ICAHN STADIUM

An Iconic New York City Stadium
Reborn in Steel

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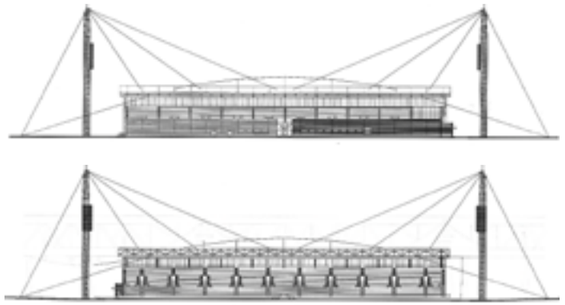

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OPPOSITE A cable catenary braces the roof structure.

ABOVE East elevation, west elevation

When the decision was made to replace the historic, yet dilapidated, Downing Stadium with a new, up-to-date facility that would include the first IAAF Class 1 certified running track in the U.S., it was clear to everyone involved that the era of Robert Moses—an era of unbridled public funding—was long gone. In order to get the project built, the Randall's Island Sports Foundation had to rely equally upon private and public resources. Even then the $40-million-dollar project had to be phased, built piecemeal as the money became available. This created challenges for the designers and engineers because each piece of the structure had to stand on its own until the money became available to put the rest of the construction in place.

"The decision to go with steel was made in the early planning stages," said David Campbell, Geiger Engineer's Principal-in-Charge of the project. "It was necessary to optimize the framing of this project because of the funding issues, which meant doing as much prefabrication construction as possible. And steel was the obvious choice for that."

"Steel was also chosen to keep the structure light," continued Campbell. Icahn Stadium's foundations had to be taken to bedrock since the site is covered with fill with a higher organic content than is desirable, requiring a design that could accommodate the lower bearing capacity.

The 5,000-seat grandstand was the first phase to be constructed. Two types of ASTM A572 Grade 50 steel beams support the pre-cast concrete risers on which the stadium's seating is mounted. The rakers running from grade to the concourse level are 30W116, whereas the rakers running from the concourse level up are 27W146. The shallower upper beams provide more headroom for the stadium concourse that runs underneath.

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OPPOSITE A steel stair ascends to the grandstand.

ABOVE The pinned connection allows the roof to slightly rise and fall.

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The rakers are pinned to 10 steel columns that rise from grade and extend above the back of the grandstand. Fabricated as "ladders," comprising rungs of 12-inch extra strong pipe and rails of 18-by-6-by-1/2-inch HSS sections, these columns were designed to support the grandstand and the eventual roof structure.

The sinuous steel structure left ample space beneath the grandstand for support facilities, including showers and locker, exercise, fitness and meeting rooms.

The next phase of construction to go up involved two 160-foot-high light towers that flank the grandstand. Each supporting 41 2,000-watt metal halide floodlight fixtures that illuminate the field at night, the towers were prefabricated in three sections each and then assembled onsite.

"The light towers are distinguished from the light poles on the other side of the field because they're structural, part of the roof support," said Campbell. Designed to support the roof structure, but erected before funding for the roof had come in, the towers were built to be free standing.

"It's a unique construction," continues Campbell. "12 vertical chords of 8-inch-diameter steel pipe connected by a hoop system of rolled 8-inch square steel tube. Helmark Steel Industries, the fabricator, came up with the hoop system. It's made up of steel channel and plate that make a bond with the face of the hoop. Plate and channel were rolled and welded to form a box."

The centerpiece of the construction was the third and final phase, the roof structure. "From the initial conception of the project, the desire was to cover the grandstand with a canopy that would provide shelter to spectators without interfering with the view of the track and field," said Campbell.

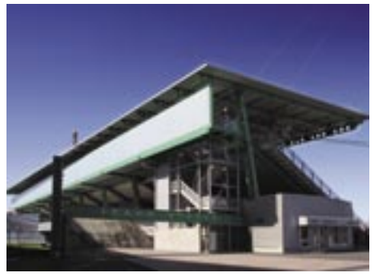
In the final configuration, the canopy is suspended from the light towers and the towers are guyed to anchorages at grade by ASTM A586 structural strand steel cables. This provides a clear span of more

