CONCRETE Monthly

News from the cement and concrete industries

Count on Concrete

Vol. 4 No. 9 September 2006

Florida construction will help to address insatiable cement need

Demand for cement is up, and in a state that imports up to 40 percent of its cement from overseas, Florida is the logical place to build new capacity. The industry has answered the call for more cement product in Florida and nationwide, with a number of plant expansions and grassroot plants across the country that will keep engineering and construction firms busy for the next five to six years.

Two major plant expansions and a new grassroot plant have recently started initial site work activities in Florida. This includes expansions for Florida Rock Industries Inc. in Jacksonville; Rinker Materials Corp. in Leesburg; and a new grassroot plant for start-up American Cement Co. (ACC) LLC in Anthony.

ACC is a joint venture between Dixie Lime and Stone Co. in Kingston, N.J. and Oldcastle Materials Co. in Washington, D.C., a division of Cement Road Holdings PLC out of Dublin, Ireland. Oldcastle recently acquired a 50 percent interest in the project for $50 million.

Dixie Lime and Stone owns the limestone quarry on which the new plant will be built near Sumterville. ACC is using Fru-Con Engineering of Tallahassee to provide the detailed engineering on the project and recently awarded the general construction contract to pulp and paper expert Spirit Construction Services Inc. of Green Bay, Wis. Site work began during the early summer months.

Florida Rock Industries also selected Fru-Con as its engineer for a $150 million expansion, which will add a second production line being supplied by Polysius of Atlanta.

Florida Rock is negotiating a general construction contract with Irondale Industrial Contractors Inc. of Birmingham, Ala. The contract is expected soon and Irondale will mobilize onsite after Labor Day. A contractor is currently sinking slip-form concrete pilings at the site.

Heavy mechanical installation work is scheduled to begin February 2007. The second line is scheduled to begin operation by the first quarter of 2009 and will increase plant capacity up to 1.7 million tons per year.

The third project to start construction this summer in Florida is Rinker Materials' $150 million expansion of its Brooksville cement plant. The AMEC-Zachry joint venture is handling engineering, procurement, and construction activities at the site.

FLORIDA
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The light weight of the thin precast panels made it practical to transport and erect panels (above) up to 16 feet tall by 40 feet long. The concrete was poured (below) in a downward position and then rotated into a vertical position.

Hybrid precast system in library saves weight, improves performance

By Michael Chusid

While precast concrete is an outstanding architectural material, its heavy weight can limit where and how it is used. A recently completed project demonstrates, however, that a new type of hybrid wall system combining cold-formed metal studs and precast concrete can reduce the weight of architectural precast and expand opportunities to design and build with precast.

PRECAST
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4 storm-resistant building seminars remain in series

Two one-day continuing education seminars on building storm-resistant concrete homes and commercial buildings will be conducted this month: Indianapolis, Ind., Sept. 7; and Columbus, Ohio, Sept. 8.

Five seminars were completed in August. The final two will be offered in October: Charleston, S.C., Oct. 24; and Savannah, Ga., Oct. 25.

Breakfast begins at 7:30 a.m., and the seminars run from 8 a.m. to 4 p.m. Attendees will receive seven Professional Development Hours, and the seminars are registered with the AIA Continuing Education System.

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PRECAST

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The new Munger Research Center provides 90,000 square feet of space for the Huntington Library, San Marino, Calif., home to one of the world's most important collections of rare books, an extensive botanical garden and a museum of fine art. The new building adds laboratories and work rooms for the conservation of historic documents, rare-book storage, administrative offices, and a reading room for scholars. "We had so many different requirements for the project," said David Zeidberg, Avery Director of the Library, "the challenge was to put them into one building and making them function seamlessly."

Together with design-build contractor, Earl Corp. of Irwindale, Calif., the Huntington established the following objectives for the new building:

- Reinterpret the neo-classical architecture style of the Huntington's original buildings.
- Work within a limited budget and tight schedule to design and complete the building within just 18 months.
- And most importantly provide a safe home for the Library's collection of rare and historic documents.

Early in the project, precast concrete was identified as an appropriate cladding for the building's steel structure: It could be finished to match the plaster and natural stone used on existing buildings at the campus. Precasting panels offsite could accelerate construction. And the durability of precast made it suitable for the 100-year service life projected for the facility. The only problem with conventional precast was its heavy weight. This was especially important due to two special design requirements.

First, the building is located in an area of high seismic activity. In order to protect the Library's collection, the building was designed as an "essential facility" using the building code's highest safety factors. The mass of heavy concrete walls would have required additional and costly bracing for the building's steel structure.

Exterior precast walls, which were installed in less than two months, accounted for just $1.5 million of the project's $20 million construction cost.

The other unique concern was to create a nearly airtight exterior envelope for the building to maintain interior environmental conditions necessary for the protection of fragile documents in the archives. The weight of conventional precast limits the practical size of panels, and the design team wanted to use larger panels to minimize the number of joints where air infiltration could occur.

Both of these problems were solved by using the Metal Stud Crete (MetalStudCrete.com) system of thin-shell precast concrete panels to clad the Library. The prefabricated panels feature architectural precast concrete faces only 2.5 inches thick and supported by light-gage cold-formed steel framing. Metal Stud Crete's shear transfer strips join the concrete and the metal framing to create a panel with composite strength.

