INSTITUTE FOR THE STUDY OF THE ANCIENT WORLD

New Steel Structure Redefines an Old Townhouse

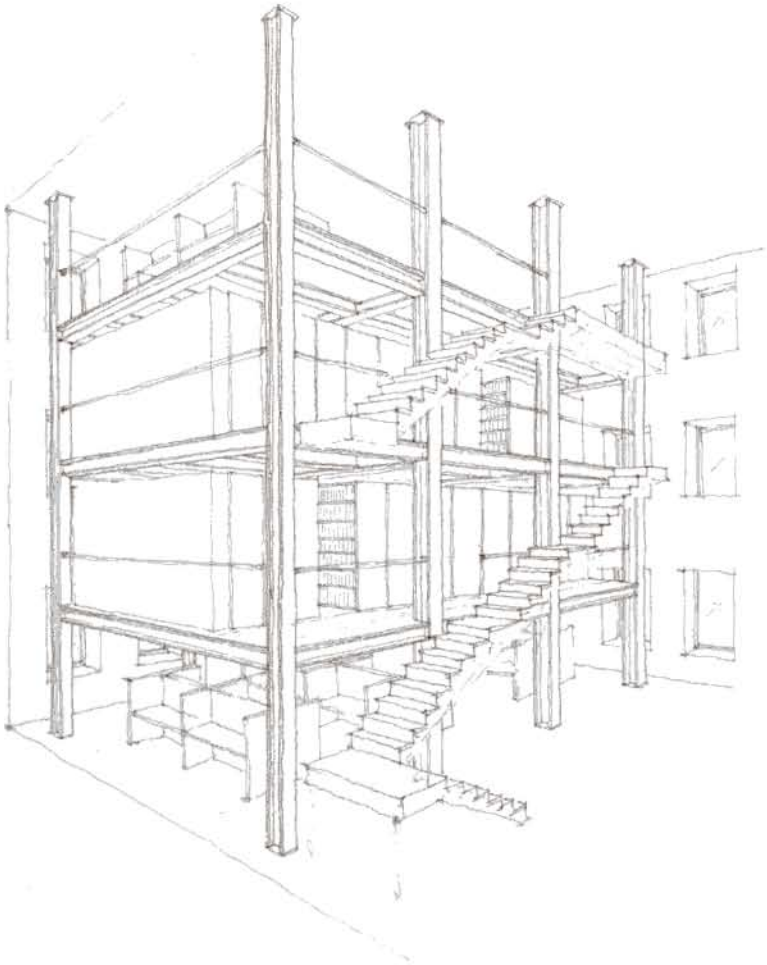
As a newly created center for graduate research with an extensive book collection donated by its founders, the Institute for the Study of the Ancient World needed an inviting and distinctive library to house its highly regarded collection, one which would symbolize the institution's scholarly mission. The challenge was realizing this within the institute's location—a six-story, turn-of-the-century East Side townhouse. The building had been purchased for this purpose in 2004, when the Leon Levy Foundation partnered with New York University in the creation of the institute. Although once a grand and dignified residence, the townhouse did not have any one room that could function as a library. So, in designing its renovation, museum specialists Selldorf Architects had, above all, to find a way to overcome this deficiency. Their innovative solution: carve away a portion of the interior volume and build a new structure within the old, framing it in structural steel so that the substantial loads of high-density files could be supported without the need for massive construction.

To create this library space, the architects removed portions of the fourth and fifth floor slabs at the rear of the building. In the resulting opening they inserted three new levels that rise from the third to the sixth floors, creating 3,035 square feet (in what was originally a 27,000-square-foot building) for study carrels and book storage. The three new floors are free standing and connect to each other and to the original floors via a stair. "The structure and the floors had to be as thin and open as you could possibly make them to let light flow through the space," says Annabelle Selldorf, principal and founder of Selldorf Architects. "Steel was the only way to do it."

"The library is its own stand-alone piece of furniture, so to speak," says Victoria Arbitrio, an associate partner at Gilsanz Murray Steficek, which provided structural engineering services for the project. But before inserting this piece of furniture, the newly created volume needed some preparation. The third floor, on which the library was to sit, had to be reframed. "By putting in a new third floor we didn't need to worry about reinforcing the old third floor," said Arbitrio. "Sometimes its easier to start from scratch." The new third floor is composed of W14x30

BELOW The addition of three new floors where before there were two increases square footage for the library.

