attach to the columns, which connect to belt trusses bearing the weight of the entire PAC, with blast loads applied to the connection.

“Due to the stresses, you have to consider that all the parts are supported on six or seven columns,” says Federico Tosi, project manager for Italian steel manufacturer Cimolai, which also fabricated the steel of the landmark Oculus Transportation Hub (see *Metals in Construction*, Spring 2017). “All of the structure you see from the ground is bearing on only seven columns, so there is a lot of stress concentrated on a few points,” he continues. “To transfer all the weight of the structure to these points, we created these laminated nodes, basically composed of sandwiches of steel plate. To fabricate a node, we coupled several steel plates and joined and welded these plates together to form a heavy thickness of steel plate, because

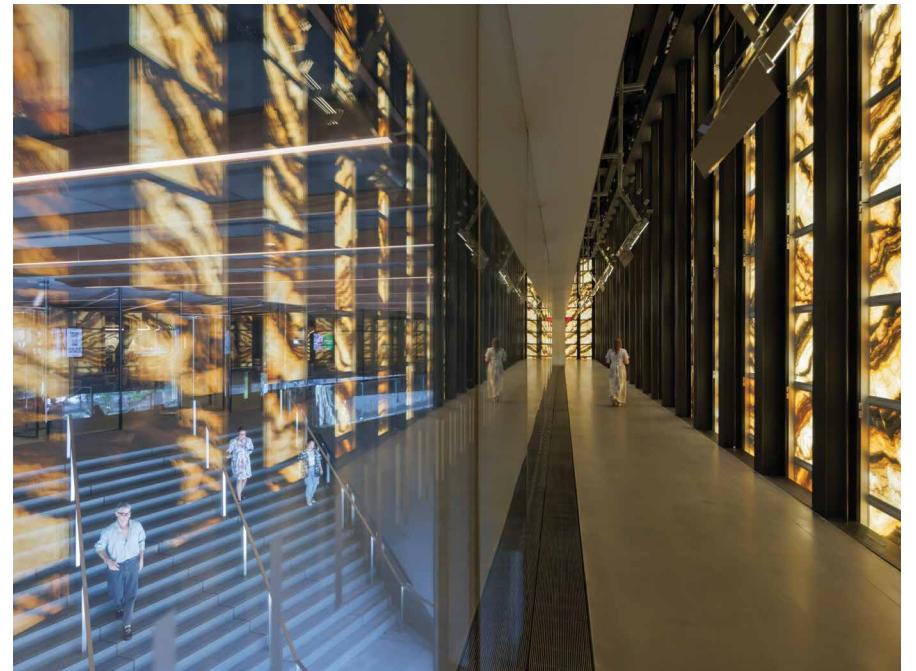
you don’t find 300 to 400 mm pieces of steel in the market.” The largest node was 18 feet tall and 5 feet wide, and weighed 16 tons, according to engineer Pete Range, senior associate at MKA. “We essentially had to fully develop every steel member that came into those nodes,” he says. “In some cases, there may be seven members coming into one node.” Below-grade sound isolators eliminate noise from the trains beneath, using a box-in-a-box construction that also keeps the theaters sound-separated from one another. Two massive trusses span the full length of the structure on the fourth level and roof, providing support for the intermediate framing of the theater boxes. The REX plan

This page, from left Erection of the center’s steel structure in the summer of 2020. The cube is wrapped in a facade of translucent, veined marble laminated within insulated glass. **Facing, from top** The interior corridor “bridge” on the lobby level. The John E. Zuccotti Theater during load-in for its first performances. The center’s mechanical room.

Jonathan Morefield Photography. Previous spread: Iwan Baan

This page: Iwan Baan

situates all three theaters on the same level, but the spaces can be configured into 25 different size-and-shape arrangements. Four 69-foot-tall steel “guillotine” doors, custom manufactured in the U.K. and assembled on-site, retract into pockets cut into the ceiling to separate and combine performance spaces. They weigh 23 and 46 tons each. Engineers at MKA carefully coordinated with steel contractor Cimolai, which manufactured and assembled the structural-steel components and shipped them from Italy. The team members developed a process of “shop assemblies” to plan what would be done in Europe and what would be done on-site. Workers at Cimolai laid out the large elements preassembled in the shop on five dedicated shipping freighters for delivery to New York. “It was interesting to see these big preassembled pieces kind of like LEGO pieces laid out in the shipping freighter, and then shipped over,” says Range. New York-based steel-erector partner Stonebridge Steel Erection received the parts and erected them on-site. Curtain-wall contractor Josef Gartner handled the system for the translucent Portuguese marble facade, which hangs on a series of vertical wide-flange steel members suspended from the roof and braced back to the structure, transferring the load to the top. The thin 3/8- to 1/2-inch slices of marble are encased in glass sheets, inserted into mullions, and book-matched to create the biaxially symmetric pattern. The effect is to use the marble veins as minimalist brush strokes. “The steel structure itself took a lot of coordination; the logistics on-site were tough because of the limited space we had,” says Robert D’Agostino, project manager for construction manager Sciamè. “We had two large cranes working simultaneously to install the steel. Once the steel was completed, we moved into the curtain wall, which involved steel mullions, which are exposed on the inside of the building. Those are all supported and fully hung from the roof. They are tied back for wind load at the fourth and the second floors. They span about 120 feet.”



The orange glow of light passing through the slices of marble can be seen on the outside at night and, during the day, it becomes a feature of the lobby and a 5-foot-wide perimeter walkway on the interior. “It’s really cool because that 5-foot walkway goes around both sides,” Range says. “And there’s a cruciform configuration through the middle of the structure, so if you’re standing in the middle, you have these slivers that look in each direction. When you’re on one of those corridors, you step back and see the full height of it, and you see that cool orange glow coming from the cladding.”

