

Empire City Casino at Yonkers Raceway

A sculptural entrance canopy reinvents the historic track's image with an 11,000-square-foot, LED-lit lattice structure covered with transparent ETFE film.

FOUNDED IN 1899, YONKERS RACEWAY is a historic track with a storied past—at the turn of the century, auto racer Barney Oldfield set a one-mile record there, and in 1936 the champion horse Seabiscuit galloped away with a victory there as well. Currently, the five sons of Pittsburgh Steelers football legend Art Rooney own the raceway. But its president, Timothy J. Rooney, isn't one to rest on the track's laurels. When it came time for the venue to expand several years ago, he approached Studio V Architecture, a New York-based firm founded by Jay Valgora in 2006. "He wanted to create an iconic and contemporary solution to change the image of his property," says Valgora. "This is especially exciting, as he is a wonderful gentleman who owns 19th-century houses in Ireland and old Virginia horse farms."

"We wanted to re-invent the casino with extraordinary architecture instead of shallow spectacle," he continues. The casino's hilltop site immediately lent itself to a sculptural form that took the shape of a porte-cochère—initial sketches pull the forms of the landscape into a curved, organically shaped canopy. "I have been fascinated for years with the expressive potential of grid shells, the dynamic structural system pioneered by Frei Otto nearly a half century ago,

and Vladimir Shukov before him. These amazing structural forms are so rarely used in architecture, and especially in the United States—the open nature and topography of the Yonkers site were perfect for this, while the program of a casino building required an expressive idea."

Studio V was only two years old at the project's start. The canopy's unique form presented the team with an opportunity to experiment with material technology—but it was an ambitious goal. After developing the fundamental architectural concept, Valgora asked Nick Goldsmith of FTL Design Engineers to help realize the idea of a lattice shell structure; the two have collaborated for years, and Goldsmith worked for Otto early in his career. Together, the teams developed physical and digital models, forms, and details of the casino's new entrance.

The 11,000-square-foot porte-cochère is a steel lattice shell structure covered with ETFE, or ethylene tetrafluoroethylene, a transparent film that is lightweight, flexible, and sustainable. According to Birdair, Inc., a lightweight, long-span roofing contractor, the material can last more than 20 years without losing transparency or strength. Due to its nonstick surface, ETFE also resists airborne pollutants, making it chemically resistant and naturally self-cleaning.

The lattice shell has three primary structural components: arches, purlins, and a complex curved perimeter beam. "We started an even grid, but quickly determined that it would be much more efficient to differentiate the members into a series of



This spread The 11,000-square-foot porte-cochère is a steel lattice shell structure covered with ETFE, a transparent film that is lightweight, flexible, and sustainable. Installers feed the edge of the ETFE film into the clamp bar of a 6-inch steel extrusion designed to hold the material in place.



This spread: Ornamental Metal Institute of New York; opening spread, photo: Paul Warcho; opening spread, illustration: Studio V Architecture



Above A system of 8-inch-diameter steel arches and 4-inch-diameter purlins created efficient geometric connections, reducing construction costs.



Bottom A cross-section of the 6-inch extrusions mounted on the steel arches of the lattice shell structure. A round channel and clamp bar hold the edge of the ETFE foil in place.

Below The shell is made of ribbons of ETFE cushions; these are continually inflated by air pipes that feed individual cushions from air handling units. Energy required to maintain pressure within the cushions is minimal.

slightly larger arches and smaller purlins that were slightly offset from one another," says Valgora. This design was more efficient and easier to construct than a geometry of overlapping forms; because it allowed for more efficient connections, it also reduced costs.

The team worked to keep the steel members to the smallest sizes possible to create a delicate appearance and increase cost efficiency, reducing the size of the arches to only 8 inches and the purlins to a slender 4 inches. The edge beam received the most scrutiny, but ultimately required only an 18-inch diameter to allow its twisted-torus form to absorb and transfer many of the structure's forces, while relating in scale to the other members. To resolve structural and form issues together, Studio V and FTL created a digital version of an upside-down "chain model," similar to Antoni Gaudi's physical models for the Sagrada Familia basilica in Barcelona. The model allowed them to find the most efficient forms, and work backwards and forwards between ideal sizes and geometries to best understand the realities and economies of fabrication.

This form-finding approach to structure led the team to create an asymmetrical design with emphasized diagonals in two opposing directions. These sweeping diagonals established the geometry of the ETFE foil, and the lighting system. Once they developed the structure, it became the basis for a series of architectural design decisions to integrate the structure, foil supports, and lighting into a series of overlapping lattices that create a delicate play of light and shadows.

Erecting the lattice shell involved arranging the structure's arches, then infilling the purlins to support each one. Installers took great care to locate the first partial arch, the precise placement of which dictated the exact geometry of the entire assembly over hundreds of feet.



