PCI
Precast/Prestressed Concrete Institute

PRECAST CONCRETE & LEED

UNIVERSITY OF NORTH FLORIDA SOCIAL SCIENCES BUILDING

Project Type:	Educational
Location:	Jacksonville, Fla.
Owner/Developer:	University of North Florida, Jacksonville
Architect/Engineer:	Smith-McCrary Architects Inc., Jacksonville Beach, Fla.
Contractor:	Elkins Constructors, Jacksonville
Precaster:	Gate Precast Co., Monroeville, Ala.

U.S. GREEN BUILDING COUNCIL LEED USGBC

OVERVIEW

The new Social Sciences Building on the campus of the University of North Florida (UNF) was the first LEED-registered building in Jacksonville, Fla. The school is set in a nature preserve, and administrators wanted to not only create an environmentally friendly project but ensure it blended with its green surroundings.

The $13.3 million, three-story project features 70,589 ft^2 of space, housing offices for faculty, staff, and administration, as well as conference rooms, lounges, and study areas. The centerpieces of the building are five regular and two theater-style classrooms and three teaching laboratories, all equipped with smart technology and wireless communication systems. The building features a variety of environmentally friendly features, including waterless urinals, an emphasis on natural light, energy-efficient heating and mechanical systems, and an irrigation system that uses recycled water.

Initially, designers planned to construct the building using a structural system of brick on steel studs. But after an in-depth series of studies, designers were convinced to convert the exterior wall panels to a precast concrete insulated sandwich wall-panel system. This design provides an increased ***R***-value, eliminates thermal breaks, and enhances energy efficiency.

To add interest to the exterior of the building, the sandwich walls were made with colored, sand-blasted concrete as well as intricate formliners and thin brick. The formliners, which were peeled off after the panels were stripped from the forms, were made with 100% postindustrial recycled content. Also, by using ½-in.-deep thin brick as opposed to 3-$^5/_8$-in.-thick full-bed-depth brick, fewer raw materials were used, brick firing costs were reduced, and more brick was able to fit on a flatbed truck, resulting in fewer trucks on the road and less fuel consumption.

School administrators were so pleased with the outcome that they intend to follow similar construction methods and specifications on future buildings to meet LEED standards. "It won't be the last such project at the university," says John A. Delaney, UNF president. "We're going to do the rest of our buildings in this same fashion," he told reporters at a news conference. "It's a healthy place for UNF students to learn and faculty and staff to work."

20 PERCENT
less energy to operate

30 PERCENT
more efficient than model energy code

$28,210
in annual energy savings

PRECAST CONCRETE'S CONTRIBUTION TO SUSTAINABLE CONSTRUCTION PRACTICES

Materials & Resources:

Building Reuse The Social Sciences Building was built to be a 100-year-plus facility, with exterior precast wall panels designed to extend the life cycle of the facility and withstand even the most extreme Florida climatic conditions. In addition, the wall panels reduced the amount of waste and the overall environmental impact to construct the facility.

Construction Waste Management The system's individual components are 100% recyclable. Scrap materials were taken to a polystyrene recycling center and recycled into other products, diverting them from landfills. In addition, the precaster diverted construction waste during production, crushing the 143 ft^2 of waste concrete in the plant and turning it into road fill.

Recycled Content To reduce the impact from processing virgin materials, the integral insulation system utilized Styrofoam-brand XPS (extruded polystyrene) insulation that contained up to 40% postindustrial recycled content. The reinforcing steel, welded-wire reinforcement, steel connections, and cementitious materials used in casting the panels also featured recycled content. To further increase the recycled content, gray cement that included silica fume and fly ash was used for the interior concrete layer. Gray cement was only used as the interior layer so that the final color of exposed concrete was not affected.

Local/Regional Materials Manufacturing the precast concrete panels at the local precasting plant reduced the environmental impacts of transportation. Because panels embedded with thin brick use less material, more units can be included in each delivery. Approximately 65% of all materials used in the building were manufactured within 500 miles of the site.

Exterior architectural finishes included thin brick and light-colored sand-blasted concrete.

Energy & Atmosphere:

The precast concrete wall system used an integral sandwich insulation system that provides an ***R***-value of 24, which is greater than what could be expected by the material alone. The building utilizes 20% less energy than the baseline requirements of ASHRAE 90.1 and is 30% more efficient than required by code. These features resulted in $28,210 in annual energy savings.

Sustainable Sites:

Site Development – Protect or Restore Habitat The panels were erected with crawler cranes, which were kept within 30 ft of the project perimeter.

Heat Island Effect – Non-Roof The panels' light color raises the building's albedo, which is the amount of solar radiation the material reflects rather than absorbs. The precaster used a high-quality white-cement concrete in the faces of the wall panels to enhance their albedo. The result was 47.39% of the area qualifying for a high albedo rating.

The precast insulated sandwich wall-panel system saved energy by increasing the *R*-value and eliminating thermal breaks.

Water Efficiency:

The building is estimated to use 2,882,000 gal of total potable water per year and 2,281,000 gal of outdoor potable water per year. The landscape irrigation system was designed to collect the campus reclaimed-water irrigation system for a savings of $15,526 per year. Waterless urinals, 1.2-gallon-per-flush toilets, and sensor faucets were installed. Each waterless urinal was designed to save 40,000 gallons of water per year, providing an estimated savings of 601,000 total gallons per year. This resulted in 31% water savings compared with the baseline design.

Indoor Environmental Quality:

Construction IAQ Management Plan During Construction Precast concrete panels are cast and cured off-site. This eliminates any dust or airborne contaminants from drying or curing of compounds during the construction phase, improving air quality at the construction site. With the precast concrete components incorporated and the facility constructed, it offers natural lighting for more than 75% of the occupied space.

Thermal Comfort The precast concrete panels utilize continuous integral insulation to effectively manage moisture and maintain a constant, even internal temperature.

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