The stairway from the street to the lobby also deserves mention in the context of the recent popular and critical consensus against staircases as architectural features. The supercolumns are held back 20 feet on the south face of the PAC to support a cantilevered corner, where a pronounced staircase rises up the lobby. (Elevators can be accessed via a tunnel.) According to the venue’s website, the PAC is free and open to the public every day from 8 a.m. to 11 p.m. But once inside, visitors may feel compelled to buy a ticket now that they can see one of the city’s most versatile venues finally in action.



Above The facade’s marble was book-matched to create a biaxially symmetric pattern that is identical on all four sides of the building. It allows sunlight to radiate in during the day and project a glow from within at night.
Left, top An interior corridor on the theater level.
Left, bottom The venue’s restaurant, Metropolis by Marcus Samuelsson, was designed by Rockwell Group.

“All of the structure you see from the ground is bearing on only seven columns, so there is a lot of stress concentrated on a few points.”

Federico Tosi, Cimolai

PERELMAN PERFORMING ARTS CENTER

Location: 251 Fulton Street, New York, NY
Owner: Lower Manhattan Development Corp., New York, NY
Design Architect: REX, New York, NY
Executive Architect: Davis Brody Bond, New York, NY
Structural Engineer: Magnusson Klemencic Associates, Seattle, WA
Mechanical Engineer: Jaros, Baum & Bolles, New York, NY
Consulting Engineer: Silman, New York, NY
Construction Manager: Sciamé, New York, NY
Curtain Wall Consultant: Front, New York, NY
Structural Steel Erector: Stonebridge Steel Erection, South Plainfield, NJ
Curtain Wall Fabricator: Josef Gartner GmbH, Gundelfingen, Germany
Curtain Wall Erector: Tower Installation, LLC, New York, NY



Two lobby floors are connected by a stair of structural carbon steel, from which visitors can see views of Hudson Yards and a large-scale sculpture by Frank Stella.

Courtesy Foster + Partners

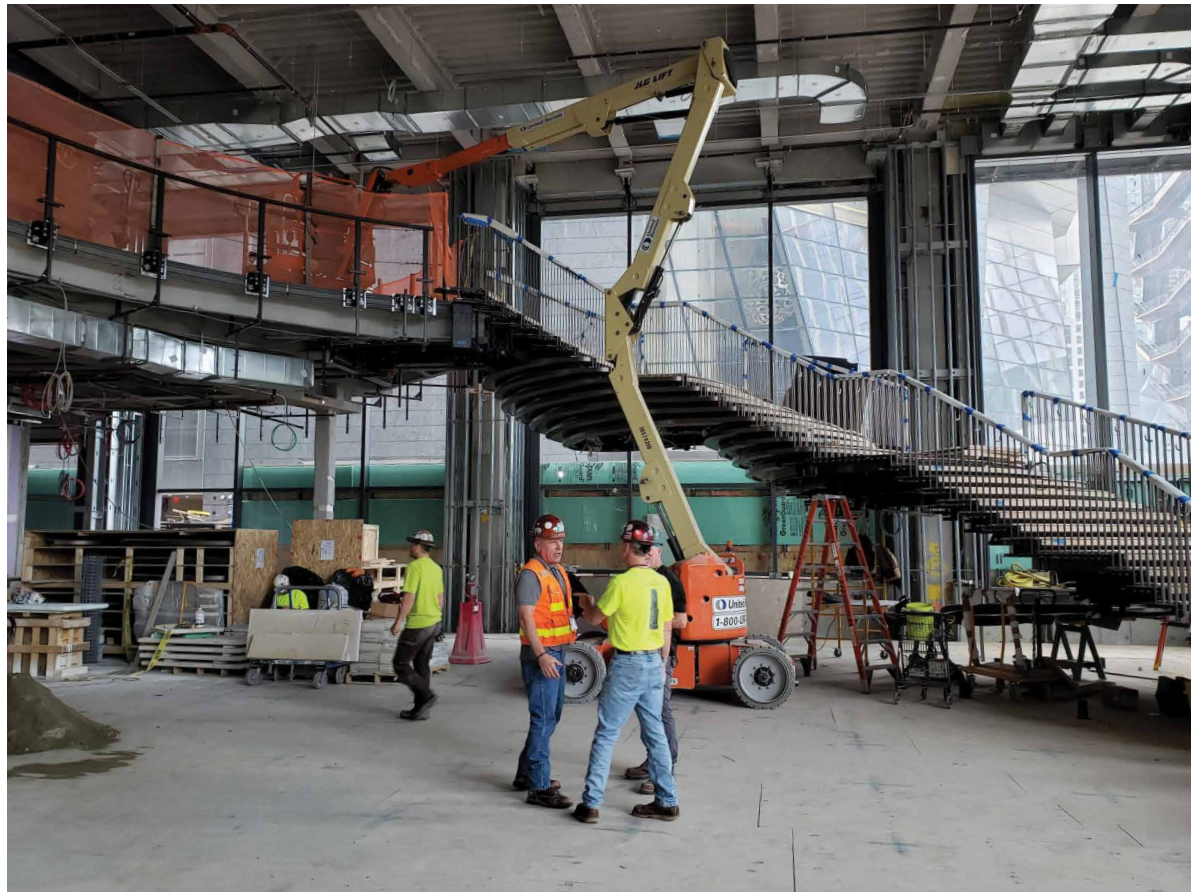
50 Hudson Yards Stair

Home to BlackRock and Meta, one of the city's largest office buildings shows off its prominence with a sculptural staircase that anchors its lively public entrance lobby.

THE RELATED COMPANIES' HUDSON YARDS development has rapidly transformed from a tourist area to a business district. Although The Vessel (see *Metals in Construction*, Spring 2020) and the shopping mall attracted eyeballs when the eastern segment of the Yards opened in 2019, in the long run the new district is likely to contribute more to New York's quality of life through its commercial and residential components. Foster + Partners' 50 Hudson Yards, a 1,011-foot, 58-story tower at the corner of Tenth Avenue and 33rd Street, adds 2.9 million square feet of office space to the city's economy and a distinctive tripartite stepped-back rectangular form to the West Side's profile. Opened in 2022, 50 Hudson Yards is the city's fourth largest office building (measured by square footage) and marked the completion of the first phase of the Yards.

