Winning Design

Saint Leo University adds significant parking space by moving existing lacrosse field to new facility's rooftop supported by Florida bridge tees

— Craig A. Shutt

Administrators at Saint Leo University in Saint Leo, Fla., faced a challenge typical to many colleges. While academic programs were expanding and the student population growing, the school's land area could not be increased to supply more parking facilities. To meet these needs, the design team appropriated a lacrosse field, extended the space by cutting into an adjacent hillside, and created a 150,000-square foot precast concrete parking structure on the site. They then restored the lacrosse field by placing it on the parking structure's roof.

The $12.7-million project abuts wetlands that served as a prime driver for the design of the structure. Building against the hill and down a slope to the wetlands proved challenging, especially with several levels dug below grade to avoid raising the structure and pushing the proposed rooftop lacrosse field too high into the air. But the results proved to be worth the effort.

"We wanted the parking structure to blend seamlessly into the campus grade," explains Edward Lunz, principal at Lunz Prebor Fowler Architects. Indeed, except for the stair towers and stadium profile, only the top of the athletic field is visible from the entry. Landscaping on three sides and on the pedestrian paths create a park-like view to the wetlands beyond.

Florida Bridge Tees Used

The structural precast system (sometimes referred to as total-precast) features 8-foot wide by 37-inch-deep Florida bridge tees, as well as traditional prestressed double tees, exterior and interior columns, beams, vertical lite walls, shear walls, several types of spandrels, stairs with landings, slabs, and wall panels.

In addition to the parking facility, 1,000-seat seating sections, concessions, and ticket-taking facilities were built with precast concrete components as standalone structures adjacent to the parking, aligned with the rooftop field. "Building these facilities as separate structures allowed both projects to be constructed at once, and designing all with precast concrete allowed for faster construction," Lunz explains.

The use of precast concrete for the structure resulted from the decision to add the FIFA-rated/NCAA-regulation lacrosse field to the roof. Saint Leo is now one of only three universities in the country with a rooftop field. "The main challenge was budgetary considerations," Lunz notes. "The innovative idea of locating the field on top of the garage required a judicious approach to the budgetary constraints." Shifting funds to allow for the field's creation required "a streamlined and efficient structure," he says.

"Additionally, the timing was tight and an accelerated schedule was requested." The schedule demands were driven by a need to complete the lacrosse field in time for the following year's season. "Precast concrete was the only logical solution that combined the desired cost effectiveness with the structural accommodations for parking, life-cycle cost, and long-term durability."

The Florida bridge tee was specified due to the heavier loads required for the rooftop level. The loads were further increased due to the university's desire to use the field for graduation ceremonies. "Those tees typically are used for bridge projects, but the 60-foot narrow tee design provided the load capacity that would be needed," explains Mark McKeny, sales manager for Coreslab Structures (Tampa) Inc., the precaster. "We had to account for the soil and turf dead load of 300 psf plus 150 psf live load for the assembly area."

The tees were cast with self-consolidating concrete, which typically provides 7,500 psi strength at 28 days. "The sections were deeper and heavier than would be typical to ensure we could support the rooftop loads," says Mark Cerminara, vice president and general manager at Salmons PC, the precast concrete specialty engineer.

Retaining Wall Placed

The precast concrete components were cast while the site was prepared. The site required considerable work, as a two-story slice of the hill had to be excavated. A 25-foot, cast-in-place retaining wall was built along one long side of the building to hold back the grade. The concession and seating sections were built against this wall. The soil was hauled away with off-road dump trucks and placed in a bowl-shaped site on campus to move it out of the way until it could be removed. "There was a tremendous amount of dirt that had to be moved from the site," Lunz says.

The retaining wall connects to the façade of the parking structure, requiring corbels to be placed precisely. "It's not really an unusual design, but it had to be coordinated closely," says Cerminara. "It created challenges in tolerances, and it required stronger connections to accommodate the heavier roof loads."

