





Capital One

A carefully engineered installation at a Midtown banking center brings together cutting-edge design modeling software with the age-old art of steel fabrication.

DESIGNED BY EMERY ROTH & SONS and opened in 1967, 299 Park Avenue is a stalwart of Midtown East. Alternating polished and matte stainless steel mullions emphasize its 42-story height, its glazing reading as almost black from the street, except at ground level. There, Capital One Financial Corp. has made its new commercial-banking headquarters known with a swooping sculpture that conveys a sense of energy to those who pass by. The piece was installed last year to mark the bank's long-term lease of 250,000 square feet of the building, including a 5,500-square-foot, double-height retail space facing Park Avenue and 49th Street.

Because the building's North Pavilion, as it is known, sits on a podium a few steps above the street, the sculpture, which is more than 19 feet tall, almost 55 feet long and almost 17 feet wide, appears to almost hover in air. Touching the floor at just two points, the 14,000-pound piece curves lightly through the pavilion, which along with the sculpture was designed by a Gensler team led by Laurent Lisimachio. The architecture firm worked closely with Amuneal, a Philadelphia-based fabrication company awarded a design-build contract for the sculpture, to realize the installation. Though it is a sort of extrapolation of the bank's logo, the client, "didn't see this as a sculpture as much as a part of the architecture," says Adam Kamens, CEO of Amuneal, who took over the family business from his parents and grew it from a technical metal fabrication shop to a firm that specializes in a range of custom architectural applications.

Before the team could begin to consider how to install such a massive piece within the glass-enclosed space, they first had to consider the site's constraints. The building sits over a Metro-North rail line, a factor that complicated its original engineering and also created a challenge for the sculpture's design and fabrication. Because any reinforcements for the piece could only penetrate the floor slab a few inches, the project engineer, Thornton Tomasetti, and Amuneal's in-house engineer worked together to develop a structural framework that would allow the sculpture to touch



the floor lightly but be fully supported beneath the terrazzo flooring.

With two structural steel beams running laterally beneath the pavilion space and tying into the building's existing structure, the engineers were able to stabilize the installation with two nested hollow structural sections (HSS). "Instead of having the anchoring points that go deep into a slab, we have anchor points that come up almost 2 feet into the sculpture," explains Kamens. A cross-section of the sculpture would show one HSS welded to the structural member below, with another 4x4 HSS within the sculpture sliding, like a sleeve, over it. During installation, the two HSS were welded together onsite.

The aluminum and steel structure of the sculpture took nearly 195 hours of engineering and modeling, 2,660 hours—over a year—of fabrication, and nearly 1,600 hours of installation time. Working from a ¼-scale wood model they milled with a 5-axis CNC machine at the project's onset, Amuneal welded more than 2,000 square feet of steel to create the individual pieces of the final sculpture.

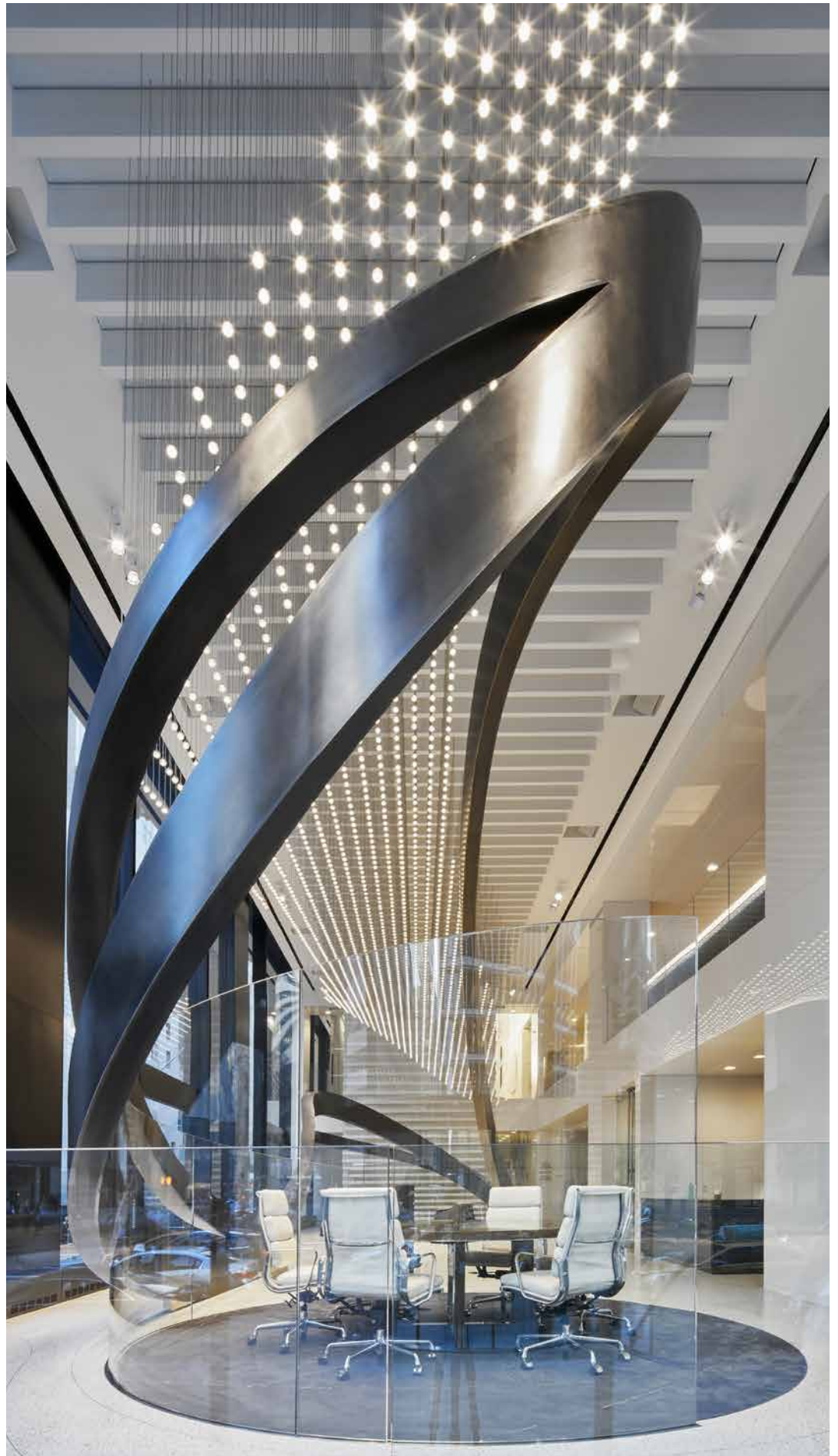
The team's earliest design conversations focused on how to realize the Mobius-strip shape of the structure. Amuneal presented a few subtle variations of the design, each with the same footprint: one was a purely rectangular form; another had bottom plane narrower than its top plane, "so as it turned through the space it would force change in elevation and form," says Kamens. From a fabrication standpoint, the trapezoidal form was more complex, but, "we thought it would bring more light and life to it," he adds. The client and architects agreed.

