BATHGATE EDUCATIONAL CAMPUS

Steel Transforms an Industrial Warehouse into a High School Campus

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ABOVE Steel framing supports dramatic atriums at the center of each school.

TOP Each school of the campus was designated with its own bright color—red, blue, or green.

When the New York City School Construction Authority (NYCSCA) hired John Ciardullo Associates (JCA) for the $50 million adaptive reuse of an industrial warehouse in the Bronx for use as the Bathgate Educational Campus, the designers were faced with the challenge of expanding an existing 68,000-square-foot, one-story building to 140,000 square feet over two floors. Moreover, because the site, owned by New York City and leased by the Port Authority of New York and New Jersey, was made available to the NYCSCA through the SCA lease program, the terms of the lease required that the major vertical and horizontal members of the existing structural steel frame be used in the new structure. Of the 591.5 tons of steel used in this project 84.5 tons were part of the existing steel frame. This required making modifications to the existing steel members themselves. Even though steel itself is produced from 96 percent recycled materials, this reuse of existing members virtually as is lent new meaning to sustainable design.

"The nature of the program itself was the initial challenge," notes Charles Heaphy, JCA design architect on the project. The industrial building had to be redesigned to accommodate three distinct high schools, each with 500 students. In addition to classrooms, the educational program called for shared spaces, such as the student dining area, library, and excursive, art, music, and multi-purpose rooms on the ground floor. The program also assigned each school its own commons area on the second floor, which acts as a central courtyard. But the architects were concerned with more than just fulfilling the program requirements. "The idea was to create a space that would not only meet the client's needs," says John Ciardullo, JCA principal, "but provide an interesting place that would engage the students, a place where they would want to stay."

Adding a second story involved some extensive foundation work and inventive details. The existing column footings were designed for 750-pounds-per-square-foot, which was insufficient to support the additional load of a second story. New 40-ton steel piles were drilled through the existing interior concrete footings at each interior column location. Because of unsuitable soil bearing capacity the new piles had to be drilled down to bedrock. MoMetal Structures, Inc., the steel contractor, welded two-and-a-half-inch-thick steel plates to the existing

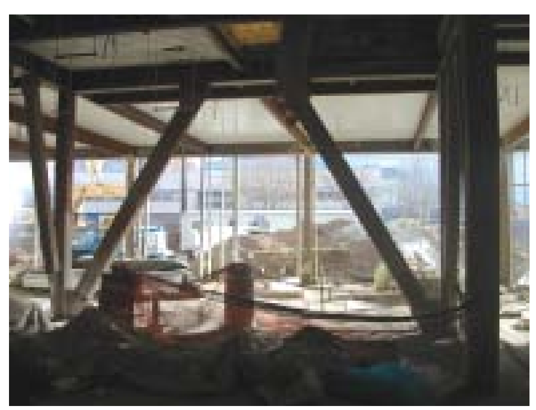
ABOVE LEFT The original building was a drab Port Authority warehouse.

ABOVE RIGHT The major vertical members of the structural steel framing were augmented for reuse.

LEFT Thirty-inch-diameter holes cut into the webs of major exposed girders accommodate spiral ductwork and allow for a clean finish.

BELOW W-shaped extensions to the existing columns deliver enough height for a second floor, while providing lateral bracing.

OPPOSITE The red atrium during and after construction



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interior steel columns, 18W76s and 21W122s of A36 steel, to modify them for connection directly to the steel piles. This unique steel column to steel pile connection system bypassed the need for traditional concrete pile caps.

Although the existing building was high-bay space, to accommodate the increase in volume required for the new second story the existing steel columns and roof girders had to be modified. MoMetal dismantled the steel members, removed them from the site, and shipped them to their shop in Quebec. There, MoMetal spliced 5-foot-4-inch-high W-shaped extensions onto the columns, increasing their total height from 27 to 32 feet. This added elevation provided sufficient vertical height for the installation of the new floor, which, in turn, would serve to provide lateral bracing to reduce the buckling reaction of the increased column height.

Generally the second floor framing consists of standard rectangular bays that employ various beam sizes, including 16W26s, 24W84s, and 18W35s. The steel framing over the multi-purpose room, however, achieves a 58-foot span with two 36W280 beams. Thirty-inch-diameter holes cut into the webs allow spiral ductwork to run through these large sections. The roof framing is somewhat lighter. The existing 24W68 girders were maintained and framed with a variety of beams, including W12s, W16s, W18s, and W24s. All of the new steel is Grade 50.

