CAMPUS Connector

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All images this spread: EYP

Boston College's newest residence hall brings the school's two campuses together in a modern, geometric space.

THE 2150 COMMONWEALTH Avenue residence hall will bring Boston College students together in more ways than one.

Situated on the corner of Commonwealth Avenue and St. Thomas More Rd. in Brighton, Mass., the new residence hall will be ideally positioned as a gateway between the school's Chestnut Hill and Brighton campuses. A large portion will be located adjacent to Commonwealth Ave., the main transportation corridor through both campuses, giving the building a significant presence from every direction. The facility will house 490 beds in apartment-style rooms, seminar spaces, music practice rooms and University Health Services.

To provide space for the new facility, the school demolished an existing structure containing administrative offices. The façade is composed of glass, brick and ashlar granite and is highlighted by pointed roof features and all-glass corner study lounges intended to glow at night.

Building Bars

The five-story building is relatively large in plan and the project architect, EYP, Inc., broke it into three distinct, structurally independent geometric portions called bars—east, north and south. Each bar contains residential units on each side of a central corridor as well as a combination of lounges and meeting spaces for study and collaboration. The northeast corner of the building includes distinct double-height spaces and more common areas for meeting and circulation. To further break up the bars into distinct pieces, a connecting "gasket" was strategically placed and clad with a glass curtain wall from the ground to the roof and offers views on each side of this central connector. Specific residential units have bay spaces that project out from the main plane of the building facade and offer 180° views.

Although a number of structural systems were considered during the conceptual design phase, steel was chosen because

➤ The five-story building is broken up into three structurally independent portions.

▲ BC's newest building will house 490 beds in apartment-style rooms, seminar spaces, music practice rooms and the University Health Services Center. To provide space for the new facility, the school demolished an existing structure containing administrative offices.

it offered the most flexibility in the face of certain constraints; initial studies of CMU block and plank and concrete flat plate construction proved to have limitations that did not suit this project. One area in particular was the signature double-height spaces that were offset vertically at every other level of the northeast corner. The offset nature and inconsistent shape of the floor openings would have made it nearly impossible to align solid bearing walls to support the openings. In addition, since all of the mechanicals were fed vertically from the mechanical attic, a significant number of slab openings would have been required.

Framing the openings with steel, on the other hand, was relatively straightforward. To work with the tight floor-to-floor requirements of the project, the use of lightweight concrete deck composite with steel floor beams and cambered beams allowed us to limit the typical floor framing to W14 beams for 35-ft spans. Where beams conflicted with mechanical ducts, beam-web penetrations were installed—and since they were coordinated ahead of time, all these penetrations were shop fabricated, thus keeping the relative cost low. And by keeping the typical floor framing to W14s, a constant ceiling height was achieved without the need to add soffits around framing. Finally, the relatively light nature of the steel framing enabled us to keep the seismic forces and impact to the foundations at a minimum.

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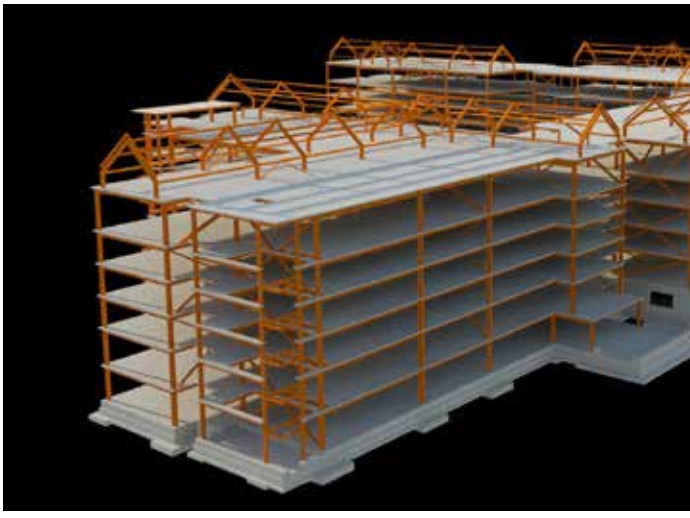
➤ A significant number of columns from the typical residential units above did not align with allowable locations below and required further coordination and study with the architect. This led to the need for four column transfers, all on W14 beams, to work with the tight floor-to-floor requirements.



➤ The residential unit layout for the building consistently located the beds on back-to-back demising walls along the exterior walls, which severely limited the locations of the columns along the outer column lines to spans on the order of 29 ft.

