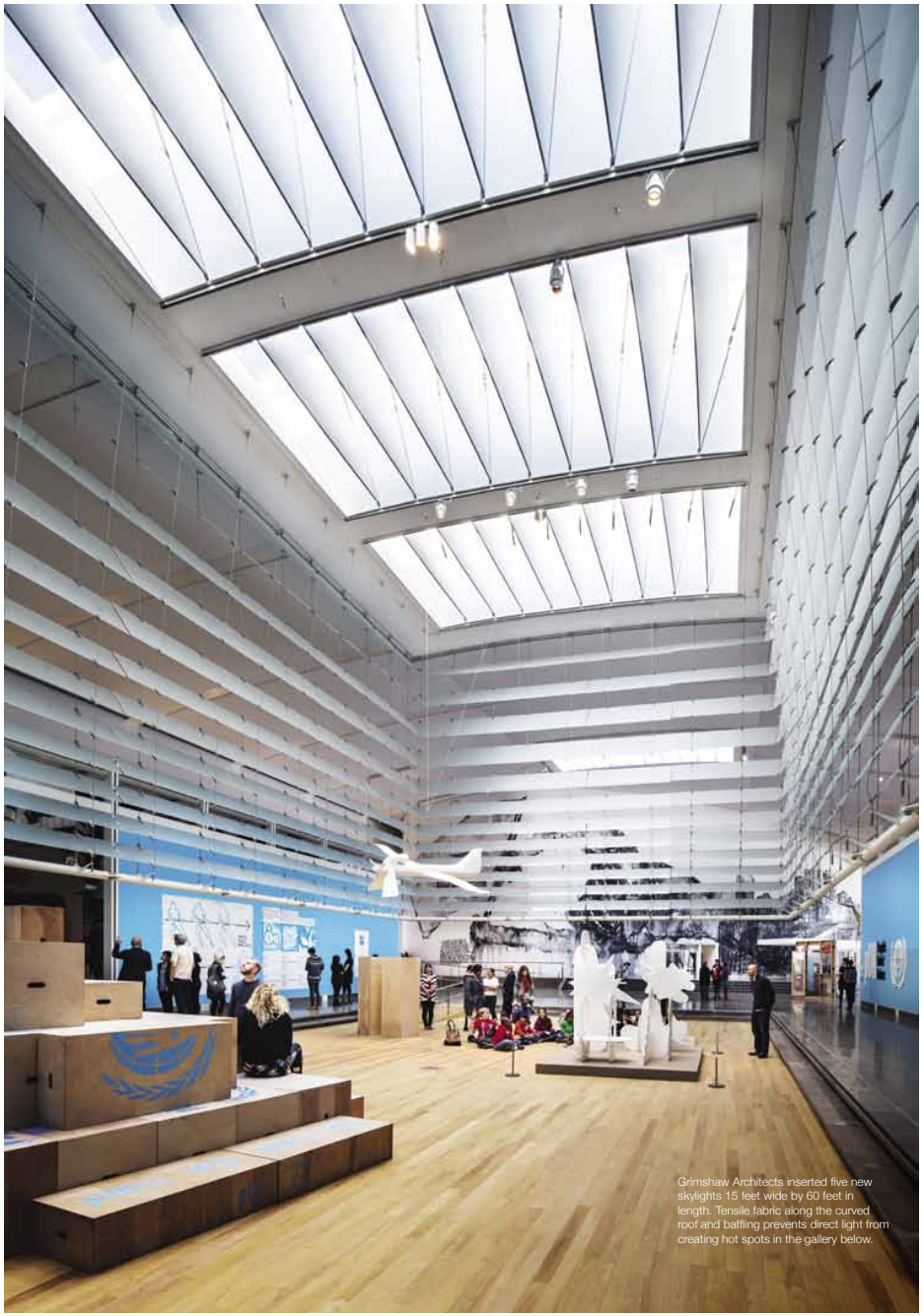

Grimshaw Architects inserted five new skylights 15 feet wide by 60 feet in length. Tensile fabric along the curved roof and baffling prevents direct light from creating hot spots in the gallery below.

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Queens Museum

A renovation transforms the Flushing museum's facade, bringing it to life for those passing on Grand Central Parkway; a new vision of its modern mission awaits inside, where a glass lantern suspended from a skylight and a new circulating stair enliven the decades-old space.

