
NYU

STEEL SOLVES
Mixed-Use Challenges
at New York University Dormitory

Dorm life at New York University (NYU) is anything but dull these days following the recent completion of the new Palladium Residence Hall. An Olympic sized 25-meter swimming pool, rooftop dining area, two regulation basketball courts, a gymnasium, a climbing wall and an aerobic fitness room, are just a few of the facilities and amenities designed to keep students happy and healthy on the university's Washington Square campus.

Built on the site of the Old Palladium Theatre on East 14th Street, the 167-ft.-tall mixed-use residence hall accommodates up to 1,000 students and faculty in apartment-style housing units on 12 upper floors. General purpose and study lounges, a game room and music practice rooms are also located on the upper floors.

The 65,000-sq.-ft. sports center is located on two basement levels with two stories of retail starting at street level. Located on the third floor are student life facilities such as a library, music room, lecture halls, food court and the outdoor dining pavilion.

The residence hall is one of the most recently completed elements of NYU's 25-year-long, billion-dollar building and renovation program to upgrade and expand its historical campus setting.

Host of Challenges The multiple functions of the residence hall created a series of design and technical challenges for Thornton-Tomasetti Engineers, the structural engineer for the project. The different physical requirements for the facility's varied uses, combined with zoning height and building setback constraints, called for innovative thinking to adapt the tight site to the different functions.

On the residential floors, the need to accommodate the target number of beds within building height restrictions limited floor-to-floor heights to 8 ft. 8 in. The engineers selected reinforced concrete construction from among other alternatives, using 7 in.-thick flat plate floor slabs and a maximum column spacing of 21 ft. on center. But the closely spaced columns of the residential floors were not

suitable for the retail space below and, to add to the complexity, the swimming pool and basketball courts in the sports center below ground required an even greater amount of column-free space, including spans of up to 100 ft.

To create the open space needed in the retail and recreational areas where continuous use of deep girders was not suitable, the engineers needed the long-span capabilities of steel framing in the entire lower portion of the structure.

Column-Free Space Required Posing another structural challenge was the need for a 100-ft. x 100-ft. column-free space above the swimming pool. A two-story-high, 100-ft.-long steel truss was designed to run west to east from the first basement level, where the swimming pool is located, to the second floor, bisecting the 100-ft. space. However, it was architecturally undesirable to place a truss at the eastern perimeter of the space to pick up the columns from the floors above, since the conventional diagonal bracing of the truss would obstruct the view from

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Column Transfers To accommodate the different column layouts for each of the building functions, more than 100 column transfers were required, with transfers occurring at the 13th floor, where the building's geometry changes considerably, and at the sixth and fourth floors. However, the majority of the column pick-ups take place at the third floor, where the building switches from residential to retail use and the structural steel framing begins.

Achieving the column-free space necessary for the retail operations on the first two stories required transferring the loads carried by the closely spaced columns of the residential and student activity floors above. The third floor was therefore designated the transfer floor for the transition from concrete to steel.

Additional load transfers occur below the third floor to accommodate local variations in layout. A lofty, three-story-high lobby was created for the main entrance on the ground floor by transferring four interior columns on the fourth floor using a 40-in.-deep steel transfer girder. Other column transfers were needed at this level to allow for clearances within the dining facilities and other areas designed for circulation.

balconies overlooking the pool. It was also undesirable to place a truss at the western perimeter, although the loads of virtually the entire western building face where it changes shape at the fourth floor had to be picked up as well.

To address this issue, the engineers chose to employ a two-story-high, steel-tied arch running north to south and spanning nearly 100 ft. to support the east end of the truss and pick up the loads from the western façade. This east-west truss frames into the arch at the second floor and at its horizontal member on the first basement level. A second, shorter steel truss only one-story high was placed parallel to the arch to accommodate the change in building function at the second floor and to better distribute the loads from the eastern façade above it. This combination of structural elements effectively picked up the loads while generating the column-free space required for the pool area and allowing for unobstructed sightlines from the spectator balconies.

The $140-million, 400,000-sq.-ft. project has proven a great success. By taking advantage of the benefits of steel, the creative structural solutions ensured that NYU was able to comply with all city zoning standards and at the same time create a state-of-the-art facility that would be the envy of college students from all over the world, a place where even the most cynical student would yearn to live. ■

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NYU DORMITORY

Owner **New York University, NYC**

Architect **Kevin Roche John Dinkeloo, Hamden, CT**

Structural Engineer **Thornton-Tomasetti Engineers, NYC**

General Contractor **J.A. Jones Construction Group, NYC**

Structural Steel Fabricator **Helmark Steel Inc., Wilmington, DE**

Structural Steel Erector **Falcon Steel Co., Inc., Wilmington, DE**