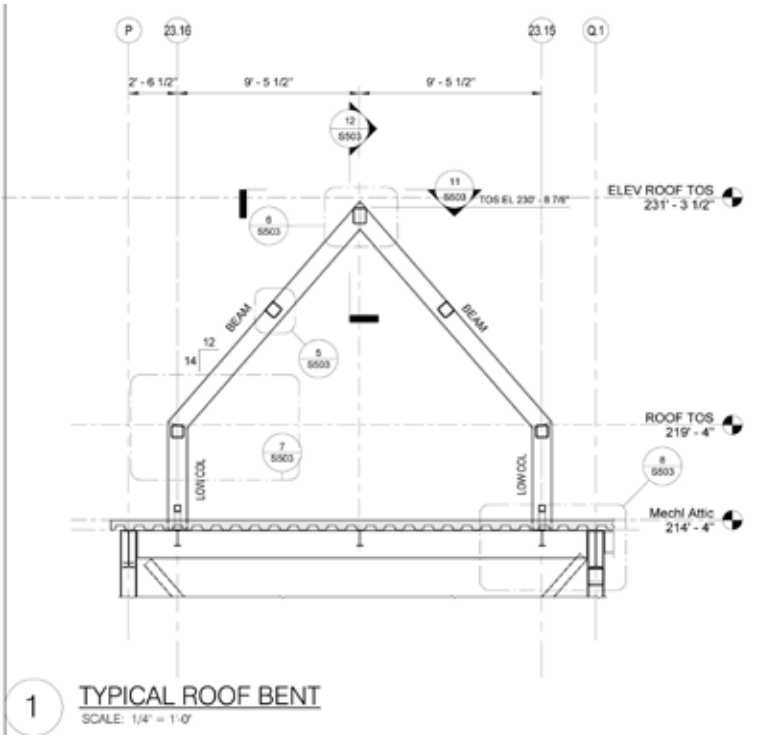
Columnar Concerns

Another structural challenge throughout the project was locating interior and exterior columns. The total out-to-out dimension between exterior column lines is 57 ft, 4 in., which, given the tight floor-to-floor requirements and the need for lateral bracing elements in the longitudinal direction, required at least one line of interior columns. The decision on the column number and arrangement was driven by both the interior architecture of the room and door layout as well as an effort to limit the number of pieces and foundation elements required. The door arrangement of the apartment-style rooms is relatively inconsistent throughout and is exclusively offset from doors on the other side of the corridor. As such, a decision was made to use one side of the corridor as the column line and coordinate the bracing elements between door elements.

The exterior column locations presented another challenge with the residential rooms. The residential unit layout for the building consistently located the beds on back-to-back demising walls along the exterior walls, which severely limited the locations of the columns along the outer column lines to spans on the order of 29 ft. Normally, that column span is modest, but the façade system of brick and granite was relatively heavy and sensitive to floor movements under live loads, thus requiring relatively robust W14 beams. This situation was the leading factor in the decision to locate a brick relief at each floor instead of the fairly typical scheme of having a relief at every two floors.

A Different Plan

A significant amount of coordination was required at the University Health Services area, which is located at the lowest level of the south bar and whose floor plan is completely different from that of the residential units above. Thus, a significant number of columns from the typical residential units above did not align with allowable locations below and required further coordination and study with the architect. This led to the need for four column transfers, all on W14 beams, to work with the tight floor-to-floor requirements.



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One of pointed roof sections on paper and in the field.

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Some of the residential units have bay spaces that project out from the main plane of the building façade and offer 180° views.

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The lateral force resisting system is made of concentrically braced frames one each side of the corridor linked together with a moment frame. Linking the two frames together allowed the unbraced corridor space to become part of the lateral system, using compact W14 beams, and increased the overturning capacity. The approach was to first lay out the bracing assuming that each bar was a separate building, then link them together through the diaphragm. The architecture was such that several columns were not aligned from one spandrel to the other, so in some cases the link beam was skewed to maintain the additional lateral capacity.

Early on in the project, the thought was to eliminate expansion joints as they added complex architectural joint details, which came with the need for long-term maintenance of the joint itself. In conjunction with that was the fact that decks on the northeast corner have a number of large openings that vary in size and location at each of the five levels. As such, the team designed the north bar and the south bar to stabilize the northeast corner of the east bar. Additional slab diaphragm steel was included in the concrete deck to ensure adequate shear transfer as well as mitigate any cracking due to building movements.

Speaking of movement, move-in is scheduled for next summer and BC's newest residence hall will open in time for the 2016 academic year and provide the school with more and better residential space for the next group of students. ■

Owner
Boston College

Construction Manager
Bond Brothers

Architect
EYP, Inc.

Structural Engineer
LeMessurier