QUEENS MUSEUM IN FLUSHING, NEW York has undergone more renovations than most buildings in New York—and certainly more than any structure intended for show at most World's Fairs. Originally designed by Aymar Embury III to house the New York Pavilion in the 1939 fair, it has subsequently functioned as the initial home of the fledgling United Nations General Assembly, and as exhibition space for the 9,335-square-foot architectural model depicting Robert Moses's Panorama of the City of New York featured at the 1964 World's Fair, among other things. Despite this storied past, few knew of its existence. The building's blank, unarticulated facade—which countless commuters pass each day—was an opportunity to alert vehicular passersby of the museum's presence.

Despite four sizable rehabilitations, the building's core characteristics have remained intact for more than 75 years. The most recent of these—completed in November of 2013 after Grimshaw Architects won the 2005 Design and Construction Excellence program from the New York City Department of Design and Construction—aims to increase visibility, bring in abundance of natural light to a dark interior, and direct visitors to one of the museum's most celebrated collection items: the Panorama of the City of New York. Following a 1994 update by Rafael Viñoly Architects, the existing site presented some unique challenges for Grimshaw. The east side of the museum, which is open to Corona Flushing-Meadows Park, features views over a broad pond, but the western side of the museum is flanked by the Grand Central Parkway, which runs almost parallel to the building.

"Hundreds of thousands of cars that pass the museum every day probably didn't know it existed, so opening the landscape design and adding a new entry with signage considerations, and an interactive dynamic LED wall, creates visibility that otherwise didn't exist," says Casimir Zdan, head of industrial design at Grimshaw Architects. "This new design helps puts the museum on the map."

The building's nearly perfect symmetry is expressed through a glass-brick fascia fronted by a colonnade of limestone pilasters embellished with dark granite. To avoid breaking moisture barriers and thermal seals, a custom decorative solution called for a 200- by 27-foot cantilevered glass rain screen on the western elevation. Ten 10-inch, Architecturally Exposed Structural Steel (AESS) carbon steel columns support a network of 2-inch, tubular carbon steel outriggers that cantilever 3 feet and align with panel points on the glass. Welded hatch fittings attach to 4½-by-4½-foot panels of ⅜-inch tempered glass, which form a geometric series of light boxes. The glass sports acid etching and a ceramic frit to reflect color tones of the original structure and diffuse artificial light. At night, the glass is illuminated by vertically integrated, programma-

ble color LEDs that transform the building into a glowing billboard to relay current events and various programming to Grand Central Parkway passengers.

Within the glass, a new 56-by 13-foot-3-inch piece of Type 316 stainless steel sheet metal forms a canopy over the western entrance. While the length is a continuous sheet of 3/16-inch stainless steel, the width was harder to achieve, so two 56-foot sheets at 8 feet and 5 feet, 3 inches in width were spliced together to achieve the desired depth. "The west canopy is designed to be a pure sculptural object rather than an assembly of materials executed through typical panelized construction techniques," says Richard Yoo, project architect with Grimshaw. The length of the canopy was fabricated by forming it over the carbon steel that floats 1 inch above the finished floor. A similar reveal along the remaining three sides produces a ribbon of light that adds drama to the entrance. To account for the material's significant expansion due to direct sunlight exposure, a custom Teflon-coated sliding bearing system is welded to the frame and rotates slightly for a subtle hinging effect when a minimal rotation of the walls pushes against the roof during expansion.

The visitor entrance from both East and West are identical, and open to an expansive hall, in which a large, four-sided glass chandelier hangs over a main gallery space. What was once a dark, shadowy skating rink is now a space full of natural light thanks to a series of five new skylights with a suspended, 80-by-40-by-30-foot glass volume that hangs approximately 30 feet from the ceiling. Because the architects had envisioned a modern aesthetic, the team designed 9-foot segments of solid carbon steel ring beam at the base of the structure, which was carbon-steel bolted on site and coated with chromium electroplating. Acid-etched glass panels handle partial structural loads, in addition to stainless steel springs every 4½ feet that support 8mm (exterior) and 6mm (interior) tensioned cables. The springs also help maintain the weighted curvature, which measures 35 degrees from the top horizontal louver and 51 degrees at the bottom.