At the same time soil was being excavated to provide two below-grade levels to reduce the building's overall height. This placed the entry at mid-level, with one parking level below the entry and the lacrosse field above. A kiosk sign with a parking-space counter at the main entry guides patrons to open parking and indicates when the facility is full. Two-way, 60-foot clear bays, and four bays with one, two-way ramp down to the lower level ease congestion.

"We dug down because we wanted to make the project as environmentally friendly as possible and enhance the landscape," says Lunz.

Photo: Lunz Prebor Fowler Architects.

PROJECT SPOTLIGHT

Saint Leo University Parking Structure

Location: *Saint Leo, Fla.*

Project Type: *Parking structure*

Size: *150,000 square feet (275,000 square feet including adjacent supplemental facilities)*

Cost: *$12.7 million*

Designer: *Lunz Prebor Fowler Architects, Lakeland, Fla.*

Owner: *Saint Leo University*

Structural Engineer: *Master Consulting Engineers, Tampa, Fla.*

Contractor: *Creative Contractors Inc., Clearwater, Fla.*

PCI-Certified Precaster: *Coreslab Structures (Tampa) Inc., Tampa*

Precast Specialty Engineer: *Salmons PC, Phoenix, Ariz.*

Precast Components: Florida bridge tees, prestressed double tees, exterior and interior columns, beams, vertical lite walls, shear walls, several types of spandrels, stairs with landings, slabs, and wall panels.

The new precast concrete parking structure at Saint Leo University in Saint Leo, Fla., was built adjacent to a wetlands and features a lacrosse field on its roof. Precast concrete concession stands and seating were built next to the parking as standalone structures. They feature the campus' signature Mission style.

Photo: Aerial Innovations.

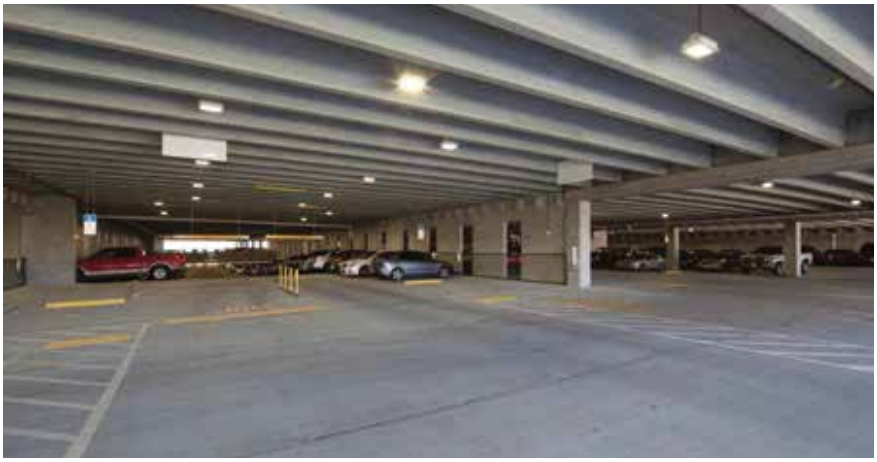

Photo: Lunz Prebor Fowler Architects.

"It's a beautiful site, and we didn't want to block views to the wetlands and wooded areas if we didn't have to. We also wanted to ensure the lacrosse field remained accessible to pedestrians."

Vehicular wayfinding was provided with reflective stop bars and floor arrows, as well as reflective signage attached to the bottom of double tees. Pedestrians access the top-level field and main campus from stair towers at each end of the structure on all levels and at the main entry.

Three Fields on Roof

The rooftop fields required significant work once the bridge tees were erected. In all, three fields were built on the roof, including two practice fields placed perpendicular to the main field and striped for student use. The main field features artificial turf, although it was designed to allow a change to natural turf if desired, Lunz notes. "They wanted it to be able to support loads for graduations, when thousands of people might walk over it or sit on the field, so allowing a change to natural turf in the future wasn't difficult to factor in."