With Meta and asset-management firm BlackRock among its major corporate tenants, 50 Hudson Yards offers visitors a first impression that is both dignified and dazzling. A key component is its lobby, exposed to outside observers through double-height glazing, with an array of artworks including sculptures by Frank Stella and a master staircase that is a sculpture in its own right. Sweeping upward and to the left in a gravity-defying curve to join the bronze-paneled mezzanine, the stairs combine the properties of multiple metals—structural carbon steel, aluminum trims, and a bronze patina—in a form that suggests both motion and strength.

The 40-ton staircase was designed in Italy, fabricated by Cimolai, shipped in pieces, and assembled on-site by a crew of expert ironworkers



Above In addition to steel, the stair features aluminum trims and a bronze patina. It was assembled on-site by a crew of ironworkers from Local 580, employed by installation contractor Monumental, Inc.

Facing page The stair under construction in 2021.

from Local 580, employed by installation contractor Monumental, Inc. Local 580 Shop Steward John Dougherty notes that Cimolai considers the staircase and other features to be “museum-quality,” with tolerances “to not even a millimeter,” he says. “This lobby’s going to be a jewelry box,” he said during a construction tour in 2021. Crediting foreman Jozef Siemon with managing the staircase project from its inception, Dougherty speaks enthusiastically of the precision of the unitized design and the no-nonsense procedures followed at the site. “We had guys attach metal plates to the stone so metal contractors could do the entire operation,” he says of the process of streamlining operations within a single trade, following a single set of work rules. Except for those who worked on the sprinklers and electrical system, all laborers involved were Local 580 members.

An observer can read the staircase visually as a toppled stack of wafers or coins organized into four segments, and divided by three floating platforms as the rounded stairs rise and turn. The platforms are functional and capable of supporting at least 30 people simultaneously, notes Siemon, allowing impromptu social gatherings and meetings, with all three platforms occupiable at once. Stability during construction was a top priority, achieved with custom-height jack stands weighing about 3 tons, dropped in from the ceiling beams. In keeping with recent practices in active design, the staircase’s prominent position and welcoming contours encourage self-powered vertical movement rather than reliance on elevators. However, an

elevator core is available for those with mobility challenges, adhering to American with Disabilities Act requirements; the building has 94 elevators overall. Solid bronze rails and glass rail around the landings contribute to the impression of strength without excess bulk.

Guiding visitors through the site to observe monorail-based façade panel installations and other operations, Dougherty emphasizes the cohesiveness of the ironworking crews, pointing out sets of brothers, cousins, and father-son pairs among the journeymen. The atmosphere here is familial yet rigorous—the standards are high. “These guys are good ironworkers. They get it,” he says. On other crews he has seen, “some guys have to be reminded—they have in their heads that the company ‘owes’ them. In my world, we owe the company, and that’s the way it’s going to be.”

To accommodate prominent employees and visitors, 50 Hudson Yards features a private porte-cochère off 33rd Street for executive valet parking; the 34th Street/Hudson Yards station on the 7 line is also readily accessible. With blast-proof glass throughout the building to protect tenants against all imaginable contingencies, the building offers high security, while its floor-to-ceiling glazing and broad floor plates (able to host more than 500 employees per floor) open its working environment to the world. The building strikes a balance between contrasting values on multiple fronts, with its impressively cantilevered staircase providing an effective symbol of its implicit equipoise.



Above The exterior of 50 Hudson Yards as seen from a nearby public plaza.
Facing page A view from underneath the stairs reveals a design divided by three floating platforms, each of which are designed to support at least 30 people simultaneously.



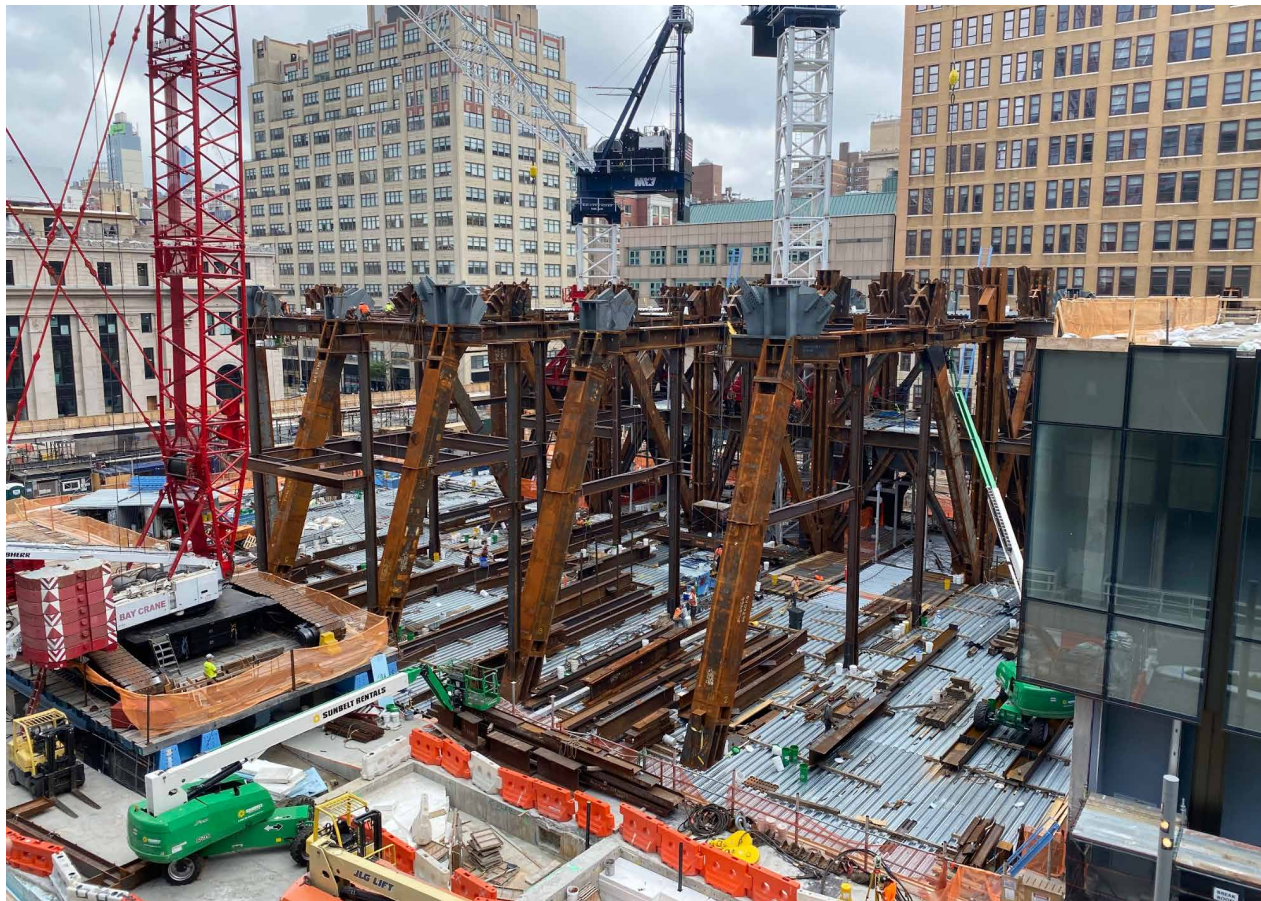
Left: © Francis Dzikowski/OTTO; above: Courtesy Foster + Partners

