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DESIGNING WITH PRECAST

Spring 2024

2024 PCI DESIGN AWARDS



HONORABLE MENTIONS



Photo: Meagan Williamson Photography.

PROJECT TEAM

Owner: Virginia Polytechnical Institute and State University, Blacksburg, Va.

PCI-Certified Precast Concrete Producer, Precast Concrete Specialty Engineer, and PCI-Certified Erector: Tindall Building Systems, Spartanburg, S.C.

PCI-Certified Precast Concrete Producer: GATE Precast Company, Oxford, N.C.

Architect and Engineer of Record: Clark Nexsen Inc., Charlotte, N.C.

General Contractor: Vannoy Construction, Asheville, N.C.

Project Cost: \$33.6 million
(\$5.63 million for the precast concrete)

Project Size: 71,000 ft²

KEY PROJECT ATTRIBUTES

- The Upper Quad North Residence Hall is a total-precast concrete solution providing more than 300 beds for Virginia Tech Corps of Cadets.
- Created through a combination of precast concrete and veneer, the building's Collegiate Gothic style blends seamlessly with other structures on campus.
- In addition to long-term resilience, the project also leverages sustainable features and is on track for LEED v4 Silver certification.

PROJECT AND PRECAST CONCRETE SCOPE

- The residence hall leverages a wide variety of precast concrete products, including architectural wall panels, floor slabs, shear and bearing walls, stairs, and more.
- More than \$5.5 million worth of precast concrete was installed. Many of the precast concrete products helped expedite the construction schedule and contribute to the building's expected longevity.
- Structural precast concrete components were installed between February 21 and May 4, 2022. The architectural components were installed between July 7 and October 6, 2022.

HIGHER EDUCATION/UNIVERSITY BUILDING CO-WINNER

VIRGINIA TECH UPPER QUAD NORTH RESIDENCE HALL

BLACKSBURG, VIRGINIA

Serving as a five-story home for the Virginia Tech Corps of Cadets, the new Upper Quad Residence Hall at Virginia Tech is a total-precast concrete solution featuring architectural precast concrete panels, as well as precast concrete floor slabs, shear and bearing walls, stairs, and more. A replacement for Femoyer Hall, which was originally constructed in 1949, the new residence hall is designed in the Collegiate Gothic style found across Virginia Tech and is consistent with campus design principles. Tindall Corporation of Spartanburg, S.C., took advantage of the flexibility and resilience of precast concrete products to deliver a solution that the university can rely on for the long-haul.

HISTORICAL FEEL, MODERN METHODS

On the building's exterior, attractive architectural precast panels reflect the historical aesthetics of the campus grounds. By leveraging a combination of precast concrete and veneer, the project saved on costs when compared with the all-native limestone alternative. This selection did present a few challenges, namely, handling the architectural water table. While the building was designed to drain at level 1, this type of drainage was not always possible at the base due to a sloping exterior grade. To solve this issue, the Tindall team had to "break" the panels so that there would always be a joint at level 1. As a result, short panels were used at the foundation to support four levels of large precast concrete panels above, ultimately allowing the contractor to leverage a continuous drainage joint at the water table that would not have been possible with alternative materials.

The team used other innovative techniques when installing precast concrete slab pieces at the Upper Quad North Residence Hall. Electrical conduit and boxes for lighting were installed within the pieces, and plumbing and mechanical openings were cast into the precast concrete floors, roof, and walls. These aspects of the project allowed the building to come into service more quickly.

The unique floor slab system is composed of a series of lightweight concrete blocks in which prestressed reinforcement could be placed lengthwise and traditional reinforcement could be placed in the transverse direction. The blocks were then encased in self-compacting concrete, generating strong arches in a series of reinforced ribs. This system, which is approximately three times the width of comparable products, decreases the number of units needed for the work. It also allows for longer spans and maximum clear heights, so there is more open usable space inside the residence hall. Overall, the combination of a precast concrete bearing-wall system and slab floors as the primary structural system for the residence hall helped the contractor rapidly erect the structure, and shop fabrication of components reduced the extent of field inspections. Thanks to these features and others, the Upper Quad North Residence Hall provides optimal living quarters and more than 300 beds for the Virginia Tech Corps of Cadets.