

# ASCENT<sup>®</sup>

DESIGNING WITH PRECAST

# HOW PRECAST BUILDS

DELIVERING SOLUTIONS FOR  
HIGHER EDUCATION



## CASE STUDY

# FLORIDA INTERNATIONAL UNIVERSITY PROJECTS, MIAMI

FIU USES PRECAST CONCRETE TO BUILD  
A RESILIENT AND BEAUTIFUL CAMPUS

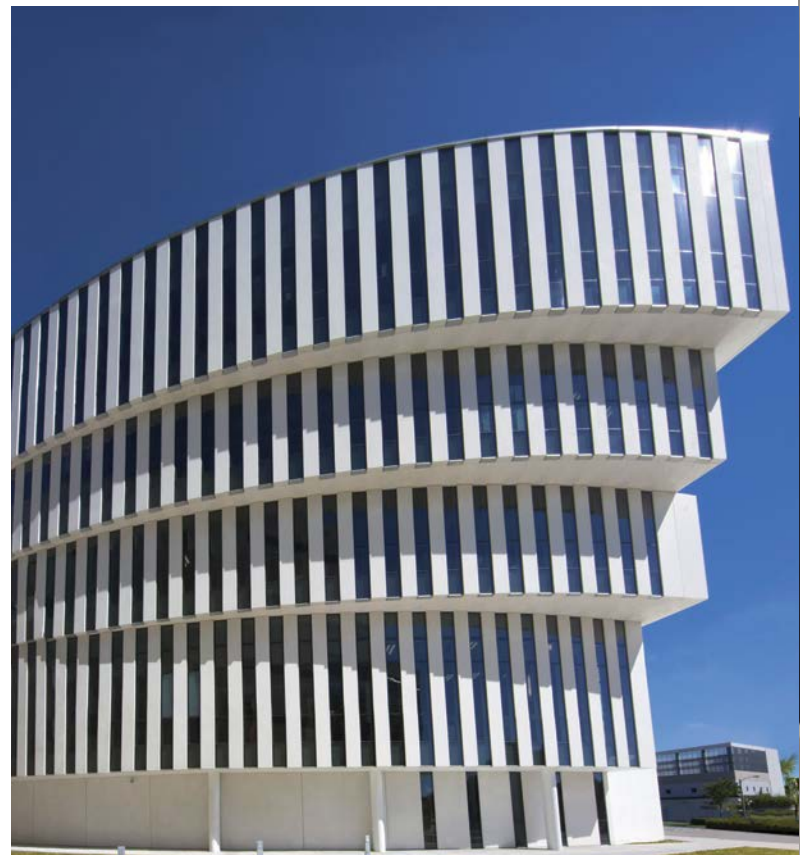
BY MONICA SCHULTES

---

**Florida International University (FIU) is Miami's first and only public research university, offering bachelor's, master's, and doctoral degrees. FIU emphasizes research as a major component in its mission to be worlds ahead.**

The university also has other challenges. Its location in hurricane-prone South Florida makes it subject to the High-Velocity Hurricane Zone requirements of the state building code. With the help of a Federal Emergency Management Agency grant, FIU earned the designation of Disaster-Resistant University. Several code-plus measures ensure the continuity of operations critical to the research and clinical functions on campus.

In addition to constructing their campus with resiliency in mind, FIU's Robert Stempel College of Public Health and Social Work is now home to the Academy for International Disaster Preparedness. The Academy is now a path for students exploring the field of international disaster management, humanitarian relief, emergency preparedness, and homeland security.





*Perkins+Will continues to inform spaces and interior experiences. FIU interior spaces are flexible, adaptable, and nimble with how furniture is used.*  
**Photo:** Robin Hill.





## Designing for Resiliency

In South Florida it is no surprise to see precast concrete on many campus structures. “In this region, maintenance, operations, and resiliency are so important in the design of higher education projects. Precast concrete is a way of allowing these institutions to manage their operations, maintenance, and envelope criteria in a cost-effective way,” says Pat Bosch, design director at Perkins+Will Miami.

When FIU developed design guidelines several years ago, they specified precast concrete for all new construction. Perkins+Will has been working with FIU for ten years, initially on a master plan for their main campus. That evolved to all of their campuses as well as design guidelines, landscape, and infrastructure framework. “When we created the design guidelines, we considered the next generation of their buildings,” recalls Bosch. Perkins+Will then took on the design of Academic Health Center (AHC) Buildings 4 and 5 that would be the embodiment of that new vision.

