Award-winning IRS center uses precast concrete

With a project team of Enterprise Precast Concrete Inc.; BNIM/360, a joint venture of 360 Architecture and BNIM Architects; and JE Dunn Construction, the Internal Revenue Service (IRS) Kansas City, Mo., campus is an award winner and an example of sustainable design.

Since the completion of construction in 2006, the project has received statewide and nationwide acclaim: the Government Services Administration named it the country's top design project in lease construction for 2006, and the Kansas chapter of the American Institute of Architects (AIA) bestowed upon it an Excellence in Architecture Award.

The $370 million IRS processing facility includes the renovation of the historic Main Post Office and construction of three office annexes and a warehouse, for a total of 1.14 million ft² (106,000 m²). Spread over 27 acres (11 hectare), the IRS Center is nearly the size of the 38-story Town Pavilion, Kansas City's second-tallest skyscraper. To create this colossal space, the building required 185,000 ft² (17,200 m²) of precast concrete, with about 25,000 ft² (2300 m²) of brick-clad precast concrete and 40,000 ft² (3700 m²) of insulated precast concrete wall panels for the warehouse.

"It's rare you see a project of this size winning awards for design," says Jim Calcara, principal at 360 Architecture. "It . . . supports downtown's revitalization. Design awards for such a massive project are just icing on the cake."

The design awards that the IRS Center won were not just for the building's aesthetic appeal; the project is also sustainable. Precast concrete was shipped from within 500 miles (800 km) of the jobsite. In addition, there was no waste on-site or at the production facility and all welded-wire reinforcement and reinforcing bars that were used in the precast concrete were made of recycled material.

In the interior, the LEED-NC–certified building features an array of skylights and clerestory windows that allow daylight to saturate the public areas and workspaces. Also, the former post office building, built in 1933, has a new atrium that opens up all six floors to natural light from a rooftop

Upper left The Internal Revenue Service (IRS) Kansas City, Mo., campus, at 1.14 million ft² (106,000 m²), is LEED-NC certified.

Upper right The IRS center in Kansas City uses multiple finishes on each panel, such as acid etching and retarded finishes, to achieve its textured look.

Lower The open interior of the IRS center in Kansas City includes access to daylight with an array of skylights and clerestory windows.

Courtesy of Assassi.

skylight. At the heart of the complex, a cafeteria, outdoor plaza, and pool serve as a social hub. Employees can also relax outdoors and experience the connections between the building and the city around it through the courtyards, a linear garden, and a pathway that winds around the site.

Because of the massive fluctuation in employees at the IRS Center—3000 full-time employees and up to 7000 total employees during tax season—special measures were taken. During the off-season, from July to January, when seasonal employees are not working on processing tax returns, about half of the space in the annexes can be closed to save on utility costs.

"Challenges were overcome by using experienced engineers and production crews from a PCI-certified plant," says Colm Breathnach, vice president of sales/marketing at Enterprise Precast. For instance, the job required multiple finishes on each panel, such as acid etching and retarded finishes; multiple brick patterns, such as running and stacked bonds, were used within the same panel; and a variety of brick types included Norman-sized bricks, combed brick finishes, and smooth brick finishes. Effective production planning controlled forming costs for the precast concrete, including the precast concrete stairs used in the stair towers.

The Kansas AIA chapter jury that gave the award comments, "This is a very humane treatment of a warehouse-type building. Details, such as windows at standing and sitting height, speak to the care with which the architects have thought about the human experience as well as the more utilitarian operations of the facility. The new building complements the old post office with similarly powerful but entirely different handling of stone."

Self-consolidating concrete in beams speeds Biloxi Bay Bridge construction

U.S. Route 90 is one of the South's most traveled scenic highways and a major Gulf Coast artery. So when Hurricane Katrina destroyed the existing four-lane bridge between Biloxi, Miss., and Ocean Springs, Miss., the Mississippi Department of Transportation (MDOT) realized it had to be rebuilt as quickly and durably as possible.

To expedite the process, they engaged the services of an ocean engineering firm, OEA Inc., which developed a computer model to predict the storm surge plus maximum wave height to ensure sufficient elevation for the new bridge to clear water levels expected from a catastrophic hurricane.

With this information in hand, the agency advertised and awarded the $338 million design-build contract to GC Constructors, a joint venture of Massman Construction Co. of Kansas City, Mo.; Traylor Bros. Inc. of Evansville, Ind.; and Kiewit Southern Co. of Fort Worth, Tex. Standard Concrete Products of Columbus, Ga., was contracted to supply the prestressed concrete beams that the project would require.

The prestressed rolling system used in the Biloxi Bay Bridge in Mississippi allows forms to be moved and reset in just 30 minutes. Courtesy of Mississippi Department of Transportation.

At the highest point above the navigation channel, the 1.66-mile-long (2.5 km) bridge rises 95 ft (29 m) above Biloxi Bay, affording unobstructed views to travelers and allowing large ships to pass under it without lowering their masts. Constructed as two side-by-side, high-rise superstructures, the bridge carries six lanes of traffic and a shared 12-ft-wide (4 m) path for bikers and pedestrians. The project also included twin 800-ft-long (240 m) bridges over the railroad in Ocean Springs.

Once awarded in June 2006, the project proceeded at a torrid pace, with the north lanes for westbound traffic opening just 16 months later and 12 days ahead of schedule. At its peak, the project employed 450 people and required 18 floating cranes.

"Two major factors contributed to the speed with which we were able to complete this project," says Peter Pieterse, mobile division manager for Standard Concrete Products. "MDOT accepted our recommendation to use self-consolidating concrete to pour the beams, and a debonded- rather than draped-strand design for the prestress cables allowed much faster production of the beams so we could inventory them for delivery as needed."

The company used Sika Corp.'s ViscoCrete high-range, water-reducing admixtures in producing the self-consolidating concrete.

Standard Concrete Products used a new, full-bed-length rolling form system to place concrete in the prestressed beams. When the concrete reached its release strength, the forms were opened hydraulically, rolled to the next bed, and set up for the next concrete placement. The beds were in line so that the form could be rolled easily to the next bed in just 30 minutes. The company's production facility had deep-water access, allowing the beams to be moved from storage directly onto barges. The project required more than 100 barge loads of 5 to 7 beams each. It took a tugboat pushing two barges at a time about 10 hours to move the beams from the plant to the jobsite, where they were unloaded and placed in position.

"This helped us reduce transportation costs," Pieterse says, "and the combination of the prestress strand design, fast-moving forming system, and self-consolidating concrete allowed us to accelerate the production schedule and stay ahead of schedule."

The use of self-consolidating concrete reduced the time required to pour the beams, virtually eliminated the need for vibration equipment and its associated noise, and reduced dry-finishing costs. The concrete was specified to 6500 psi (45 MPa) for release and 8500 psi (59 MPa) at 28 days. Actual strengths were an average 7000 psi (48 MPa) within 15 to 18 hours of being poured and 13,000 psi (90 MPa) after 28 days. Slump flow was 22 in. to 26 in. (560 mm to 660 mm), air content was 3% to 6%, maximum temperature was 95 °F (35 °C), and yield was ±2%. Static-segregation and J-ring tests were conducted every 1000 yd^3 (760 m^3). The concrete also easily passed a specified Mustafa pull-out or strand-bond test.

The westbound lanes of the north section of the Biloxi Bay Bridge in Mississippi were completed first and opened 12 days ahead of schedule. At peak construction, 18 floating cranes were on site. **Courtesy of Mississippi Department of Transportation.**