50 HUDSON YARDS STAIR

Location: **50 Hudson Yards, New York, NY**
Developers: **Related Companies, New York, NY; Oxford Properties, New York, NY**
Architect: **Foster + Partners, New York, NY**
Architect of Record: **AAI Architects, P.C., New York, NY**
Structural Engineer: **WSP, New York, NY**
Mechanical Engineer: **Langan, New York, NY**
Construction Manager: **Hudson Yards Construction, LLC, New York, NY**
Curtain Wall Consultant: **Heintges Consulting Architects Engineers, P.C., New York, NY**
Structural Steel, Miscellaneous Iron, Architectural Metal, and Ornamental Metal Erector: **Monumental, Inc., Bethpage, NY**
Curtain Wall Erector: **Force Installations LLC, New York, NY**

Two Manhattan West

The building is a final piece of the development of Manhattan West, a seven-million-square-foot, mixed-use neighborhood developed by Brookfield Properties with a master plan by SOM.



Another cornerstone of the development that was more than 40 years in the making, a 58-story office tower relies on a unique structural steel solution to rise over numerous active train tracks.

MANHATTAN WEST IS AN ENTIRELY new neighborhood that is transforming the area west of Midtown into a busy development of offices, residences, retail, hospitality, and a vast public plaza. To add to the complexity of building at such a scale, the project is predominantly constructed on a 2.6-acre platform on top of the city's active train lines.

Developed by Brookfield Properties and master planned, largely designed, and engineered by Skidmore, Owings & Merrill (SOM), the project features the new 67-story One Manhattan

West and 58-story Two Manhattan West office towers; the 62-story residential Eugene and 21-story Pendry hotel; and the renovated Five Manhattan West and Lofts building.

The concrete structural core of One Manhattan West reaches all the way down to the bedrock and provides all the lateral stability for the tower to resist wind and seismic forces. At Two Manhattan West, developers found it was possible for only half the steel core to touch the bedrock, as the train tracks partially stood in the way. To provide the needed foundation, SOM engineered a structural solution to “kick out” and transfer the northern part of the core to six steel mega-columns founded on bedrock between the tracks.

The columns served as “the most efficient solution and required less steel than every other configuration we considered,” explains Charles

Besjak, structural engineering principal at SOM. “We established and coordinated openings through the platform for the steel columns to independently reach bedrock on the north side between the tracks—to widen the aspect ratio to resist wind along the broad face of the tower. This allowed us to efficiently stabilize the tower.”

“The loading in the core was significant,” adds Marc Heublein, project manager for Walters Group, whose firm, together with sister company Metropolitan Walters, was responsible for the typical connection engineering, detailing, fabrication, and structural steel installation for the project. According to Heublein, some of the fabricated steel pieces were built-up sections with 8-inch webs, with an additional 8-inch flange in the web. This meant that, in addition to the typical top and bottom flange in a wide-flange column, the third

flange acted as a web stiffener, which went through the entire length of the column.

In terms of the overall structural design, Besjak explains that the first six floors of the tower were considered the “critical zones,” where the structure is arranged and organized to avoid the train tracks and transition to a spec-office building layout. SOM was responsible for designing, engineering, and detailing all the “critical zone” nodes and connections. Because the engineers were dealing with a very limited underground area, they developed a strategy to “kick out” the northern half of the main core to six discrete column locations, about 100 feet apart, through a segmental precast platform structure.

