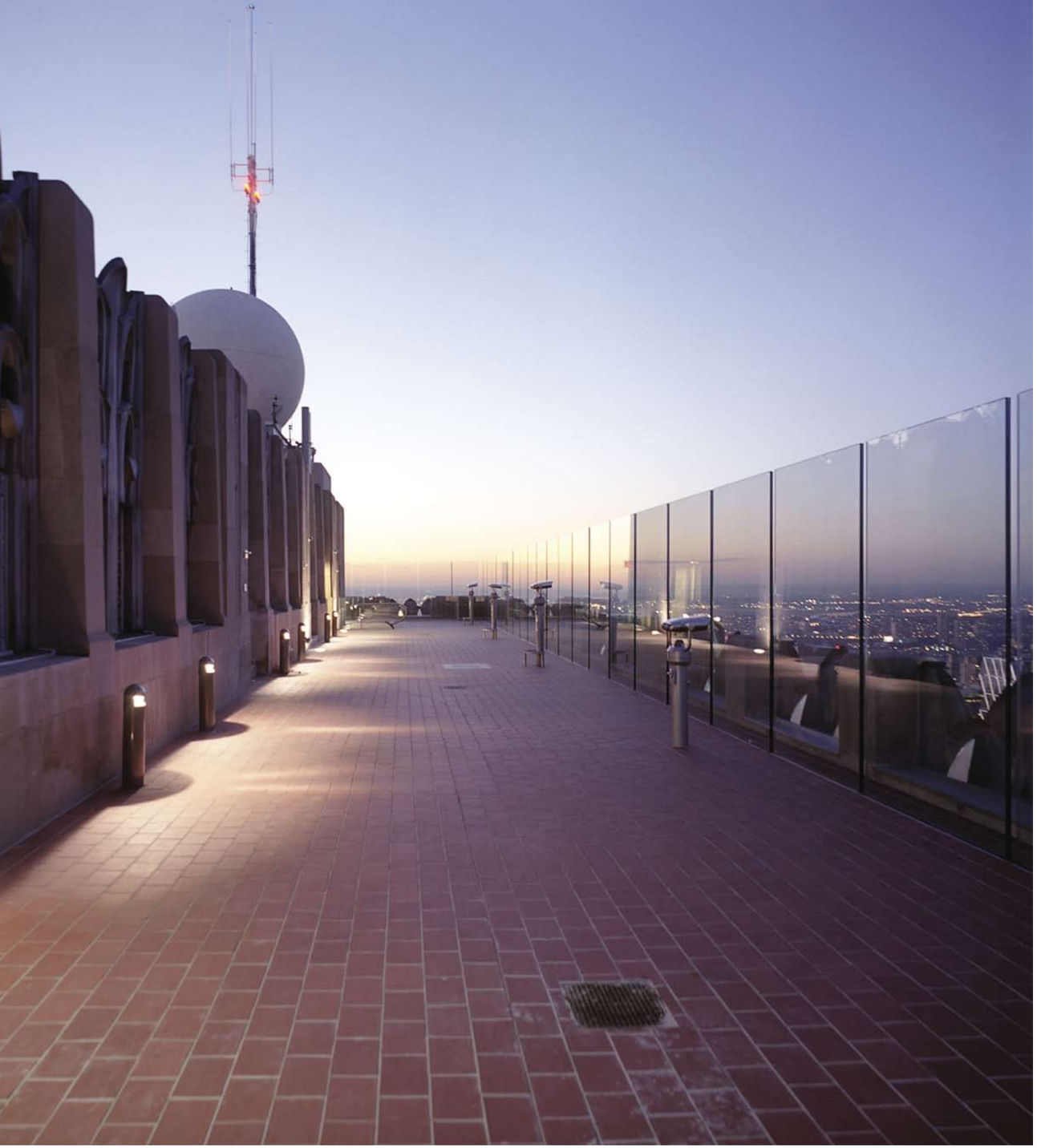

ABOVE Optically clear glass barriers offer unobstructed views of the city.

TOP OF THE ROCK

Weaving New Spaces into 30 Rockefeller Plaza

OPPOSITE © BERNSTEIN ASSOCIATES, PHOTOGRAPHERS / JOHN W. LANGHANS; © BERNSTEIN ASSOCIATES, PHOTOGRAPHERS / RAY JACKSON

When 30 Rockefeller Plaza owner Tishman Speyer decided to reopen the 70-story building's three-tiered observation deck—dubbed Top of the Rock—the developer knew that the job would require careful strategic maneuvering. Known as the GE Building (formerly the RCA Building,) the 1933 tower closed its observation deck in 1986, when 65th-floor tenant The Rainbow Room expanded to fill an entire story, shutting off access. Restoring access required, among other things, the construction of a new entry sequence from West 50th Street that connects a newly created three-story lobby off a shopping concourse on an underground level to an existing wait-station on the mezzanine level. Engineering firm Axis Design Group had to cut through original steel beams to insert a custom fabricated curving ornamental stair, while allowing the building and all of its tenants—including NBC—to remain fully operational. "It was like doing open-heart surgery on a patient while he's running the New York City marathon," proclaims Axis engineer Joseph Lieber. The only material both strong and flexible enough for the job, he says, was structural steel, which was easily welded to the building's original beams.

