BELLEVUE HOSPITAL CENTER

AMBULATORY CARE FACILITY

A Glazed Pavilion Fuses Technique and Expression

"Any building is a three-dimensional puzzle," says Ian Bader, Pei Cobb Freed & Partners Architects' (PCF) partner-in-charge of the recently opened Ambulatory Care Facility at New York's historic Bellevue Hospital, "but this one has some fairly dramatic complexities." The program called for inserting a 207,000-square-foot addition housing specialized services including cancer care, radiology, pediatrics, and psychological services, along with administration and visitor's spaces, into a narrow footprint between First Avenue and the hospital's original facade, part of an early 20th-century structure by renowned Beaux-Arts architects McKim, Mead & White. Considering the constrained site and dense programming, PCF wanted the facility to possess a sense of openness, plenty of natural light, and uninterrupted sightlines to the hospital's original monumental entrance. Furthermore, 400 new and renovated rooms, which would receive 500,000 annual visitors, had to be incorporated within an $84 million construction budget. Considering these parameters, the architects and engineers selected a structural steel frame, allowing them to design a slender structure to accommodate the hospital's programmatic needs while maximizing spans between columns and keeping sightlines open. To honor the institution's landmark facade and create a sense of openness, they chose to connect the new and existing structures with a block-long, 90-foot-high glazed atrium, which is supported by a system of steel bow trusses.

OPPOSITE The new pavilion respects Bellevue's historic entrance.

Despite its location behind the new pavilion, Bellevue's historic front door remains visible from the new entrance, thanks to a "building-within-a-building" approach. Explains Bader, "The new building, enclosed primarily with glazed surfaces, is elevated above the ground, accommodating the flow of 10,000 daily visitors in an open and expansive entrance." Structural steel beams that step from 24-inch to 12-inch depths between mid-span and column keep the addition's floor plates thin, and maintain 12-foot floor-to-floor dimensions that match those in the existing building. The cutbacks accommodate the dense HVAC and other building systems typical of labs and medical facilities. The ground floor is an open, nearly two-story space, with surprisingly few columns interrupting views. At the edge of the atrium, the upper floors cantilever out from the structure's last row of columns, between 9 feet 10 inches to 28 feet at the extreme "prow," reinforcing the sense of openness. These cantilevers are enabled by a system of 5-by-3-by-5/16-inch steel hangers connected to the addition's steel-frame, which distribute live load deflection among the addition's five floors. A similar system of hangers, paired 1-by-12-inch vertical plates, spaced one inch apart, supports bridges and balconies that link the new and existing buildings.

The entrance is located at the crescent-shaped atrium, which is topped by a 67-by-175-foot skylight and capped at either end by full-height glazed curtain walls. In all, some 4,500 individual glass panels

ABOVE The skylight's bow trusses bolt tothe addition. Hangars tying back to the existing steel frame connect it to the historic building, while allowing for independent lateral movement in case of seismic activity.

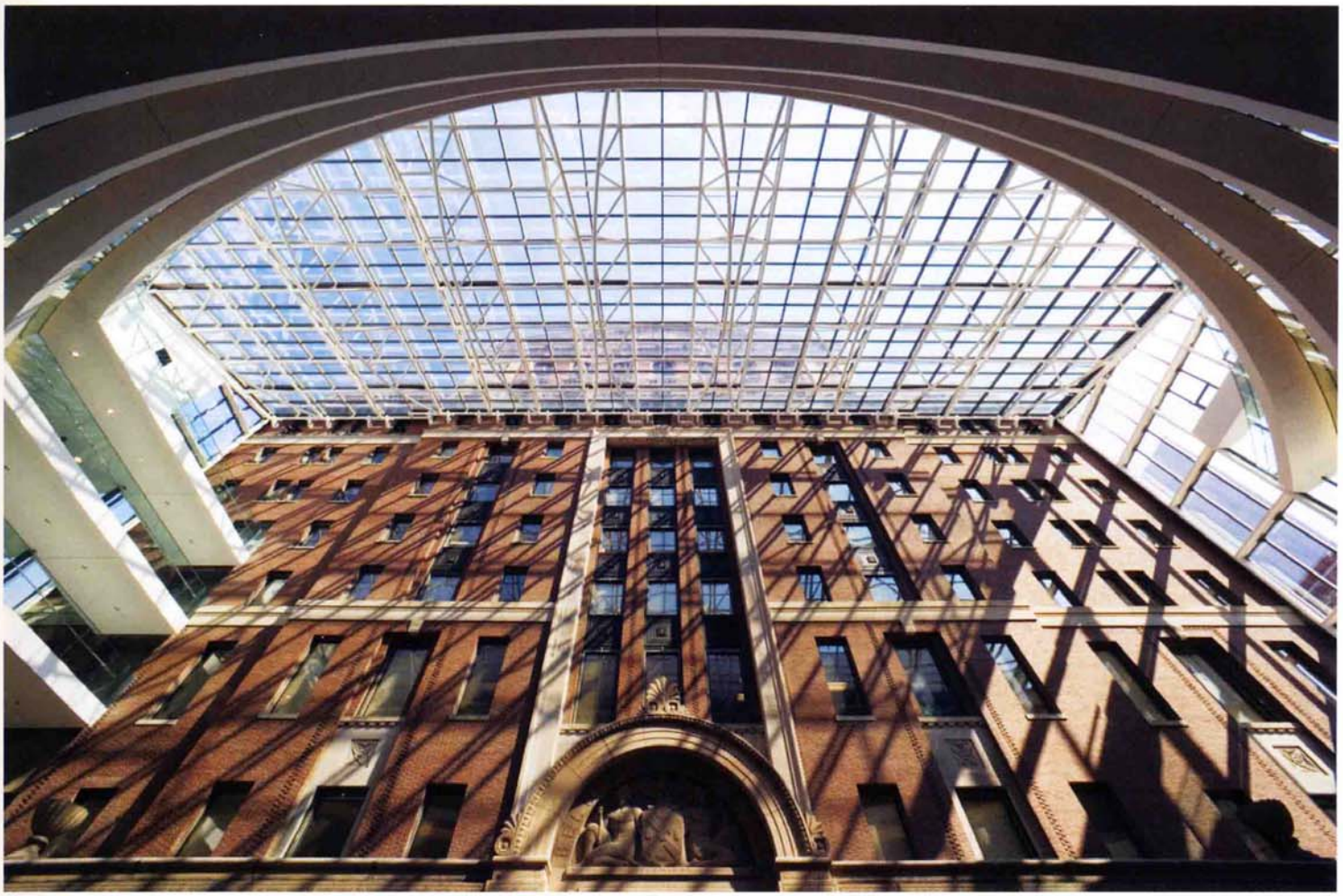
enclose the addition and atrium. The designers specified 1 1/4-inch Viracon-assembled Low-E Insulating Laminated glass for the skylight, and 1-inch low-E Solarban clear insulating glass units for the end walls. W&W Glass Systems erected the curtain wall and skylight, setting all of the glass in a system of aluminum mullions and clips, fabricated by Sota Glazing, which attach back to the system of steel bow trusses.