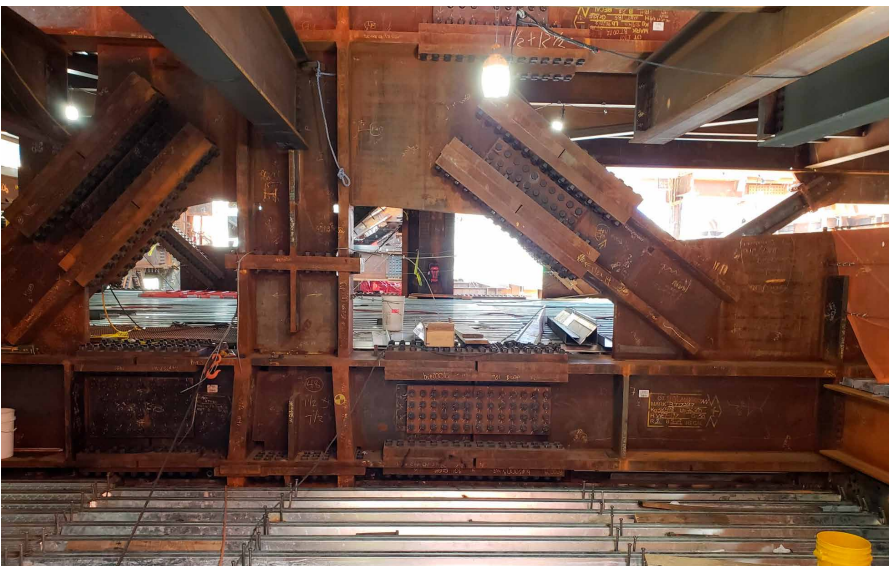
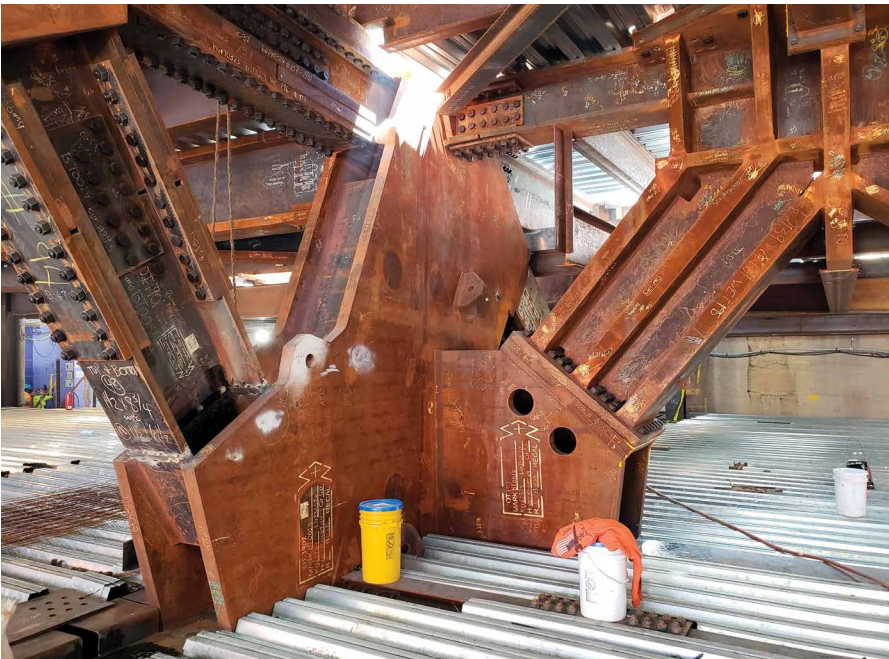
“Foundations and steel columns were erected underneath the platform, between the tracks, with the columns projecting up through the platform to support

This page and facing The complex steel structure of Two Manhattan West was erected both beneath and above the Hudson Yards platform, allowing the building to rise above a busy train yard.

a one-story transfer truss, which helps resolve misalignments in the spacing between the kicked-out columns that support both the north side of the tower and the columns erected underground,” Besjak says. In addition, SOM designed concrete-filled steel, 48-by 48-inch, built-up box columns with 6 1/2-inch steel plates to carry the massive loads and stabilize the structure.

Lateral bracing was placed above the platform for all the columns at each floor. Between levels three and six, a three-story perimeter belt truss distributes the tower columns to the larger mega-columns on the south and east faces, and also transfers the northern half of the steel-braced core. These strategies create a continuous load path for all the tower columns and the steel core down to the foundations.

“For many of the truss connections, called nodes, we used double, 4-inch-thick steel plates with customized shapes,” says Besjak. “Because of these differences in shape, we actually developed nicknames to identify each piece, including a ‘New Hampshire node’ and a ‘New Jersey node,’ because they actually looked like the shapes of those states.” Fondly recalling the challenge of installing the massive New Jersey node, which weighed 70 tons and spanned just over 17 feet by 12 feet, Heublein explains that the piece had to be closely monitored during installation, which required tandem



This page and opening spread: Courtesy SOM; facing: Walters Group



engineered picks. “Everybody was pretty excited when that one got installed,” he remembers.

Another significant aspect of the installation was Walter’s use of a Self Climbing Kokoon installation platform. Equipped with its own hydraulic lifting system, the Kokoon climbs up and down the facade. Not only did the platform support construction around the perimeter of the tower, but it greatly enhanced construction safety. “The Kokoon was perfect for this job; we used it on One Manhattan West and it was a huge success,” says Heublein. “It adds an unmatched layer of safety, and you have an additional working floor, at all times, where you can also store equipment.”

Furthermore, the ironworkers and other installers were able to work 360 degrees around the perimeter of a building, which was significant from an efficiency standpoint. “Once we got into a rhythm, it was great,” Heublein recalls. “We got to a point where we were flying up the tower and

installing a new floor every five days.”

Because the steel design and construction team was composed of just two entities—SOM served as both the architect and engineer, and Walters Group as both fabricator and installer—workflow between the teams was as streamlined as possible. Furthermore, notes Heublein, SOM and Walters have a close working relationship. “Because we already had that comradery,” he says, “it was much easier to continue working remotely through the pandemic.”

Developing the steel details and connections in a live Tekla model also supported the workflow, which essentially enabled the team to avoid any ambiguities during the fabrication and erection of the steel. In addition, “we developed concrete rebar models, especially for congested areas, to simplify the construction process and prove constructability between the steel and concrete contractors,” says Besjak. “The result of these

efforts was a major reduction in the overall construction schedule.”

Along with the Tekla model, the team used the construction management software Procore, which served as the one source of truth where all submittals, RFIs, change orders, etc., were located, and file exchanges could be executed in a seamless manner.

“Building Two Manhattan West required a feat of extraordinary coordination among the design, engineering, and planning teams,” said SOM Partner Julia Murphy in written comments upon the building’s completion in January 2024. “While Two Manhattan West’s presence in the sky and at grade is rigorous and clearly defined, its most dramatic complexities lie underground.” Now, with the final piece of the Manhattan West development in place, residents, workers, and visitors alike can move from marveling at the spectacle of its unprecedented construction to enjoying the vibrant atmosphere of Manhattan’s newest neighborhood.