All hardware connections—an approximate total of 300—function as hinges to support a flexible engineering plan, horizontally stabilized at the base by the 6-inch solid steel ring beam that also helps maintain tension. "In the case of any seismic movement or natural disasters, the lantern was designed to actually move within a 5-foot range," says Michael Ludvik, glass and special structures engineer of his own eponymous firm. "Theoretically, you could actually swing from it."

Another unique feature of the museum is a triple-tiered glass and metal staircase that carries visitors to what is arguably the museum's best known exhibition; the Panorama of the City of New York. The free-form shape was modeled extensively in STAAD, and then again in RISA-3D, says Joel Stahmer, vice president at Ammann & Whitney, whose firm served as engineer of record. "What's unique about the stair-

Above A 53-by-13-foot sheet of 3/16-inch stainless steel metal is affixed to a frame via a Teflon-coated sliding bearing system that accommodates material expansion and contraction.

This page, except where noted: M. Ludvik Engineering; lantern hardware details: George Valkai

M. Ludvik Engineering

Clockwise from top left Two-inch annealed glass treads support vertical loads from foot traffic. A tri-tiered staircase carries visitors to a landing that overlooks Robert Moses' Panorama of the City of New York, which has been a feature of the museum since the 1964 World's Fair. Acid-etched, canted glass panels are strung between tensioned cables and stainless steel springs that handle partial structural loads and maintain the lantern's weighted curvature. Details of the lantern's 3/16-inch stainless steel hardware and cable system. The central gallery's 80-by-40-by-30-foot glass volume of acid-etched glass panels is stabilized with a carbon steel ring beam that serves as a counter weight and maintains tension.

case is that it uses no off-the-shelf, rolled shapes; every section is custom built."

The base sports a configuration to echo the shape of the Unisphere in the distance, set within a new pile foundation that supports the stairs. Three, three-sided masts fabricated from ⅝-inch A36 steel plate fan upward to support three landings at shorter intervals. These are more like a terraced descent than an abrupt experience, explained Zdan. The first landing is approximately 8½ feet above the ground floor, the second landing is at approximately 12½ feet, and the top landing reaches a height of 14½ feet. The delicate apex at the base also keeps the ground level uncluttered, accounting for three existing columns that support the Panorama.

Horizontal steel beams connect to the curved steel plates via welded built-up construction around a 5-inch solid round. The outer steel ribbon is made up of three 1-foot-and-1-inch plates, while the interior plate's height of 7 inches forms a shoe to pick up the balustrade. Two-inch annealed glass treads from AGNORA fabricators, measured by a laser on-site and CNC-milled in Canada, support vertical loads.

Since the building was established as a museum post–World's Fair in 1974, Grimshaw Architect's renovation has nearly doubled the institution's square footage to 105,000 square feet. Newly defined entrance points that now direct visitors through the large central gallery to various specialty and temporary exhibitions are equipped to meet the Museum's charge: to attract approximately 200,000 members of the Queens borough community through engaging art, history, and educational programming. □

Above left The west elevation of the Queens Museum fronts a major vehicular parkway, and is now articulated with an LED-illuminated decorative glass facade to alert passengers of its existence.

Above The base of the staircase, which was designed to echo the shape of the nearby Unisphere, supports three, three-sided steel masts that fan upward to support three gently terraced landings.

QUEENS MUSEUM

Location: **New York City Building, Queens, NY**
Owners: **Queens Museum**, *Queens, NY*; **New York City Department of Design & Construction**, *New York, NY*
Architect: **Grimshaw Architects**, *New York, NY*
Executive Architect: **Ammann & Whitney**, *New York, NY*
Lead Structural Engineer: **Ammann & Whitney**, *New York, NY*
Mechanical Engineer: **Buro Happold**, *New York, NY*
Specialty Structures Engineer (interior lantern): **M. Ludvik Engineering**, *Brooklyn, NY*
General Contractor: **Volmar Construction Inc.**, *Brooklyn, NY*
Construction Manager: **URS Corporation**, *New York, NY*
Architectural Metal Erector: **CAPCO Steel**, *Providence, RI*
Curtain Wall Erector: **Action Storefronts**, *West Islip, NY*