Unveiled last November, Top of the Rock's new visitor experience begins with a three-story, belowground atrium that is accessed from the street and is linked to an underground shopping concourse. For the floating staircase that encircles the atrium, the engineers initially studied concrete, but concluded that to achieve the dramatic cantilevers of the precast terrazzo treads, steel was the more suitable material. Constructed from curved, ASTM A500 Grade B, 46 ksi steel tubes and steel plates supported by posts and hangars that are concealed in the walls, with a railing of ASTM A-304 brushed stainless steel, the stair was installed in two segments. Both were manufactured off location by Empire City Iron Works and brought to the site in four sections each, then field erected and welded in place. To create the atrium, Axis had to cut through both the mezzanine and street levels, which was done without transferring structural loads. Before the holes were cut, Empire City installed overhead rigging steel, and the existing street level slab was left in place to allow the installation of the upper half flight of stairs. Afterward, the slab was removed and the lower half flight was erected. Since the curved, tempered-glass balustrade was manufactured in parallel with the stair itself, it was necessary to insure that the stair deformation remained within tight tolerances.

In addition to the stair, two elevators were inserted into the atrium space, necessitating installation of an elevator pit directly above the electrical room that serves the entire building. A concrete slab could not have been accommodated in the tight clearance space, so a 2-inch-thick steel plate now supports the elevator reactions.

At the mezzanine level, ticket-holding visitors exit the elevators and walk through an exhibition on the history of Rockefeller Center before entering another set of elevators. Four existing elevators were extended up to the first of three decks at the 67th floor—a very difficult feat, relays Lieber, as it was necessary to penetrate through a mechanical room on the 66th floor as well as through The Rainbow Room restaurant. Open space for a lobby was created on the 67th floor by removing most of an intermediate floor that supported eight existing elevators, and transferring their reactions to existing structural framing above and below.

The challenge was worth it: Visitors are met with breathtaking views that are barely disrupted by an elegant and optically clear glass barrier. The barrier is an engineering feat in and of itself. The glass lites, each weighing about 800 pounds, are 5 feet wide by 1 7/8 inches thick and rise 8 feet 6 inches above the deck, and are cantilevered with only 8 inches of glass at the base buried in a concealed channel. The lites arrived on site

ABOVE The nearly 800 pound glass lites cantilever out of an 8-inch-deep steel channel imbedded in the deck.

with steel shoes and were set between a pair of 8-inch steel tubes that form the channel. The shoes were then grouted in with poured rock and the stone paving was brought right to the edge of the glass, creating a clean finish.

Leading to the upper decks is a new escalator that required the engineers to cut through existing 36-inch steel beams and transfer structural loads by re-framing and re-supporting. As was the case throughout the job, steel was vital for this task, being flexible and easily welded onto existing beams. While the building's original framing utilized now-obsolete A7 steel with 33 ksi strength, the new construction typically employs

ALL ABOVE The stair was shop fabricated in eight pieces, then welded on site in two segments.

TOP: © BERNSTEIN ASSOCIATES, PHOTOGRAPHERS / RAY JACKSON; OTHERS: © THE ORNAMENTAL METAL INSTITUTE OF NEW YORK

© DANIEL BARBER

ALL ABOVE The tempered glass balustrade was manufactured at the same time as the curving stair, meaning that deformation had to be kept within tight tolerances.

a combination of 36 and 50 ksi steels: ASTM A36, A992 and A572. By using components no longer than 10 feet to create the needed members, workers were able to carrry up all of the new steel in the elevators, requiring no external hoists.

In order to provide elevator access to the 67th floor, four of the elevators had to be raised, and their machinery transferred to the 69th floor. In addition, the building's water tank, which was in the path of the elevators, had to be reconfigured. To support the reactions of the four elevators as well as the new water tank—all totaling a half million pounds—the engineers used existing A7 steel beams and created hybrid trusses with new ASTM A992 steel. During construction, a temporary water tank was held in place by structural steel supports, which were later reused as wide flange beam framing in other parts of the project—saving both materials and energy.

Rockefeller Center has long been considered the center of Manhattan. At the uppermost deck, on the 70th story, visitors are treated to a 360-degree view, taking in Central Park, the city skyline, both rivers, and beyond. With the existing vents shaped to resemble a ship's exhaust stacks—a carry-over of the original deck's nautical theme—guests can imagine that they are truly floating above the city. ■

TOP OF THE ROCK

Owner **Tishman Speyer** *New York, NY*
Architect **Gabellini Associates** *New York, NY*
Architect of Record **SLCE Architects** *New York, NY*
Structural Engineer **Axis Design Group** *New York, NY*
General Contractor **Structuretone** *New York, NY*
Structural Steel Fabricator and Erector
Empire City Iron Works *Long Island City, NY*
Miscellaneous Metal Fabricator and Erector
Empire City Iron Works *Long Island City, NY*
Architectural Metal Fabricator and Erector
W&W Glass Systems, Inc. *Nanuet, NY*
Ornamental Metal Fabricator and Erector
Coordinated Metals *Carlstadt, NJ*