Creating drainage for a sports field on the roof added challenges, says Salmons' Cerminara.

"We had to consider camber on the tees and allow for the loads during any point in time. The field will not always have the heavy live load, so we had to allow for excess camber so natural drainage will be provided. We had to balance all of the loading needs at different times and calculate the optimum slope."

The field slopes from east to west with a trench drain at the end to collect water and direct it to a detention pond at ground level, where it is treated and released into the wetlands. To protect lower levels from a buildup of water, a burlap waterproof membrane was added over the tees, as well as a layer of rock. The rock had to be trucked in and moved by escalators onto the roof from the sides. "It was a pretty complex process," notes Coreslab's McKeny.

Mission Style Featured

The structure and adjacent facilities feature a Mission-style design, a predominant theme throughout the campus. This motif was designed into the structure—notably at the stair towers—and was also used on the standalone structures. Some of the curved shapes were cast into the precast concrete using formliners, while others were added after erection with stucco. The precast walls were painted gray after erection to match the color of the other buildings on campus.

"The Mission style is a hallmark of the campus, owing to the original abbey on the site," Lunz explains. "Using precast concrete gave us a much more durable surface to work with in creating some added touches." No special forms were needed to create the design, he adds.

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High lighting fixtures, towering 40 feet above the field, were needed to provide illumination for night-time activities. These fixtures were placed on heavy-duty, 32-inch-square precast concrete columns that serve as the bases. "They're much larger than would typically be provided for a parking structure," McKeny says. They also required 4-foot-long anchor bolts to be cast into the columns to secure the fixtures.

Fabricating the precast concrete components off-site minimized site congestion, a key requirement with so much campus activity nearby. The school gymnasium and baseball stadium were adjacent to the parking structure, along with existing surface parking areas. The construction also had to contend with a great deal of pedestrian traffic in the area. "It was a lot of activity, so we had to carefully plan our activities and minimize disturbances, especially as we were building next to the wetlands," Lunz says.

The precast components were cast and staged at a nearby site off-campus, McKeny notes. One traffic lane was provided to bring trucks in and out, the components were picked from the trucks and erected immediately. "Our goal was to avoid any traffic congestion or to interfere with activity on the campus in any way."

LEED Standards Met

The building was designed to meet LEED standards but was not submitted for certification. "We've designed other LEED buildings for the university, including one that achieved Gold," Lunz explains. "But for budgetary reasons, the university wanted the structure to comply with LEED but didn't want to spend the money on the application fee."

With the concession and seating areas placed along the side containing the retaining wall, the design offered three open sides for the interior parking levels, creating light, bright openings for daylight, Lunz says. In addition to 730 car spaces, there are 24 motorcycle and bicycle slots. Twenty golf-cart charging stations are located in the lower level. This amenity allows university personnel to park their cars and pick up a cart to get around campus, reducing vehicular traffic. Another 6,000 square feet of storage space was provided under the ramps to house the building's sprinkler system and university property.

The result is a multifunctional building that adds to the existing facilities while providing considerably more function without disturbing the natural beauty of the area. It also offers options for future changes when needed. In addition to the possibility for switching to a natural-turf field, designers also allowed the potential for removing the field and creating another level of parking if that option is needed in the future.

The designers achieved the university's goal of fitting the structure into the landscape a little too well. They discovered that the building blended so well with its surroundings that first-time users had difficulty finding it. Signage was added to direct visitors to the entry. "The university was very pleased with the building," says Lunz. "It meets all of their functional and aesthetic goals, so having hidden it so well that signage was needed was a minor point."

The structure also provided an improvement on the existing field. The new fields are elevated 3 to 10 feet above the adjacent roadway. The variance results from the topography sloping toward the wetlands, which had caused problems for the previous lacrosse field. That difficulty was ironed out by the rooftop position, which could adjust to the topography and create a literal level playing field for all.