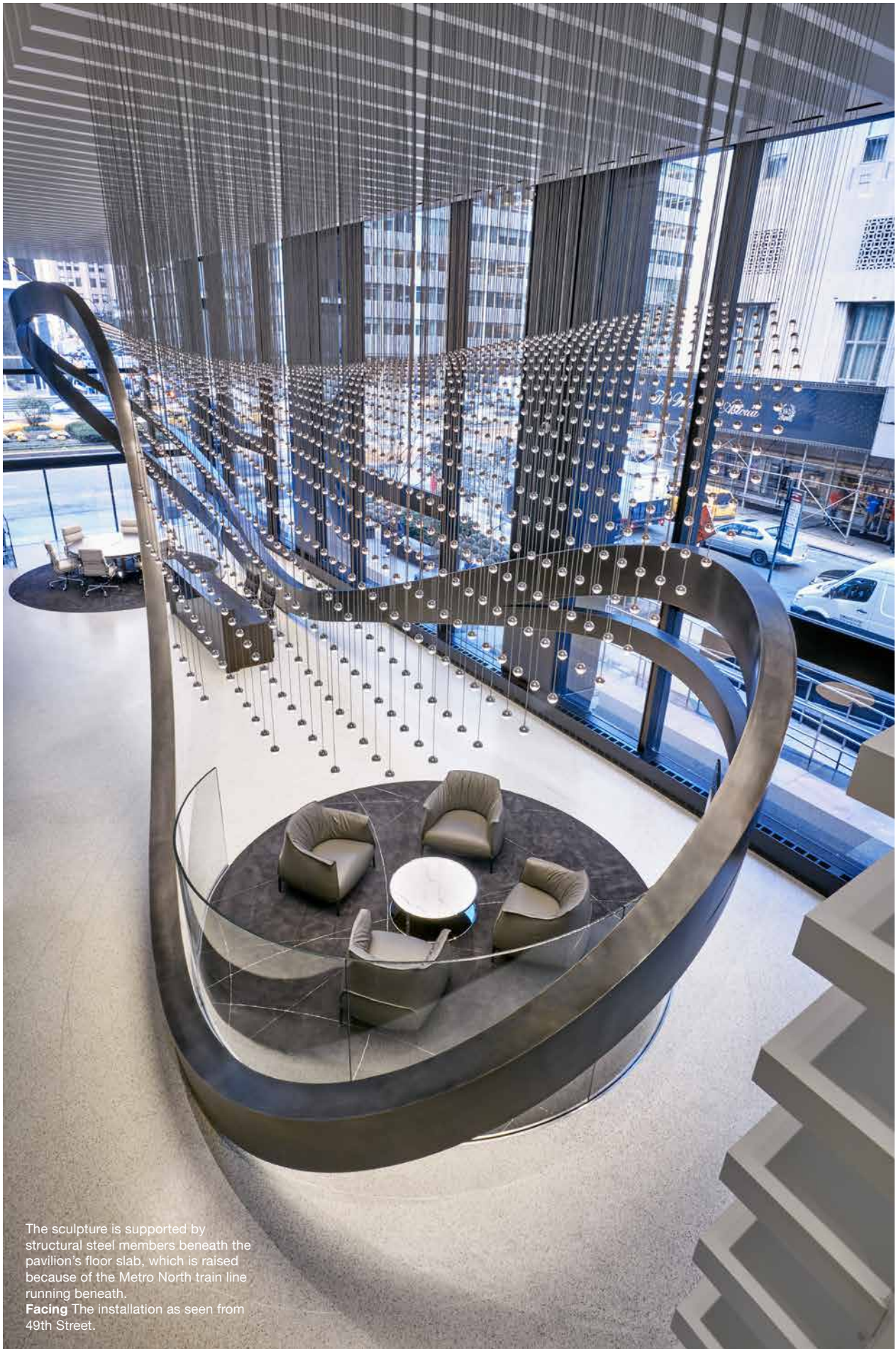
Other important conversations focused on how the structure would touch the ground. Amuneal created a full-scale, 12-foot-long section of the shape to test deflection and fit, locking the piece to two anchor points that represented the permanent anchors at 299 Park, which allowed for only ¼-inch of tolerance throughout the entire sculpture.