Above The tower stands on an extremely challenging site above active rail lines and is supported by a central core—only half of which could touch down to solid ground. SOM aligned a series of sculpted mega-columns at the building’s perimeter with subgrade spaces between the tracks. Highly visible, these mega-columns express the strength of the tower’s structural system and announce the building’s complex structural solution.

Facing Two Manhattan West sits to the south of its counterpart, One Manhattan West, a tower completed in 2019.

TWO MANHATTAN WEST

Location: **Two Manhattan West** (Ninth Avenue and 33rd Street), New York, NY

Owner: **Brookfield Properties**, New York, NY

Architect and Structural Engineer: **Skidmore, Owings & Merrill**, New York, NY

Mechanical Engineer: **Jaros, Baum & Bolles**, New York, NY

General Contractor: **AECOM Tishman**, New York, NY

Curtain Wall Consultant: **Vidaris**, New York, NY

Structural Steel Fabricator: **Walters Group**, Hamilton, ON

Structural Steel Erector: **Metropolitan Walters**, New York, NY

Curtain Wall Fabricator: **MiTek Benson Curtain Wall**, New York, NY

Podium Curtain Wall Fabricator: **TriPyramid Structures**, Westford, MA

Podium Curtain Wall Erector: **W&W Glass**, Nanuet, NY



This page and facing: Courtesy SOM

METALS IN CONSTRUCTION
2024 DESIGN CHALLENGE WINNER ANNOUNCED

Metals in Construction magazine has announced the winners of its 2024 Design Challenge, which asked architects and facade specialists to submit their concepts for a curtain wall constructed with the highest possible efficiency properties, serviceability characteristics, and recyclability of constituent parts.

The winning entry in this year's Design Challenge is a facade system rather than a building design. The R-IOT (Revolutionary Internet of Things) project, revealed after jury deliberations to be the work of the Berlin-based firm Priedemann Facade Experts, combines a dismountable unitized facade system (Fig. 1) with a physical/digital interface that monitors the performance status of components via integrated sensors and a digital representation of the system. (The abbreviation, Priedemann representatives say, combines the Internet Of Things with an intentionally ambiguous initial that could designate Revolutionary, Renovation, Refurbishment, Reduce, Reuse, Recycle, and others.)

During the jury's assessment of competition entries, juror Vishwadeep Deo, a vice president at Thornton Tomasetti hailed this proposal's innovations: "keeping digital twins and machine learning and AI (artificial intelligence) to run early detection and preventative pattern recognition." The jury unanimously found that R-IOT, although it did not offer a site-specific design for the Broadway address described in the competition's design brief, more than made up for that aspect by proposing a modular concept that can improve the longevity and performance of any curtain-wall system.

Described in the competition entry as "Revolutionary Cyber-Physical Maintenance and Renovation Strategies to Extend the Lifespan of Facade Constructions," the R-IOT system renders energy-intensive facade refurbishments unnecessary by taking what it calls a "precognitive" approach to continuous monitoring and maintenance (Fig. 2). By continually providing data on three main interdependent parameters—building energy efficiency, occupant comfort, and facade component conditions—the system identifies degradations in performance proactively rather than reactively. When expected and measured performance diverge and components approach a predefined threshold value for failure, the system gives stakeholders a warning

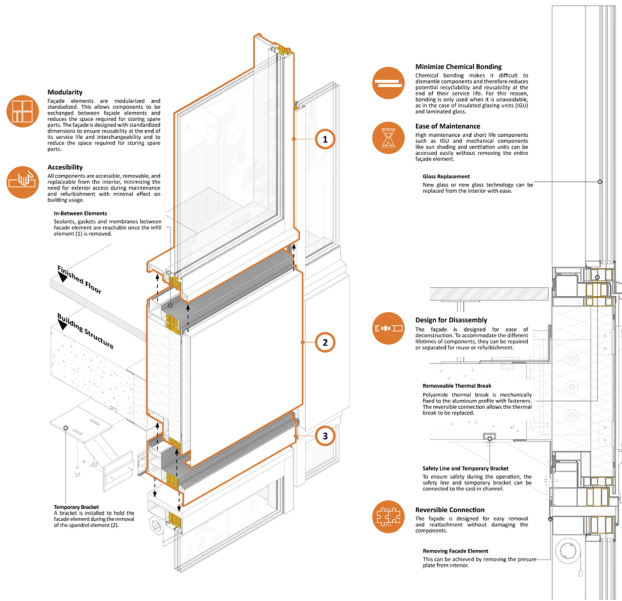
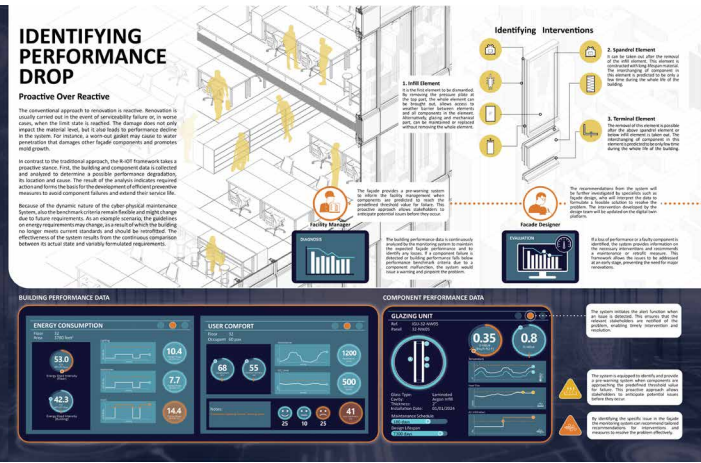
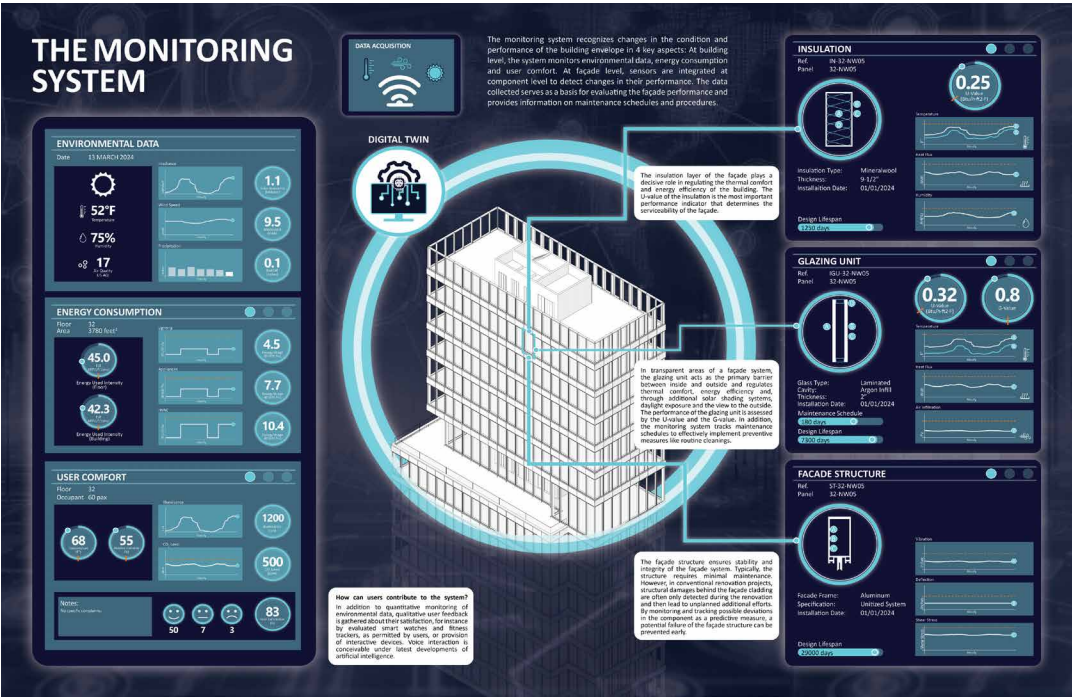