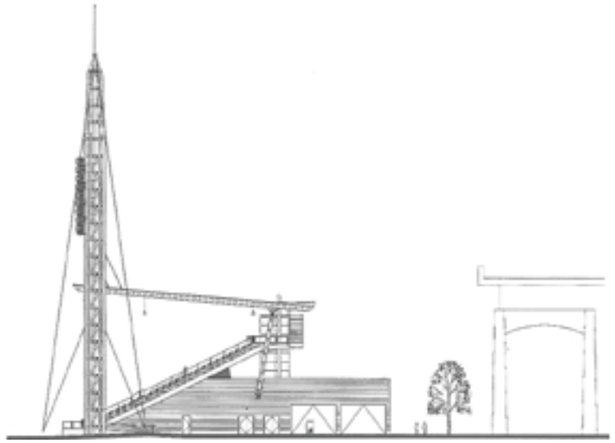
OPPOSITE Castellated beams prior to erection of roof decking

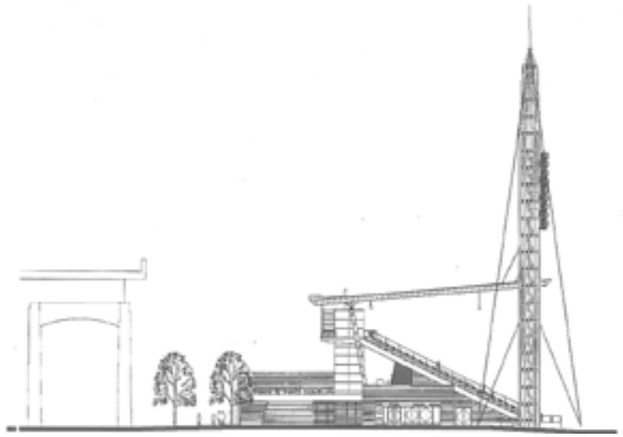
ABOVE The light towers were craned into place.

BOTTOM LEFT Roof beam being attached to light towers

BOTTOM RIGHT Stadium entrance







RIGHT, OPPOSITE South elevation, north elevation

BOTTOM The light towers illuminate the field and support the roof.

BOTTOM: ©JEFF TRYON / HILLIER ARCHITECTURE; DRAWINGS COURTESY OF HILLIER ARCHITECTURE

than 400 feet at the front of the canopy. Meanwhile, at the rear of the canopy is a continuous girder attached to the 10 HSS steel columns rising out of the back of the grandstand by pinned connections that act like a giant hinge. The roof can rotate on those hinges when loaded with snow or lifted upward by the wind.

The roof framing is composed of very light 110-foot-long 27W55 castellated beams of 50 ksi steel, which were craned into place. Conventional 20 gauge 3-inch metal decking, erected by Helmark, completes the shelter.

Circular openings in the beams' webs, a result of the fabrication process, in conjunction with the grass-green color selected by the architect, enhance the sense of lightness inherent in the steel construction. To keep the roof from lifting in the wind, a structural catenary, serving as the top cord of a bow truss, stabilizes the suspension structure. Gracefully arcing in a continuous span between the light towers' guy anchorages, the cable catenary rises to a height of 75 feet at the center of the seating and is fastened to the A-frames above the roof surface with cast steel saddle clamps.

One of the expressed design goals from the beginning of the project was that the stadium should have a unique and distinct presence discernable from a distance, particularly from across the East River in Manhattan and the FDR Drive. It was quite a challenge for a small grandstand stadium with the Triborough Bridge and the Hell Gate Viaduct as a backdrop. The final structure, however, has all the grandeur of one of Robert Moses' monumental works, but with a distinctly humanistic edge particular to our time. And it was done with limited and piecemeal funding, something Moses never faced. Steel helped that all to happen. ■

ICAHN STADIUM

Owner **NYC Economic Development Corp.** *New York, NY*
Architect **Hillier Architecture** *Princeton, NJ*
Structural Engineers **Geiger Engineers** *Suffern, NY*
General Contractor **Bovis Lend Lease** *New York, NY*
Structural Steel Fabricators
Helmark Steel Industries, Inc *Wilmington, DE*
Kline Iron & Steel, Inc *Columbia, SC*
Miscellaneous Steel Fabricators and Erectors
Achilles Construction Co, Inc. *Brooklyn, NY*
Summit Group *East Rutherford, NJ*
Structural Steel Erectors
Falcon Steel Co, Inc *Wilmington, DE*
AJ McNulty & Co, Inc *Maspeth, NY*