BOTTOM New steel framing was used to reinforce the townhouses's old steel structure.



infill beams, W24x68 or W24x76 girders to transfer the library columns above, and 2 ½-inch stone weight concrete over 3-inch composite metal deck. Also, the existing walls needed additional lateral support after losing the fourth and fifth floors. The engineers reinforced them with 14x6 HSS tubes tied back to the existing floors.

Shop welded and bolted on site, the new library structure is a moment frame with infill beams. The beams and girders are W10x33s and W10x45s and the columns are W8X35s. The landings of the stair that connects the library floors and the existing floors were cantilevered on W8x40s and W8x52 wide flange members. Thin, perforated steel plates with a powder coat gunmetal finish make up the floors, landings, and stair risers, and allow light to pass through the space. The rails for the sliding book storage units rest directly on the steel girders. From there the loads transfer to the columns and go directly into the third floor. Remarkably, according to Arbitrio, the weight of the new library plus the high-density files is less than the portions of the heavy concrete slab floors that were removed.

The architects wanted an industrial aesthetic for the library and for that reason the steel was left exposed, coated with Cafco intumescent paint with a two-hour fire rating, and then painted black. Two-inch holes were drilled into the webs of the beams for the integration of the sprinkler system. And because the steel members serve an architectural purpose, the sizes of the wide flange shapes were kept consistent, even though certain members could have dropped in size and still carried the expected loads. Even the bolts were kept consistent: ¾-inch-diameter A325s. And all of the library's steel was ASTM A992 Grade 50.

"The library is its own stand alone piece of furniture, so to speak," says Victoria Arbitrio.

ABOVE The addition's floors are staggered from the existing floors and connected by a stair.

OPPOSITE The designers left one existing column in place, cladding it in black tiles.

Erecting the library structure within the existing envelope presented considerable challenges, as the space was largely inaccessible by cranes. Its location within the building was too far back from the street to open the roof slab temporarily and insert the steel from above. A temporary interior gantry crane was considered, but rejected as too costly. General contractor E. W. Howell and the erection team from Post Road Ironworks finally decided on a solution that required careful crane positioning. From the street they inserted the members through the windows horizontally, distributed and moved the steel across the flooring, and then pivoted and chain-fell each piece into place.

The architects and engineers also used steel in reinforcing much of the original structure to accept loads introduced by the library and upgraded mechanical systems. In the penthouse, the mechanical floor was stripped and replaced and the sixth floor was reinforced locally. An existing column in the library space was left in place and reinforced, as it would have been too costly to transfer the loads it carried from above. Luckily, the existing structure is also steel (embedded in masonry), which was easily accessed and reinforced with A36 plates. The architects replaced the crumbling cornice as well, tying the new one to a tube steel frame embedded behind the existing masonry facade.

But the library is the hero of the institute—creating as it does a new and exciting condition within an old space. But it very easily could never have been realized, considering that options for using the existing building's spaces were certainly cheaper. "I was really impressed that the client was able to make that leap and opt for something that makes it a better and more interesting space," says Selldorf. "It showed that architecture can transform activity in a meaningful way." It also showed that when it comes to structural steel, almost nothing is impossible. ■

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OPPOSITE AND ABOVE A slim cantilevered steel stair connects the new and existing floors.

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Architect: **Selldorf Architects, LLC** *New York, NY*
Structural Engineer: **Gilsanz Murray Steficek, LLP** *New York, NY*
Mechanical Engineer: **AltieriSeborWieber, LLC** *Norwalk, CT*
General Contractor: **E. W. Howell Co.** *New York, NY*
Structural Steel Fabricator and Erector: **Post Road Iron Works, Inc.** *Greenwich, CT*
Miscellaneous, Architectural, Ornamental Steel Fabricator and Erector: **United Iron Inc.** *Mount Vernon, NY*
Metal Decking: **Post Road Iron Works, Inc.** *Greenwich, CT*