Figure 1 (above) Diagram of major components of the R-IOT system: infill (1), spandrel (2), and terminal (3) elements.
Figure 2 (left) Monitoring system for R-IOT on building and facade levels.
Figure 3 (facing, left) Monitoring system for R-IOT on building and facade levels.
Figure 4 (facing, right) Repair, reuse, recycling, remanufacture, and repurpose of R-IOT components after problem detection and interventions.



THE JURY

Stanford Chan
Senior Principal,
SOCOTEC

Vishwadeep Deo
Vice President,
Thornton Tomasetti

Vivian Fu
Associate Principal,
Heintges

Mic Patterson
Ambassador
of Innovation &
Collaboration, Facade
Tectonics Institute

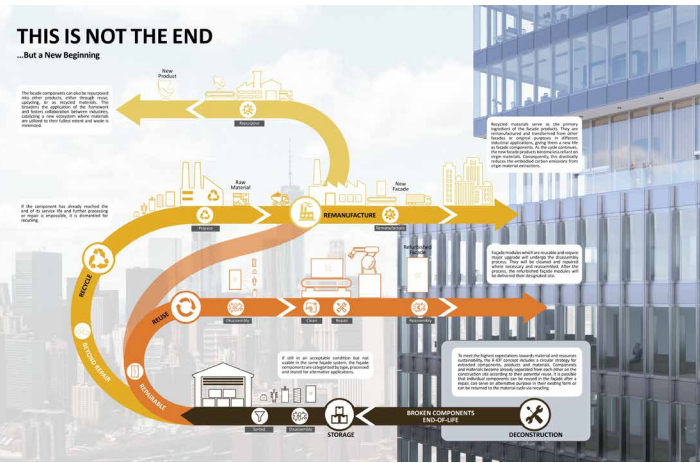
Jack Robbins,
AIA, LEED AP
Partner and Director
of Urban Design,
FXCollaborative

that enables timely and appropriate interventions in the form of component removal and replacement or maintenance (Figs. 3, 4).
The infill, spandrel, and terminal elements of the R-IOT facade are all designed for deconstruction, with standardized components in replaceable cassettes accessible from the interior. Transparent, opaque, or partially opaque infill elements can include features such as openable windows, shading systems, and other mechanical elements; sealants, gaskets, and membranes between facade elements are accessible when the infill element is removed. Opaque spandrel elements, the interface between the facade system and the building structure, accommodate a range of cladding elements, potentially including photovoltaics or green wall systems; supporting terminal elements allow staged removal of the system and access to hidden components such as removable polyamide thermal breaks. Chemical bonding is minimized, used only where unavoidable, as in IGUs or laminated glass. A mobile glass-handling machine enables on-site maintenance or retrofitting operations, reducing downtime and carbon emissions from transportation and heavy machinery use.

The system can also accommodate new design elements and material technologies as they appear, allowing aesthetic upgrades in the form of exchanged cladding or insulating components. R-IOT's designers are "pointing to the fact that there is a relationship between these things, and that the service life of an assembly is determined by its weakest link," commented juror Mic Patterson of the Facade Tectonics Institute. "Their approach is that it all needs to be replaceable.... With this kind of strategy, the service life is an irrelevant term, because what you have is a perpetual service life: as long as you can maintain the thing, you can go 1,000 years, and you may not have an

original part in the assembly, but it's seen continuous service."
Jurors acknowledge that while the winning entry satisfies the requirements of the brief, a fully realized version of R-IOT will need to address practical questions such as specification of resilient materials and the mechanisms of sensor function. "Looking at U values and the glass performance," observes juror Vivian Fu, an associate principal at Heintges in San Francisco, "the deterioration of the facade, a lot of times, is about air leaks and water leaks. Where's the detection of that?" Stanford Chan, a senior principal at Socotec, questions whether the system should incorporate exterior access for maintenance, considering the disruption to occupants that interior access may cause. Use of standardized components, Patterson also notes, can imply potential creative constriction: "The problem with modularity is, how do you give the architects freedom of expression with a modular concept?" That the R-IOT proposal stimulates such discussion, however, commented Jack Robbins, partner and director of urban design at FXCollaborative, is "a good sign that we're getting into little details: how does this actually work?"

