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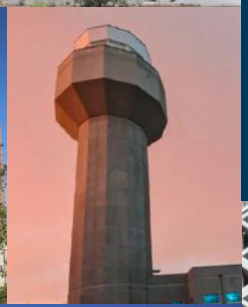

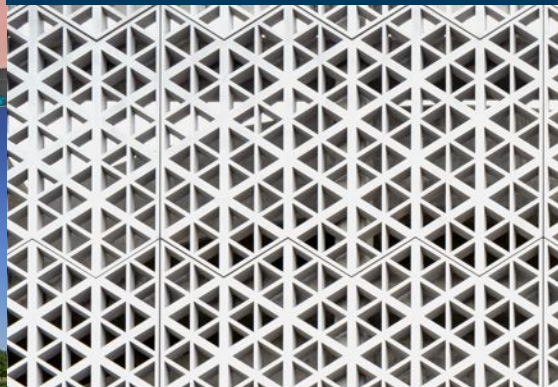

Custom Solution

DUKE UNIVERSITY CENTRAL CAMPUS CHILLED WATER PLANT #3

DURHAM, NORTH CAROLINA

PROJECT TEAM

Owner: Duke University, Durham, N.C.

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

Precast Concrete Specialty Engineer:
GATE Precast, Brentwood, Tenn.

Architect: Flad Architects, Raleigh, N.C.

Engineer of Record: Affiliated Engineers Inc., Chapel Hill, N.C.

Structural Engineer: Bennett & Pless, Raleigh, N.C.

General Contractor: LeChase, Durham, N.C.

PCI-Certified Erector:
Carolina Steel Setting Company, Morrisville, N.C.

PCI Associate Supplier:
Leviat, Home of Thermomass Insulation Systems, Boone, Iowa

Project Size: 48,500 ft^2

Tracing its roots back to Trinity College, which was founded in 1838 by local Methodist and Quaker communities, Duke University in Durham, N.C., is world renowned for its academic programs. With nearly 17,000 students throughout its campus, it is important that Duke meet the heating and cooling needs of its buildings year-round, including during the hot summer months, while also achieving the university's progressive goal of reaching carbon neutrality by 2024. Central Campus Chilled Water Plant #3 joins two existing plants in the university's system of chilled water plants to support the university's progressive goal of reaching carbon neutrality by 2024. Flad Architects, in partnership with GATE Precast and Affiliated Engineers Inc., selected architectural precast concrete wall panels as the primary exterior building material for the new facility.

NOT YOUR AVERAGE CHILLED WATER PLANT

Chilled Water Plant #3 is centrally located near the arts district on Duke's campus. Nearby attractions include a popular arts center, the university's art museum, and a prestigious botanical garden, which is one of the most-visited spots in Durham. The site also fronts a main vehicular and pedestrian thoroughfare for campus traffic, and the project team sought an aesthetically pleasing solution for the facility that would allow it to seamlessly blend in with its surroundings. The use of refined precast concrete panels, ample amounts of glazing, and sunshades allows Chilled Water Plant #3 to neatly fit within the campus context and provide visual flair not typically associated with utility-focused structures.

"The prominent location of the building in Duke's arts district indicated that we needed a material that would complement the surrounding architecture," said Chuck Mummert, principal at Flad

Photos: *Mark Herboth Photography LLC, GATE Precast, and Duke University*

Architects. "Among the many benefits that precast [concrete] brought to the work is its flexibility as a design material. We used it to customize choices for color, texture, and materiality to fit in with its campus neighbors."

The facility includes 90 insulated architectural precast concrete wall panels encompassing approximately 21,700 ft^2. The panels delivered advantages to the building on both the interior and exterior. Externally, the color, texture, and materiality of the panels match the aesthetics of other buildings in the campus precinct. The cladding also boasts 1-in.-deep reveals at different intervals that, along with multiple finishes, visually reduce the scale of the tall walls. Inside, the use of 2-in.-thick insulation within each panel eliminated the need for interior metal furring and drywall. The use of exposed precast concrete material as the interior finish for multiple areas within the building generated cost efficiencies and saved time on the project.

Beyond these advantages, the building's design also provides unobstructed views of the interior from the street through the large curtainwall openings in the precast concrete, allowing pedestrians to see the large, color-coded equipment that powers the campus's cooling systems. On top of Chilled Water Plant #3, a sunshade structure is integrated into the precast concrete wall panels with an inset steel channel. These sunshades emphasize the texture and relief variations within the panels by casting shadows onto the walls throughout the day. Additionally, the insulation contained inside of the panels improve energy efficiency while reducing the plant's overall life-cycle costs. The materials' effective *R*-value meant that the HVAC systems could be downsized, thereby lowering the amount of energy needed to achieve and maintain uniform indoor temperatures.

Overall, whether considering utility or aesthetics, Chilled Water Plant #3 is not your average university mechanical facility.

"As a highly visible structure that supports Duke's goals for carbon neutrality and a sustainable campus, the powerful cooling systems housed in this plant work in harmony with other university plant facilities, forming a looped network of more than 25 miles of pipes," Mummert said. "This system works efficiently to cool buildings across campus, with Plant #3 specifically enabling a new, 490,000-ft^2 hospital bed tower to come online, expanding medical services within the community."

KEY PROJECT ATTRIBUTES

- Duke University's Central Campus Chilled Water Plant #3 seamlessly integrates with surrounding architecture in one of the school's highest-profile areas.
- Plant #3 is part of a cooling system network that supports the university's progressive goal of reaching carbon neutrality by 2024.
- Chilled Water Plant #3 enabled a 490,000-ft^2 hospital bed tower to come online, expanding medical services within Durham, N.C.

PROJECT AND PRECAST CONCRETE SCOPE

- GATE Precast manufactured 90 insulated architectural precast concrete wall panels encompassing approximately 21,700 ft^2 for the project.
- The cladding has 1-in.-deep reveals at different intervals that, along with multiple finishes, visually reduce the scale of the tall walls.
- Each precast concrete panel contains 2 in. of insulation, which helps achieve greater energy efficiency while reducing the plant's overall life-cycle costs.