“AHC 4 and 5 are hybrid buildings. They are highly efficient, smart buildings from the interiors to the envelopes,” explains Bosch. “AHC 4 and 5 are gateway projects and part of the master plan. We wanted to create structures that work together to tie the existing campus to the new precinct. They are meant to convey that buildings work in community as do the colleges, and so the connectivity between buildings was important.”

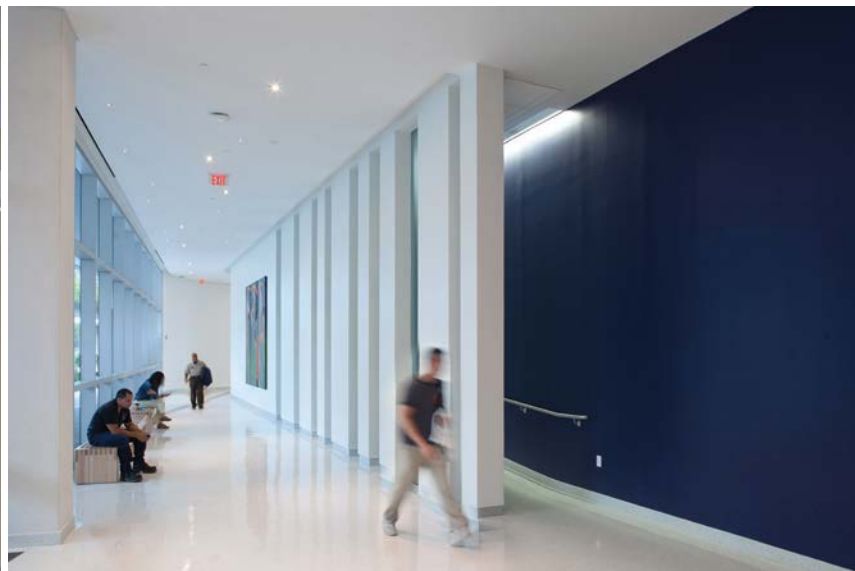
FIU has a clear vision of how to develop a sustainable campus environment, one that fosters innovative and interdisciplinary learning and research. The master plan and design guidelines are meant to reinforce FIU’s identity through the articulation of precincts, edges, buildings, and open spaces, creating a more compact urban environment.

## Where Science Meets Art

“Perkins+Will is very client-centric,” says Bosch. They worked closely with FIU and to generate ideas that met this vision. Concepts were developed around “where science meets art.” Perkins+Will used analytics to harvest daylight, self-shade, and ultimately create the next generation of learning and research environments.

All of this was incorporated in the final design. Both buildings have a very specific attitude to the north and self-shading on the south. That mapping of solar exposure and heat gain determined the design of the buildings.

In Florida, sun and water are the two main enemies. “People think they have to make buildings insular to protect from sun and heat. If only we understood that buildings can self-protect and self-shade, it is a win-win situation,” describes Bosch.



## Facility Planning

The FIU administration were collaborative yet challenged the design team at Perkins+Will. They embraced the concept of interdisciplinary research and education. The academic mission was the integration of graduate, undergrad, and health sciences into one cohesive campus. Because of that model, building ownership is less identified with the individual schools.

"The mandate was that no department was to own their own laboratory or research area. There were dry and wet areas and shared spaces. The focus was on transparency and how to showcase learning," explains Bosch.

The parametrics of the precast concrete façade on Science Classroom Complex/AHC4 focused on heat mapping and shadowing. The university directed that the design provide all faculty members with the same view and same windows. "The structure was to speak to the ethos of what we are doing: being conscious environmentally, being innovative scientifically, and creating buildings that deal with well-being," recalls Bosch.

A modular façade was developed, as were the spaces behind them. The modules rotated and adapted depending on sun exposure. A logarithm located where more shade was needed, and the panels rotated in two directions. Where less shade was required, the panels became flat.

That whole dynamic reacts to solar and heat exposure. "Gate Precast was very collaborative. We utilized Revit models to communicate with their engineers to maximize efficiencies with the precast module. We also planned how deep, how wide, and how they would be supported off the structure," says Bosch.

"Working with Perkins+Will and FIU has been very challenging, which is fun for us," says Bryant Luke, vice president, special operations, for Gate Precast. "They push the capabilities of the material as well as us as precasters to create some unique processes and projects to meet their vision."