Above A four-story facade of frameless, low-iron glass forms the 300-foot arching facade of the new casino.

"As with many steel jobs, the project progressed rapidly once the initial geometry was confirmed and the installation crew hit its rhythm," says Valgora. "I think the ironworkers who installed the components were astonished by the form and how it developed, as the pieces were so individual and complex, and it changed dramatically and quickly over the course of the installation."

The structure proved so massive and complex that scaffolding could not be erected to install the ETFE foil and its 6-inch extrusions on top of the steel arches—it would have been too complex itself. But without scaffolding, each ribbon of foil pillows blocked access to the next one as it was installed. Birdair solved the challenge with a carefully coordinated series of articulated man lifts that granted access to the extrusions and pillows from several different points. To give access to electricians installing lighting above the canopy's

extrusions (without having them balance on the extrusions, which are up to 40 feet in the air) the company used a system of "surf boards," elongated, elliptical working platforms covered with soft material to bridge between the pillows and allow safe access. The canopy's custom LED lighting, by Tommy Voeten of 212 Studio, has a constantly changing pattern of light and color developed in conjunction with Tillotson Design Associates.

Because sprinklers would have interfered with the delicacy of the steel members and with the lighting design, the project team worked with local fire and code officials to review material testing reports and facilitate approvals for a sprinkler-free structure. (ETFE foil is not fireproof or resistant—but in the event of a fire, it vaporizes on contact with flame without residue or other safety concerns.)

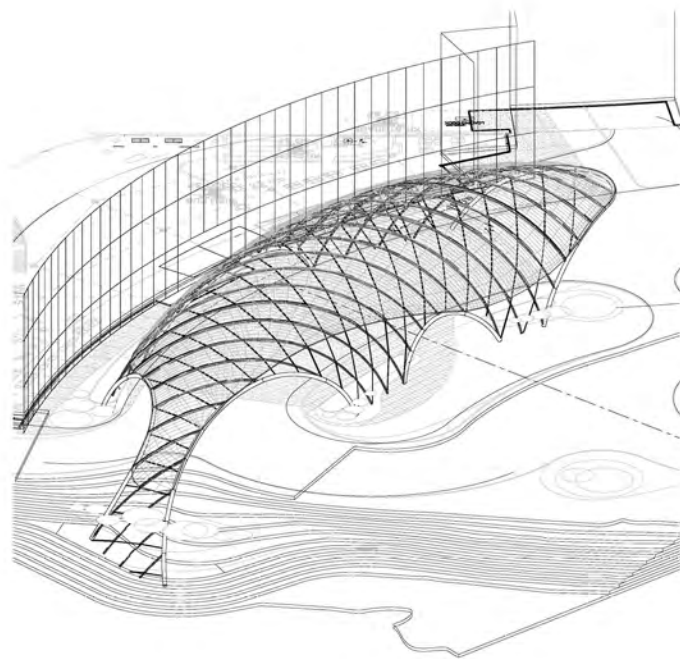
Behind the canopy, a four-story facade of frameless, low-iron glass in a 300-foot arc gives visitors a

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Jay Valgora, Studio V Architecture



This spread The lattice-shell porte-cochère and 45-foot-tall glass curtain wall create a dramatic visual identity for the new casino.



window into the casino before they ever step from their cars. The curtain wall acts as a delicate membrane that divides and connects the casino's new vertical atrium with the broad forecourt that makes the new entry, and identity, for the casino.

The design and detailing of the curtain wall reinforce this concept at every level: massive sheets of low-iron white glass have minimal seams and frameless connections, and dramatic “fly-bys” soar into space on either side of the building as the facade joins the roof with a continuous frameless skylight. The glass has a gradated frit pattern to create a delicate veil between inside and out, framing views of the porte-cochère for those inside. The view of the casino has changed immensely for motorists on the New York State Thruway as well—if new crowds at the venue are any indication, many are stopping for a second look. Innovative architecture has proved a good bet.

EMPIRE CITY CASINO AT YONKERS RACEWAY

Location: 810 Yonkers Ave., Yonkers, NY
 Owner: Yonkers Raceway and Casino, Yonkers, NY
 Architect: Studio V Architecture, New York, NY
 Structural Engineer: DeSimone Consulting Engineers, New York, NY
 Porte-cochère Engineer: FTL, New York, NY
 General Contractor: LP Ciminelli, Buffalo, NY
 Curtain Wall Consultant: Israel Berger & Associates, New York, NY
 Structural Steel Erector: Berlin Steel, Kensington, CT
 Architectural Metal Erector: Custom Exterior Systems, Sloatsburg, NY
 Ornamental Metal Erector: Birdair, Amherst, NY
 Curtain Wall Erector: Birdair, Amherst, NY