Modeling software facilitated collaboration and productive problem-solving throughout the design and fabrication phases. Working with Gensler's Rhino model, Amuneal's engineers created a type of translator between Rhino and their modeling software, Solid Edge. "The reason we use this specific software package is that you can't engineer something you can't make," says Kamens. "In Rhino or other modeling packages you can create any shape you want, but in our package, if you can't actually form that in metal, it won't let you create the shape." In other words, it forces the user to figure out a form that can be fabricated in real life, not just onscreen.

Once the design had been translated into Solid Edge, the software essentially "unfolded" its form and shapes, then generated laser codes and profiles for each to be rolled in the proper shape. The software also contemplated the entire form within a virtual two-story space to verify ADA compliance and mandatory distances from the pavilion walls. Putting the entire team on the same page about the forms of the installation, the software then allowed them to move on to conversations about their engineering approach. Amuneal worked with Thornton Tomasetti to determine weld conditions, material thicknesses, and the thickness of ribbed members required to stiffen the structure from within.

Opening page and right Capital One's commercial-banking headquarters, designed by Gensler. The space features a 55-foot-long installation designed by the architects in collaboration with Amuneal Manufacturing Corporation. **Facing** In Amuneal's Philadelphia facility, the entire sculpture was fabricated and erected to ensure tight tolerances were met in the final installation in New York.





The sculpture is supported by structural steel members beneath the pavilion's floor slab, which is raised because of the Metro North train line running beneath.

Facing The installation as seen from 49th Street.



After the mockup phase, the Amuneal team constructed the entire structure at a Philadelphia warehouse. They designed individual buck forms for each of the negative spaces beneath the sculpture's curves, using the forms to ensure the entire piece was within the very tight tolerances. Inside the piece is a ½-inch thick carbon steel fin running through the entire structure, with hundreds of ½-inch-thick carbon steel ribs on either side of the fin. That skeleton is enclosed in a ¼-inch-thick outer skin. This was pre-finished through an abrasive grinding and patina process using a series of chemical solutions to bring out various minerals and oxides in the steel to achieve the desired coloration. Then, each corner was burnished, and the entire structure was dismantled for delivery to 299 Park.

The installation arrived in New York in 16 pieces—the size of each segment was based on the length of the piece and the amount of curve that would fit through a single, not-so-large door, says Kamens. A crane picked up piece and got it as far as the door, then installers used a winch to pick pieces up inside the pavilion and place them onto a trolley to move into place. “It was like a big, primitive form of Jenga,” jokes Kamens.

The piece was erected by Local 580 ironworkers at New York-based Freedom Ironworks. “When we were putting together the logistics plan we met with them onsite and collaborated with them,” says Kamens. “We like to collaborate early on in the process. We want them to inform the process and make sure they’re going to be comfortable with it.”

In turn, the ironworkers were eager to collaborate on a piece that would have such a public audience. “They say they look forward to the projects that we work on because they can take friends to see it,” says Kamens of the Freedom team, whose skilled work on other staircases, for instance, may sometimes be covered over by drywall or paneling.

In its finished form, the installation creates a sense of movement within the Pavilion, where seating areas sit within the curves at either end of the piece. But the space doesn't just shine during daytime meetings. A light installation of hundreds of bulbs suspended on vinyl-coated cables hangs over the piece, responding to its negative space with its cloudlike shape and providing illumination that ensures the sculpture adds its dynamism to busy street outside any time of the day or night.

CAPITAL ONE

Location: **Capital One North Pavilion, 299 Park Avenue, New York, NY**

Owner: **Capital One, New York, NY**

Developer: **Fisher Brothers, New York, NY**

Architect: **Gensler, New York, NY**

Structural Engineer: **Thornton Tomasetti, New York, NY**

Construction Manager: **Richter + Ratner, New York, NY**

Architectural and Ornamental Metal Fabricator: **Amuneal Manufacturing Corporation, Philadelphia, PA**

Architectural Metal Erector: **Freedom Ironworks, New York, NY**