*FIU Student Academic Support Center (above and facing page)*  
This four-story multipurpose student support complex serves as the welcome center and an integrated service facility for students to conduct university business. One of the distinctive architectural features on the building is the angled light wells on the east and west walls of the buildings. Architectural precast concrete with a burnished finish alternates with glass windows and storefronts. The window opening fins provide natural day lighting while keeping interiors cool.  
*Photos: Robin Hill (above photos and bottom photo on facing page) and Miami In Focus (top photo on facing page).*

*"People think they have to make buildings insular to protect from sun and heat. If only we understood that buildings can self-protect and self-shade."*

Precast concrete was the only enclosure option that could create so many different shade patterns. Gate Precast developed protruding sunshade boxes around the window openings with angles that vary from 0 to 15 degrees horizontally and pitched down as well. Gate Precast overcame major production challenges as to how to construct window block outs with extreme negative draft. Wooden molds were constructed from as many as 12 separate pieces that were numbered for ease in reassembling after stripping.

"This project was one of the most difficult casting jobs we have undertaken. The way the sun shades project outward at a downward angle and turn to the left that vary from panel to panel was quite a challenge," recalls Luke.

Negative draft is the bane of precast concrete producers. "An even bigger challenge was just envisioning how this would work. If it were not for BIM [building information modeling], we would not have been able to produce the 148 panels with over 1000 openings," describes Luke. "Using BIM technology was a necessity on highly complex projects like this."





**Left: FIU Student Academic Support Center (SASC)**

*This four-story multi-purpose student support complex serves as the welcome center and an integrated service facility for students to conduct university business. One of the distinctive architectural features on the building is the angled light wells on the east and west walls of the buildings. Architectural precast with a burnished finish alternates with glass windows*

**Below: FIU College of Business MANGO Building**

*College of Business and FIU Online FIU opened the Management and New Growth Opportunities (MANGO) building in 2014 with two floors dedicated to online education. The \$35 million building, which also houses the school of accounting, the department of management and international business and the college of business academic advising office, was clad in precast concrete panels. and storefronts. The window opening fins provide natural day lighting while keeping interiors cool.*



*Photos:  
(This Page) All  
photos provided  
by Gate. (Facing  
Page) All photos  
provided by  
Miami In Focus.*

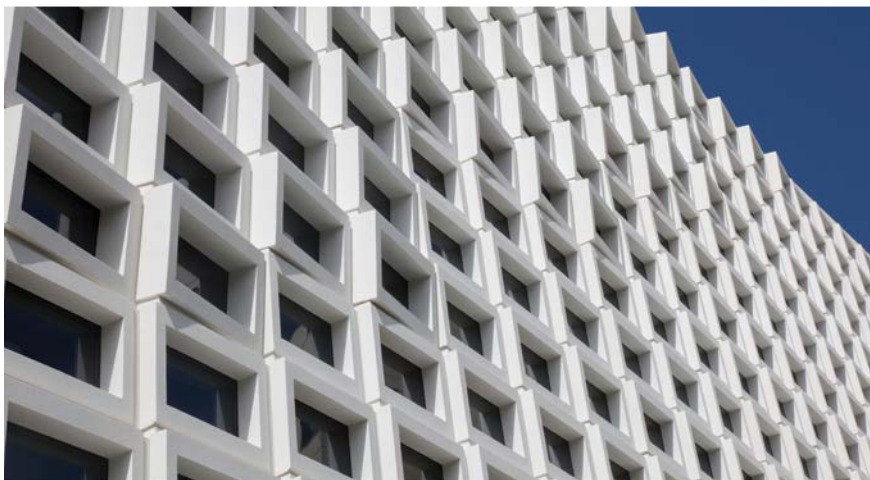
## Miami Fusion

"Gate has produced eight projects with FIU over the years; they have a very eclectic campus," says Luke. FIU embraces this diverse approach with a variety of buildings types and architecture around campus. Architectural precast concrete allows for those differences in design, textures, and finishes. "We have really enjoyed working with FIU to showcase the myriad ways architectural precast can accomplish these things," describes Luke.

Each building in the new precinct had to work well with others on campus, both aesthetically and in the circulation patterns they create. "We went for different coloration than some past projects," describes Bosch. "We are bringing a more neutral palette to the university, which helps reduce maintenance in terms of weathering. The neutrality of the color also makes for an inclusive environment so that the buildings are not competing against each other."

Concrete is very apropos to this region and very common in Florida; the quality control and maximum efficiency make it a good fit. Operational efficiency of materials and maintenance are priorities at FIU. "They also want to leverage their budget and at the same time portray this vision of innovation," says Bosch.

In keeping with that initiative, windows were installed at the plant to save time and money on the Science Classroom Complex/AHC4 project. Before delivery to the site, each precast concrete panel was preglazed, caulked, and inspected. Inspections are done on the ground, so no lift is required. There are also life safety benefits when installing an all-inclusive section of wall, including solid area, window caulk, air, thermal, and vapor barrier. Controlled plant conditions also result in a more consistent fit and finish, compared with finalizing off-the-ground assembly of the exterior envelope in the field.



