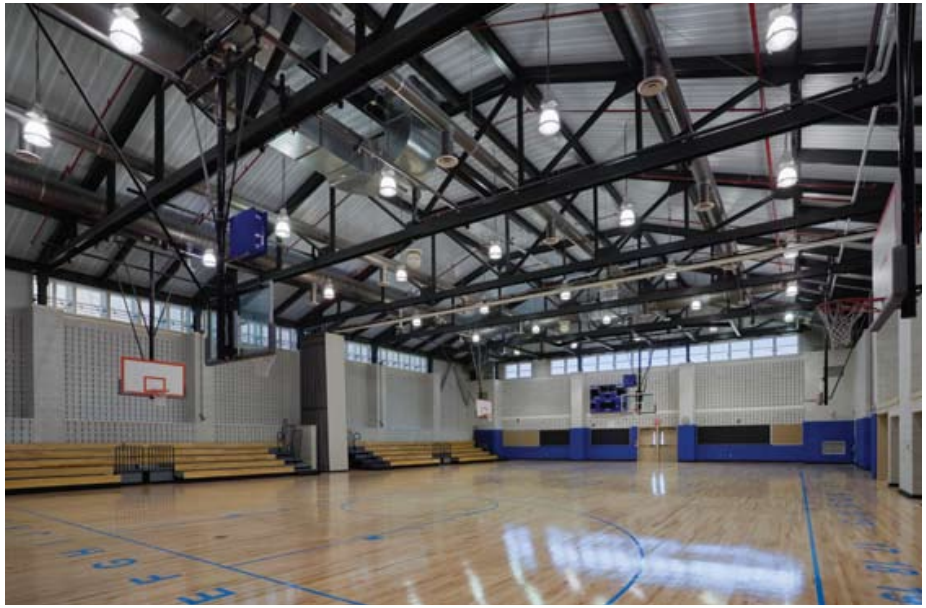
Monroe High School Annex

Steel provides an elegant solution for the design and budgetary needs of a new high school addition in the Bronx.

THE NEW YORK CITY Department of Education has the largest construction budget in the country, spending billions of dollars a year on new facilities. But with more than a million students enrolled and a desperate need for new schools, especially as families increasingly choose the boroughs over the 'burbs, New York must stretch every dollar as far as possible. For a new addition to the James Monroe High School in the Soundview neighborhood of the Bronx, the designers built with steel because it allowed them to create a building that is both economical and elegant. Through steel's expressive beauty, the designers were able to leave many structural elements exposed, especially in the building's two signature spaces, the auditorium and the gymnasium, saving money in the process.

From the project's inception, steel helped guide the design process to keep it as efficient and inexpensive as possible, including even the layout of the new school. "If you think about the most economical plan in a school, it's a double-loaded corridor," says Alex Diez, the principal in charge of the project at Kliment Halsband Architects. This allows for standardized layout with the steel columns, ranging from W12x14 to W21x44, evenly spaced at 30-foot spans with one classroom per bay. The columns are connected to the slab with ¾-inch diameter studs. This configuration makes for the easy placement of doors and lockers within the spans, as well as expansive windows that pour natural light into the classrooms. The system's diagonal bracing did make for a tight layout, though it was preferable because it required less steel, and thus less money.

This relatively simple setup is not without its challenges,



Previous spread and this page: Peter Mauss/Esto

This page: Kliment Halsband Architects

Previous spread The 146,000 square foot, five-story school provides space for two independent schools of 500 students each. Students pass through a landscaped courtyard to the building entrance and a shared auditorium and gym.

Facing, top The gym's hip girder was left exposed, reducing materials costs and heightening the sense of openness. **Facing, bottom** The annex consists of three structures connected by expansion joints. The architects and engineers meticulously designed the joints to alleviate the SCA's concerns about their long-term maintenance.

as the four-story main building houses more than just cookie-cutter classrooms. It must also accommodate doublewide labs, a cafeteria, and other sundry spaces like a library, music room, and nurse's office. To address this problem, additional bracing is added to shift the loads around and create the wider spans required.

The real challenge, though, is connecting the main building to the auditorium and gym, vaulted spaces that are the centerpiece of the new school—in addition to an arts focus, for which the auditorium is key, this layout also creates a courtyard between the new school and its historic 1924 neighbor. Because the environmental loads on these grand spaces is much greater than on the school proper, an expansion joint was required to connect them. "We're basically taking three buildings and making them one," Diez says.

But that is not always an easy process, especially in light of the client. "The School Construction Authority hates expansion joints," says Cawsie Jijina, a principal at Severud Associates, explaining that the spaces can present maintenance problems down the line if poorly designed or neglected, which is why the designers were meticulous in creating their joint. As for the spaces on the other side of the expansion joint, they are the most dynamic in the school, not only for the activities that take place within—basketball games and plays—but also because of the engineering overhead. For the gym, a hip girder was used while a barrel girder was used for the larger auditorium roof. "The barrel shape gives the structure an elegant arch as well as making it stronger," says Carey Ngai, an associate principal at Severud who oversaw the project.

For the gymnasium, W12x53 flat members were used with double-angled L4x4x3/8 for the vertical and diagonal member; W12x14 beams provide lateral stiffness between the arches. The system for the auditorium was slightly more complicated, given its size and complexity: W10x68 flat members were turned on their side and attached again to L4x3x3/8, though with the long legs back to back. A conventional truss of the same composition is used at the ends of the roof for added stability as well as W10x88 horizontal braces. All trusses were bolted with 3/4-inch and 7/8-inch bolts and the barrel truss was also fillet-welded in places.

To further the efficiency of the roof systems, mechanical systems are wholly supported by the trusses—even the lighting is hung from the base of the trusses in the auditorium. The roof deck, which was also left exposed and untreated, does double duty, as well. In the gymnasium, a standard acoustical deck was used, Epic Metals' EP 300 18/20, though a special composite deck from Epic was employed in the auditorium roof, ECP324 16/18. "It eliminates the need for any acoustical insulation," Jijina says.

In addition to the design's cost savings and overall utility, Diez says it could serve another purpose: hopefully it will mint future architects and engineers. "There's all kinds of interesting stuff up there," he says. "Maybe they can understand how the large spans work. It could be a lesson for the students." **M**

Above Thirty-foot spans allow for the placement of one classroom per bay. Columns are connected to the slab with 3/4-inch diameter studs, allowing doors, lockers, and large windows to be placed in between.

This spread Thought the new school was built economically, steel allows it to accommodate the most modern amenities, including double-width labs, a cafeteria, auditorium, library, and other open spaces.

This spread: Peter Mauss/Esto

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MONROE HIGH SCHOOL ANNEX

Location: **1300 Boynton Avenue, Bronx, NY**
Owner: **New York City Department of Education**, *New York, NY*
Architect: **Kliment Halsband Architects**, *New York, NY*
Structural Engineer: **Severud Associates**, *New York, NY*
Mechanical Engineer: **Ambrosino, Depinto & Schmieder Engineers**, *New York, NY*
General Contractor: **Bovis Lend Lease**, *New York, NY*
Structural Steel Erector: **Glasmar Steel Erectors, Inc.**, *Rockville Centre, NY*