These bow trusses span the atrium's 65-foot-5-inch depth and angle up some 22 degrees from the addition to the facade of the historic building. Paired and placed on 22-foot centers along the width of the atrium, the trusses are 11 feet deep at mid-span, their chords assembled from 6-inch XXS pipe and diagonals from 4-inch XS pipe. They were fabricated off-site, under the supervision of Turner Construction, and, as Bader reports, "to expedite the ambitious construction schedules, trucked in over the George Washington Bridge in the dead of night." To enable minimal structure at the glazed end walls of the atrium, a series of beams hidden within the steel tracery of the skylight laterally link each truss. These beams deflect loads back to 2-foot cantilevered steel brackets that extend from the new and existing buildings on 12-foot centers. The brackets tie back to the existing steel frame of the McKim, Mead & White structure, elements of which have been wrapped and reinforced by new welded steel plates. Bader credits its project structural engineer Leslie E. Robertson of LERA with this insight into structural re-use, noting, "His brilliant structural judgment was that the existing historic building could support the gravity loads of the new skylight."

City seismic code required that the new and old buildings, despite their structural interdependence, be able to move independently in the event of earthquake or similar disruption. To solve this complexity the engineers came up with an unusual feature on each of the cantilevered bracket arms: smooth, flat, load-bearing surfaces coated in Teflon. The mounting ends of the bow trusses feature similarly configured and coated pedestals, enabling unencumbered horizontal displacement and a purely vertical load. "This junction," explains Bader, "can accommodate 9-inch movements in any direction. You could figuratively lift away the new structure without disturbing the old."

Throughout the project, PCF specified 304 grade stainless steel for signage. Other finishing details such as a #4 brushed-finish on glass edge-caps for tempered glass balustrades at the balconies, and lively lighting solutions like steel-rod-suspended mirrors reflecting recessed flood lights, add shimmer, sheen, and sparkle to the interior. A 36-foot-long, 3-foot-3-inch-high stainless steel sign embedded in the main facade adds, in Bader's phrase, "a reflective there-but-not-there effect."

The cumulative result of these design strategies is a balance between old and new architectures and a space of striking lightness and calm. The steel framing system and glass atrium not only fulfill the project's complex program and the architect's design goals, but they integrate the contemporary addition with the historical facade in a way that avoids pastiche. As Bader puts it, the use of steel in the project "fuses technique with expression."



ABOVE The bow trusses, fabricated from 6-inch XXS pipe, support a skylight of Viracon laminated glass.

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BELLEVUE HOSPITAL CENTER AMBULATORY CARE FACILITY

Owner **Health and Hospitals Corporation** *New York, NY*
Developer **Dormitory Authority of the State of New York** *New York, NY*
Architect **Pei Cobb Freed & Partners Architects LLC** *New York, NY*
Renovation Architect **Guenther 5 Architects** *New York, NY*
Structural Engineer **Leslie E. Robertson Associates** *New York, NY*
General Contractor **Turner Construction** *New York, NY*
Structural Steel Fabricators **SteelCo./Metropolitan Steel Industries, Inc.** *Sinking Spring, PA*
Structural Steel Erectors **Midlantic Erectors, Inc.** *Roselle, NJ*
Architectural Metal Fabricator and Erector **Champion Metal & Glass** *Deer Park, NY*
Ornamental Metal Fabricator and Erector **Christy's Glass** *Jamaica, NY*
Curtain Wall Fabricator and Erector **W&W Glass Systems, Inc.** *Nanuet, NY*
Metal Deck Erector **A.C. Associates** *Lyndhurst, NJ*