## FIU SCIENCE CLASSROOM COMPLEX/ACADEMIC HEALTH CENTER 4 (AHC4)

The ultramodern 137,000- ft<sup>2</sup> AHC4 creates a gateway to the Academic Health Sciences district within the main campus. AHC4 stands out for interweaving technology into the design and construction process and within the facility itself to create a progressive learning environment. The six-story, cast-in-place concrete structure features an exterior skin of architectural precast concrete panels with preglazed punched window openings, metal panels, and curtainwall. It houses a mix of classrooms and staff offices, 145-seat auditorium, advanced research laboratories, wet and dry laboratories, and flexible research space.

## International Style

These projects used traditional precast concrete panels. "In the future, we would like to use lightweight panels, whether it be GFRC [glass-fiber-reinforced concrete] or other technologies that meet hurricane codes. The next evolution of these panels would reduce mass and weight of this material," predicts Bosch.

"The design community has put the precast industry on notice that we need to advance the use of lighter-weight precast concrete panels," says Luke. "We are embracing that in our development of 'GateLight' products. Lighter, thinner panels are needed to advance the entire industry," he predicts. (See the feature story on precast concrete insulated wall panels on page 14 of this issue.)

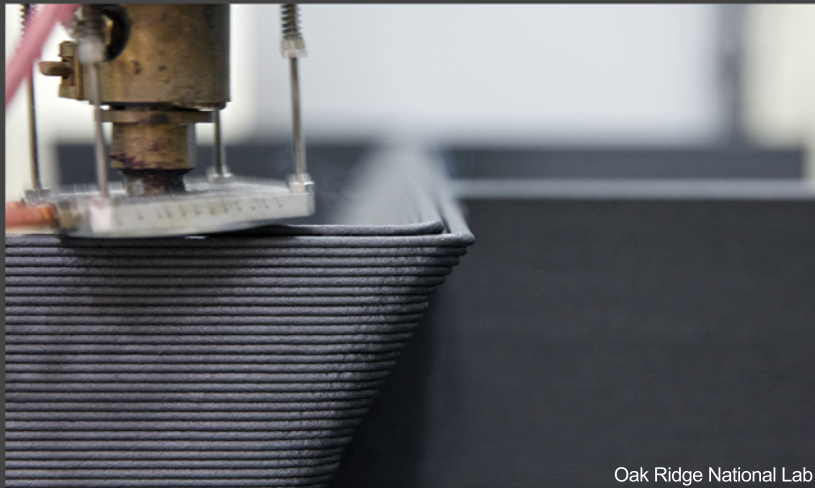
"Gate Precast covers almost two thirds of the U.S., and no other single market challenges us like the City of Miami and FIU," says Luke. "This region really pushes the boundaries of precast concrete. We like being challenged to develop new methods to achieve our common goals on these high-profile projects."

Perkins+Will were also challenged to design buildings where science meets art. "These structures are sculptural representations of the ethos of FIU. They welcome you in their transparency and create outdoor spaces that are sheltered and thoughtful in terms of nature and campus. They are forward-thinking in terms of technology; they are flexible. With everything FIU is putting forth to enhance the student learning experience, the buildings are a physical manifestation. As an architect, I love their monumentality and their gentleness in how they position themselves on the site," says Bosch.

The FIU administration is creating an identity for this institution, both physically and philosophically. As a young institution, they are building a foundation for a coveted college experience. ●



Forms produced  
utilizing 3D printing  
for concrete exterior  
systems offers solutions  
for a complex facade.



Oak Ridge National Lab



As part of a research project to verify the transformative possibilities of 3D printing for concrete applications, Gate Precast Company is using 3D printed forms in the production of a 42-story tower in Brooklyn, NY, clad exclusively with polished and acid-etched architectural precast concrete.

Through a design-assist relationship, Gate Precast, Two Trees, and architecture firm COOK FOX refined some of the window profiles on the tower to make it cost effective and practical to make use of the 3D printed forms. The multi-faceted window panels include aluminum framing and glass pre-assembled and caulked at the manufacturing facility prior to shipping to the jobsite, streamlining the installation of the façade.

Casting on the 3D printed forms also provided the added benefit of incredibly sharp details and improved finishes.



**GATE PRECAST COMPANY**  
precast concrete systems

Monroeville, AL   Kissimmee, FL   Oxford, NC   Pearland, TX  
Jacksonville, FL   Winchester, KY   Ashland City, TN   Hillsboro, TX

[WWW.GATEPRECAST.COM](http://WWW.GATEPRECAST.COM)  
(888) 470-3450

FOLLOW US!  
[gateprecastco](http://gateprecastco.com)

