Facing Steel framing allowed generous 14-foot-6-inch floor-to-ceiling heights while maintaining slim column profiles.
Below A rendering of the finished tower.

ONE BRYANT PARK

Making a Point on the Skyline

Like a shard of quartz thrusting up from Manhattan bedrock, The Bank of America Tower at One Bryant Park almost effortlessly tapers 1,200 feet to the tip of its spire—a naturally occurring element in the New York skyline. But creating this urban icon took the monumental coordination of 25,000 tons of structural steel, eight steel fabricators, and a cunningly engineered, cost-saving column design. The collective result is a high-performance tower with equal doses of practicality and poetry.

With a core-and-shell budget of $1.3 billion, the project was developed as a joint venture between The Durst Organization and Bank of America, which sought an eye-opening headquarters for its New York operations. For inspiration, designers didn't need to go far—just across Sixth Avenue, as it happened, where once stood New York's Crystal Palace, a shimmering, iron-and-glass structure erected for the 1853 World Exhibition. Rising between 42nd and 43rd streets, the new 55-story structure is a crystal palace for the 21st century. Its faceted profile makes a strong skyline statement while meeting its urban surroundings in a novel way. "We shaped the building so that when you're standing inside, rather than looking directly at the adjacent properties, you're looking around them," explains Serge Appel, associate partner at Cook+Fox Architects. "It also allows us to bring more light and air down to the street."

At 2.1 million square feet on a two-acre site, the project called not only for a dynamic form, but also for an economical method of construction. The solution: an unusual array of sloping steel columns. Though the curtain wall slopes in two directions as each corner of the building angles inward toward the top, the columns slope in only one direction: orthogonally to the core. And that offered dramatic cost savings. "We managed

Above, left, and facing Framed in structural steel, Henry Miller's Theater, in the base of One Bryant Park, offers approximately 1,000 seats.

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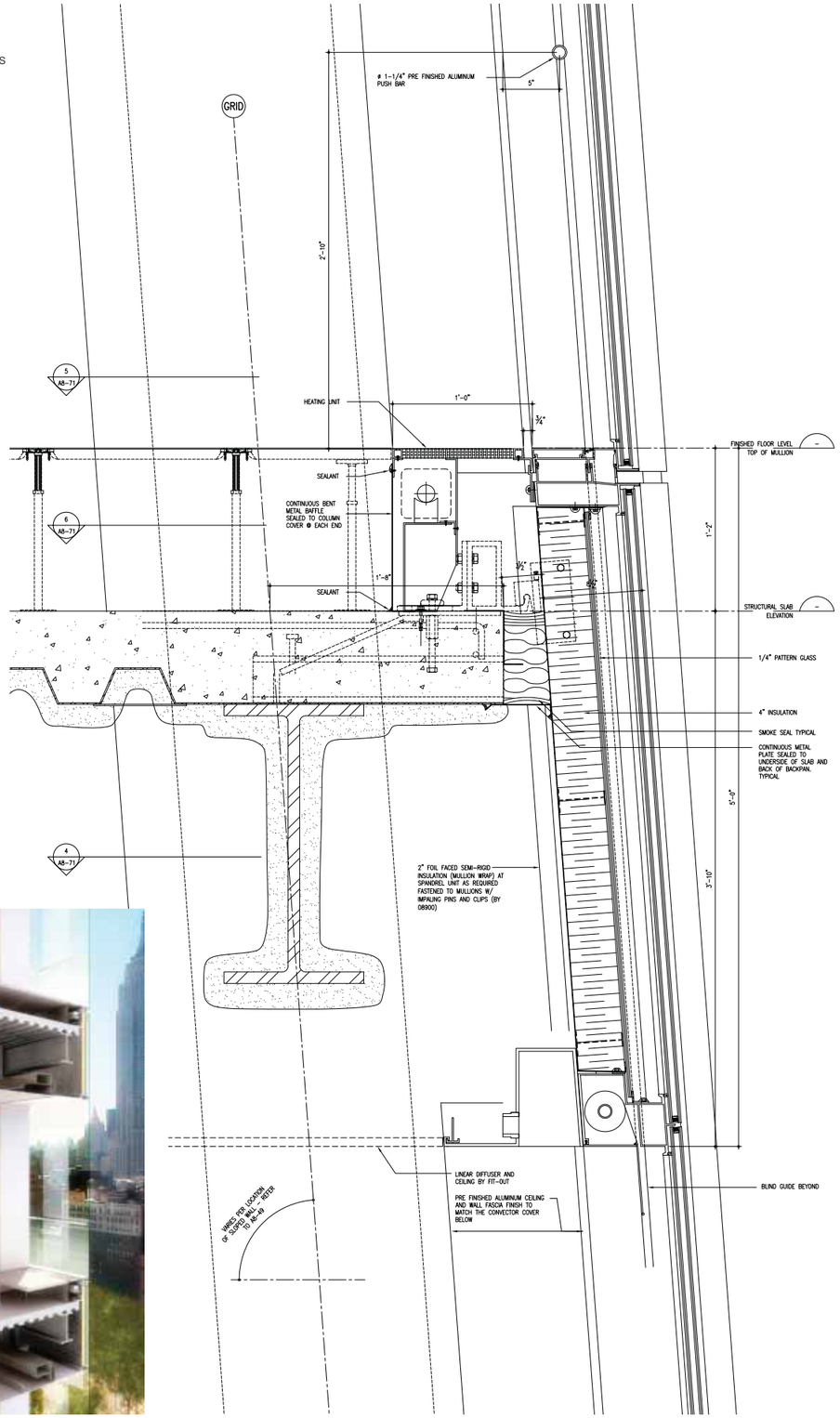
Facing A tower crane lifts a load of steel members.
Above More framing for Henry Miller's Theater.
Right top Horizontal bracing delivers lateral loads from sloped columns to the core.
Right bottom A truss transfers column loads to a shear wall below.