The modified steel frame combined with the new steel structure successfully provided the 15-foot floor-to-floor heights required by

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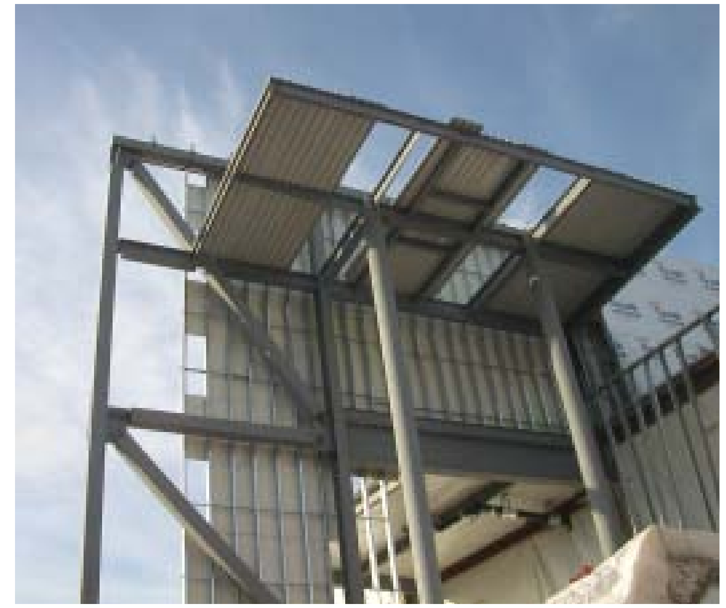

THIS PAGE AND OPPOSITE Intumescent paint protects exposed structural steel members in the circulation stairs.

NYCSCA standards. However, the exterior perimeter footings could not support the additional load of the new second floor while continuing to support the existing masonry wall. Says Heaphy, "The exterior footings already had a certain amount of load and capacity. The concrete block system on the outside had a lot of weight. The addition of a second floor would overload the exterior concrete footing." In response, the architects removed the exterior masonry wall and replaced it with a lightweight aluminum panel wall system backed with metal studs. This allowed the second floor loads to be imposed without modifying the exterior footings. Notes Heaphy, "It would not have worked with the existing concrete exterior."

Steel proved to be not only structurally advantageous but an important visual aspect of the design, unifying the school campus with an engaging industrial aesthetic. The architects left the steel structure and metal deck exposed in all of the shared spaces on the ground floor, eliminating the need for a hung ceiling system and increasing the overall ceiling volume. Exposed sloping steel sections also frame three large skylights in the commons areas on the second floor, creating a dramatic interior courtyard. Perhaps the most ambitious architectural gesture, however, is the three major vertical steel-framed stair enclosures that define the school entrances. These each feature a 12-inch-diameter tree column treated with an intumescent paint for fire protection. Tapered steel sections branch off the column to support the stairs, roof, and glass curtain wall. As a result the staircases seem to float, adding a bit of drama to the entry sequence for each of the three schools.

While conducting an adaptive reuse for this project created challenges of its own, such as dismantling columns and shipping them to Canada to be modified, it would not have been possible to complete the work under the given constraints in any other way. Beginning work in mid 2004, the architects, engineers, and construction team had just under two years to complete the project for the fall 2006 school season. "It wouldn't have been possible to finish this project in that time frame if it were a new building," says Heaphy. "The time it would have taken to pour a new foundation, and bring in new water and electrical mains alone would have pushed the construction over budget and past deadline." And it wouldn't have been possible to adapt the existing building without steel.

BATHGATE EDUCATIONAL CAMPUS

Owner **NYC Board of Education/NYC School Construction Authority** *New York, NY*
Developer **NYC School Construction Authority** *New York, NY*
Architect and Structural Engineer **John Ciardullo Associates, P.C.** *New York, NY*
General Contractor **DeMatteis Construction Corporation** *Elmont, NY*
Structural Steel Fabricator and Erector **MoMetal Structures, Inc.** *Varennes, Quebec, Canada*
Miscellaneous Steel Fabricator and Erector **MoMetal Structures, Inc.** *Varennes, Quebec, Canada*
Architectural Metal Fabricator and Erector **MoMetal Structures, Inc.** *Varennes, Quebec, Canada*
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