The winning team will receive the 2024 competition's \$15,000 grand prize. The winning entry may be viewed in full below. Watch discussion of the winning entry and the 2024 competition themes via the "Curtain Wall Design for Longevity" course on Architectural Record's Continuing Education Center: continuingeducation.bnppmedia.com. 1 AIA LU/HSW. For more information about the annual competition, visit metalsinconstruction.org. A special thanks to this year's jury: Stanford Chan, Socotec; Vishwadeep Deo, Thornton Tomasetti; Vivian Fu, Heintges; Mic Patterson, Facade Tectonics Institute; and Jack Robbins, FXCollaborative



For more information about upcoming Institute-sponsored events, visit www.siny.org and www.ominy.org.

Robert Samela, Chairman
A.C. Associates
Clifton, NJ

Jake Bidosky
Keystone Management
Associates, LLC
Stuart, FL

Terry Flynn
TF Steel Bridge
Kendall, NJ

Kris Amplo
JC Steel Erectors
Islip, NY

Robert Weiss
A.J. McNulty & Co. Inc.
Maspeth, NY

William Matre
Skanska Koch, Inc.
Carteret, NJ

Gord Leder
NYC Constructors LLC
New York, NY

Peter Maglicic
Kiewit Infrastructure, Co.
Woodcliff Lake, NJ

David Pisacrita
Metropolitan Walters, LLC
New York, NY

Randy Rifelli, Chairman
United Iron, Inc.
Mount Vernon, NY

Peter Carriero
Post Road Iron Works
Greenwich, CT

Michael Haber
W&W Glass Systems, Inc.
Nanuet, NJ

Randall Ment
Ment Brothers I.W. Co. Inc.
New York, NY

Jeff Silverstein
Metralite Industries, Inc.
Flushing, NY

Arthur Rubinstein
Skyline Steel Corp.
Brooklyn, NY

The labor to erect the structural steel on projects featured in this publication was provided by the following labor unions:

LOCAL UNION NO. 40
International Association of Bridge, Structural Ironworkers & Riggers
451 Park Avenue South
New York, NY 10016
(212) 889-1320

Daniel Doyle
Business Manager and
Financial Secretary-Treasurer

Christopher Walsh
President and Business Agent

Robert Johnson
Recording Secretary and
Business Representative

LOCAL UNION NO. 14
International Union of Operating Engineers
141-57 Northern Boulevard
Flushing, NY 11354
(718) 939-0600

Edwin Christian
President and Business Manager

LOCAL UNION NO. 361
International Association of Bridge, Structural Ironworkers & Riggers
89-19 97th Avenue
Ozone Park, NY 11416
(718) 322-1016

Matthew Chartrand
Business Manager and
Financial Secretary-Treasurer

Anthony DeBlasie
President and Business Agent

John Cush
Vice President and Business Agent

LOCAL UNION NO. 15 & 15-D
International Union of Operating Engineers
44-40 11th Street
Long Island City, NY 11101
(212) 929-5327

Thomas Callahan
President and Business Manager

The labor to erect the architectural and ornamental metal on projects featured in this publication was provided by the following labor union:

LOCAL UNION NO. 580
Architectural and Ornamental Ironworkers
501 West 42nd Street
New York, NY 10036
(212) 594-1662

Joseph Nolan
Business Manager and Financial
Secretary-Treasurer

Joseph Maffei
President

Earl Dunne
Business Agent

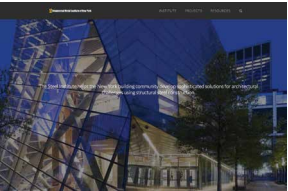
Kevin McKeon
Business Agent

Thomas Milton
Business Agent

Joseph Nolan
Business Agent



www.siny.org
Steel Institute of New York



www.ominy.org
Ornamental Metal Institute of New York

The Steel and Ornamental Metal institutes of New York are not-for-profit associations created in 1972 to advance the interests of the structural steel and the architectural, ornamental, and miscellaneous metal construction industries. They serve a geographical area encompassing New York City and the adjacent counties of Nassau, Suffolk, and Westchester. Each sponsors programs to aid architects, engineers, construction managers, and developers in selecting structural systems and architectural metals for optimum building performance. Programs in which the institute is engaged include:

- Consultations extending to the preparation of preliminary design and construction cost analyses for alternative structural systems
- Consultations on design and finishes for bronze, stainless steel, and aluminum for architectural and ornamental iron-work, curtain wall systems, window walls, and metal windows and panels

- Seminars covering structural systems, economy of steel design, curtain wall systems, design, and use of alloys and surface treatments for miscellaneous iron work, and issues important to the construction industry addressed to developers, architects, engineers, construction managers, detailers, and fabricators
- Representation before government bodies and agencies in matters of laws, codes, and regulations affecting the industry and the support of programs that will expand the volume of building construction in the area
- Granting of subsidies to architecture and engineering schools and funding of research programs related to the advancement and growth of the industry
- Publication of *Metals in Construction*, a magazine dedicated to showcasing building projects in the New York area that feature innovative use of steel

Institute staff are available with information regarding the use of structural steel and architectural metals for your project by contacting institute offices at

270 Madison Avenue, Suite 401
New York, NY 10016
T 212-697-5553/5554 F 212-818-0976

The institutes are a registered provider of the American Institute of Architects Continuing education system (AIA/CES).

Steven N. Davi
Executive Director & General Counsel
Gary Higbee AIA
Director of Industry Development



METALS IN CONSTRUCTION

THE STEEL INSTITUTE OF NEW YORK
THE ORNAMENTAL METAL INSTITUTE OF NEW YORK
270 MADISON AVENUE, SUITE 401
NEW YORK NY 10016

PRSRT STD
U.S. POSTAGE

PAID

PERMIT NO. 161
LANCASTER, PA