to find the structural system which achieved what we were looking for architecturally with a minimal increase in costs," Appel says. All the same, exterior columns, which are spaced 20 feet on center, begin sloping at different elevations, meaning that few floors in the structure are exactly alike. Moreover, where lateral loads build up due to the offset columns, floor framing needed to transfer the resulting loads to the core.

Constructing this system demanded further ingenuity. The owner's choice of concrete walls around stairs and elevators, plus the need for a heavy core stiffness due to the building's height, led engineers initially to study concrete. Partly due to concerns that a concrete structure could not be built quickly enough and because of steel's greater facility with the site's extensive subsurface infrastructure, the design team settled on a composite structure with a steel frame and concrete shear walls at the core.

Columns are predominantly wide-flange sections of ASTM A992 Grade 50, with other rolled steel members of A572 Grade 50. Larger, roughly 24-by-24-inch box sections take heavier loads at the tower's base, sized to match equivalent cover-plated W14x730 columns. At street level, this stoutly framed base helps bring light into the airy "urban garden room" located at 43rd Street and Sixth Avenue, designed as a free-flowing extension of Bryant Park. In addition, a public, through-block tunnel, approximately 30 feet square, allows passage between 42nd and 43rd streets. The structural system switches modes at the roof level, where screen walls are cantilevered with a structure built up from 10x8 HSS and 8x8 HSS sections of ASTM A500 Grade B steel. This structure was

This page Steel enabled the designers to keep a shallow framing depth to fit both an under floor ventilation system and space above the ceiling for sprinklers and additional duct work.



Above The screen wall framing cantilevers up from the roof and is topped by a stiffening truss.

kept as thin as possible around the perimeter of the building to maximize rooftop area for mechanical equipment. It also makes way for One Bryant Park's nearly 300-foot-tall spire. Built mainly of large-diameter, shop-welded steel pipe, the spire tapers from 5-foot-10-inch-diameter at its base to 2-foot-2-inch-diameter at the tip, where it makes the tower New York's second tallest after the Empire State Building.

Floors, consisting of a 3-inch composite metal deck, are generally framed in W18x35 steel sections, with a typical floor span of 42 feet 6 inches. Where extra loads from column offsets require them, horizontal trusses are added to floor framing to transfer these lateral forces to the core. Floor-to-floor heights are a generous 14 feet 6 inches to accommodate the building's mechanical infrastructure. The choice of an under-floor air ventilation system and other utilities required a 14-inch raised floor, while lighting, additional duct work, and sprinklers still required space above the ceiling. "We were still held to a fairly shallow framing depth to maximize the space above the ceiling," says Mueller-Lust. Throughout, connections are typically bolted with $\frac{7}{8}^{th}$-inch-diameter A325 bolts, or, for higher loads, $1^{1/8}$-inch-diameter A490 bolts. Moment connections of larger magnitudes are field-welded.

Steel's inherent properties helped achieve another goal at One Bryant Park. As developer Durst had done in its previous tower at 4 Times Square, the design team aimed to create an emblem for the green building movement. In this case, the tower will be the first highrise to receive LEED Platinum certification from the U.S. Green Building Council, in part by specifying structural steel with at least 60 percent recycled content (calculated by adding the post-consumer recycled content percentage and one-half of the post-industrial recycled content). Steel thus contributed to two out of an expected 53 LEED points, beautifying New York's skyline in more ways than one. **M**

ONE BRYANT PARK

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