A double-height gymnasium occupies a former mechanical court in the landmarked building.

26 Broadway Educational Campus

The landmarked building in Lower Manhattan gets a second life as a school thanks to its steel structure and an innovative adaptive reuse plan.

FOR THE PAST SEVERAL YEARS, the landmarked Standard Oil Building at 26 Broadway has been transformed from the oil giant's Carrère and Hastings-designed headquarters into a lively academic complex for secondary students in Lower Manhattan. The third academic institution to be located in the building, it occupies 104,000 square feet of space on the first, mezzanine, and second levels and adds nearly 700 high school seats to what SCA calls its Broadway Educational Campus. The entire complex, which also includes the Urban Assembly School of Business for Young Women (on the 4th and 5th floors) and the Lower Manhattan Community Middle School (on the 6th and 7th floors), was designed by New York-based architecture firm John Ciardullo Associates, who has worked extensively on projects with SCA for several decades. Perhaps this longstanding relationship is why Ciardullo was allowed to have a bit of fun with the campus, transforming an underused mechanical courtyard into a dramatic double-height, steel-framed gymnasium.

The original building at 26 Broadway was built in three stages in 1885, 1899, and 1921. Because most of the building's existing structure is steel, Ciardullo knew it afforded the latitude to tie framing for a gymnasium into the columns already in place. "With steel, you have flexibility," he says. "You can literally put the beams anywhere within the steel structure. If you had a concrete structure, you'd have a problem analyzing it structurally because you don't know what reinforcing steel is in the concrete frame. You would have to drill into the concrete to find out."

"I suggested that if we filled the center core of the building, we could create a large space that could function as a gym and we could bring in light through a skylight," says Ciardullo. Though the idea of giving Manhattan students an indoor gym was a novel one, the execution of it proved relatively straightforward says Ciardullo. Crews guided five W18x86 wide-flange beams through the building's window openings two stories above street level, carefully maneuvering them across the floor and into the open courtyard space. There, the beams were welded at one end to existing steel columns on the portion of the building built in 1921. At the other end, they were set into 1-by-1-foot, 10-inch-deep pockets cut in the 1890s masonry bearing wall, resting atop a bearing plate attached with non-shrink grout to an existing granite sill. The roof structure is cross-braced by W12x22 and W14x22 members, which are bolted to the W18s.

Ciardullo designed the roof to give the space a lofty feel, moving the connection of the peaked skylight to the roof beam 6 feet away from the wall to create a steeper pitch. "We wanted a flat roof section so we could frame the skylight; that also reduced the moment on the steel beam that supported

Left Steel framing for the gymnasium roof is lifted through the third-story windows of 26 Broadway and carried through the building into the courtyard. **Below** Five W18x86 wide-flange beams are welded to the building's original steel columns to create the roof of the gymnasium.

> **"The contractor and the steel fabricator and erector came up with the solution of how to bring the steel into the building and put it in place… That's where the experience of the unions came into play."**
>
> **John Ciardullo, John Ciardullo Associates**

Opening spread: Anne-Marie Kellen; This spread: John Ciardullo Associates

This page The gymnasium's peaked roof structure is framed with HSS round sections and finished with Kalwall skylight panels. By moving the connection of the peaked skylight 6 feet away from the wall the architect created a steeper roof pitch and a higher ceiling.

a three-hinged arch. So we were able to reduce the depth of the beam, and by reducing the depth, we were able to have a higher ceiling," he says.

The skylight structure is created with W14x43 members, which were preassembled into five roof sections and delivered to the site to be lifted through the historic building's windows and into the courtyard. The remainder of the skylight is framed with ASTM A500 Grade C 46ksi HSS. Elsewhere the project's structural steel is ASTM A992 Grade 50.

"The contractor, along with the steel fabricator and erector, came up with the solution of how to bring the steel into the building and put it in place," says Ciardullo. "The architects and the engineers really don't talk about how everything gets constructed; we just lay it out in its final position. They came up with the idea, and the way they did it was really quite interesting." As each piece was moved into position, the erection crew from Midtown Heights hung it with cables from steel beams above, so as not to damage the existing floor below. "That's where the experience of the union ironworkers and the steel contractor and erector came into play," adds Ciardullo. A design that utilized heavier material would have been impossible, he observes: "If this were concrete they'd have to put formwork in, and they'd have to wheel the mix onto each floor. Steel is a lot lighter; we couldn't have done it in concrete."

The SCA has long recognized the benefit of turning existing steel-framed structures into schools. As the city's need for classroom seats grows, existing buildings like 26 Broadway offer the flexibility to create new openings between floors—a crucial aspect of any vertical urban campus. At 26 Broadway, use of the elevators was restricted by a business agreement between the owner and SCA, so the architects designed a convenience stair connecting the school's four floor levels to limit elevator use. But creating the staircase required removal of a structural steel column to make room for the opening. The

Left The stair's top riser and tread are welded to a lateral beam with its flange removed. The construction allows the stair to function as the beam's top chord, creating a less bulky design.
Below In previously completed areas of the school, structural analysis revealed appropriate unsupported heights for existing columns, allowing the team to remove some lateral supports to create stair openings.
Facing Perforated carbon steel railings encircle the top of a convenience stair, one of many that cut down on the students' use of elevators in the multi-use building.

remaining column adjacent to the stair opening was supported laterally by steel beams at each level, so Ciardullo, also the project's structural engineer, had to calculate how many beams could be removed to create the opening.

"I knew the size of the steel column and I had the weight of the steel structure, so we did an analysis to determine the acceptable unsupported height of the column," says Ciardullo. "Since I had the size of the columns to calculate the buckling effect and column width by taking out the lateral support at one floor, we were able to then determine that the existing column could take the elimination of the lateral support beam and handle the buckling effect, the non-lateral support, at each floor."

Ciardullo also designed a solution to eliminate some bulk from the area where the top of the stair attached to a lateral steel beam. Normally, plates would be fastened to the top of a wide-flange beam to support the stair risers and treads. "It would create a very bulky structure," said Ciardullo. Instead, the team cut away the top flange of the lateral beam, welding the topmost stair riser and tread to the beam and thus allowing it to function as the beam's top chord. The stairs were fabricated in flights from Grade A36 plate and hoisted into the building through a window.

John D. Rockefeller might not have imaged that students would someday play basketball within the walls of his Beaux Arts edifice. But as the first leased space school in an existing office building to come under New York City's sustainable building mandate, 26 Broadway will set the standard for ongoing development under the NYC Green Schools Guide and remain as much a part of the city's progress as it has always been.

This spread: Anna-Marie Kellen

26 Broadway Educational Campus

Location: **26 Broadway, New York, NY**
Owner: **NYC School Construction Authority**, *New York, NY*
Architect: **John Ciardullo Associates P.C.**, *New York, NY*
Structural Engineer: **John J. Ciardullo, R.A.**, *New York, NY*
Mechanical Engineer: **DVL Consulting Engineers**, *Hackensack, NJ*
Construction Manager: **Pavarini McGovern**, *New York, NY*
Structural Steel Erector: **Midtown Heights, Inc.**, *Secaucus, NJ*
Miscellaneous Iron Erector: **Transcontinental Contracting**, *Newark, NJ*
Architectural Metal Erector: **Transcontinental Contracting**, *Newark, NJ*
Ornamental Metal Erector: **Transcontinental Contracting**, *Newark, NJ*