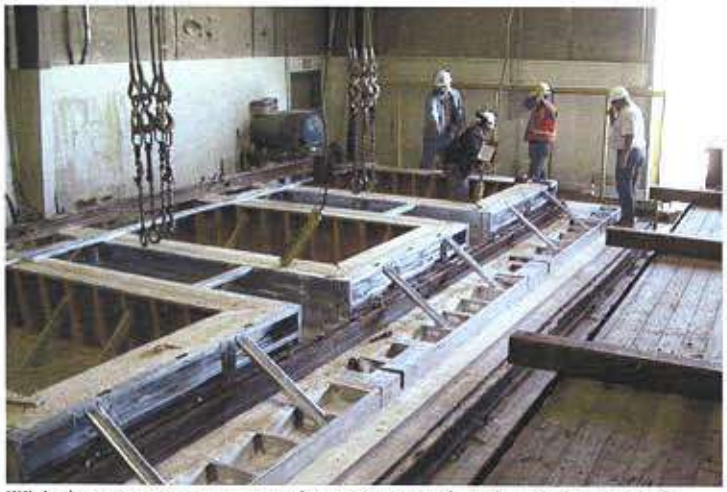
Bert England, lead designer for the project and senior vice president of Earl Corp., explained that the Metal Stud Crete shear transfer strip is fabricated from galvanized steel sheet. "The strips are screwed onto studs and their Y-shaped flanges are embedded into the concrete to produce an economical and reliable composite panel."

Using the thin, lightweight panels, he says, "enabled us to get the aesthetic and functional benefits of precast concrete without the normal limitations of the material. The panels were engineered to move independently from the structural steel frame to resist cracking due to building movement, yet provide the long-lasting quality and appeal of concrete."

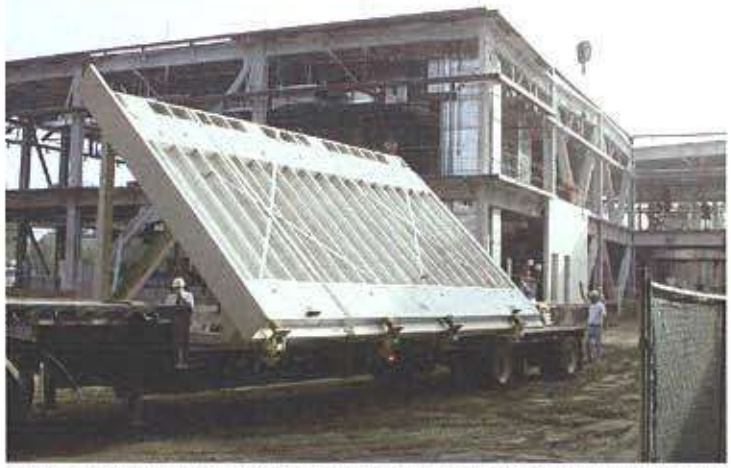
The Metal Stud Crete system also helped maintain a dust-free environment and nearly stable temperature and humidity inside the building. The light weight of the thin precast panels made it practical to transport and erect panels up to 16 feet tall by 40 feet long, much larger than most other wall panel systems, according to Bob Konoske, vice president and general manager of Coreslab Structures (L.A.) Inc., the precast subcontractor.

"It was very aggressive to make precast panels this large," Konoske said, explaining that precast panels typically do not exceed 8 feet by 20 feet. "If these panels were a more conventional 4.5 inches thick precast concrete, they would have been much heavier. Practically, we could not have made conventional panels this big; the panels would have had to be smaller, and more joints would have been exposed."

It is estimated that using the thin-shell composite precast panels reduced the quantity of joints on the Research Center by approximately 40 percent. Fewer joints, coupled with closed-cell foam insulation spray-applied to the interior of panels, helped achieve a moisture barrier and thermal break, minimizing



While the precast concrete is very thin, entrances and windows were recessed 30 inches to make the wall look thick and massive and create dramatic shadows.



The large panels had to be shipped on a slanted easel at a 35-degree angle to be able to pass under a highway overpass. All panels traveled 80 miles without a crack.

air intrusion and maintaining the required environmental conditions.

The large panels had to be shipped on a slanted easel at a 35-degree angle so they would stay under highway height and width limitations. Initial concerns that such large panels would be fragile were allayed after the ultimate test of their durability: surviving the 80-mile trip from Coreslab's plant to the project site without a single crack. There was also no cracking during installation, which was performed by a mobile crane.

To create the panels, Coreslab used large flat casting tables with smooth fiberglass surfaces and side rails around the perimeter. The cold-formed steel framing was prefabricated into the required panel sizes, and the Metal Stud Crete shear transfer strips were screwed to the faces of the studs. The framing was then set into the forms and secured in place above the casting table so that concrete could be cast to the required thickness. In some panels, it was necessary to pour the concrete first and then set the frames onto the concrete.

While the precast concrete is very thin, entrances and windows were recessed 30 inches to make the wall look thick and massive and create dramatic shadows. Fabricating the deep returns required ingenuity to preserve the high-quality finish of the panels, and the precaster chose to form the recesses in a two-step process.

First, they poured the concrete for the panel returns in a downcast position. The panel returns were then rotated into a vertical position and set into place in the forms so the panel faces could also be downcast. As a result of tight quality control, no pour lines or joints are visible at the transition between the two surfaces. Altogether, 325 precast components were cast and assembled to create a total of 146 building panels.

The architectural precast concrete contains integrally colored concrete and light colored aggregate. With a light sandblasted finish, the precast looks like fine honed limestone. Precasting the panels in very large pieces, however, enabled the designer to create a visual scale not possible with small, quarried blocks of natural stone. The very large panels enabled almost all joints between panels to be to be concealed by architectural elements; vertical joints occur at changes in wall plane and horizontal joints are behind belt courses and cornice moldings. The result is an almost monolithic appearance, as if the entire building had been sculpted from a single massif of limestone.

Paul Clark Jr., vice president of Metal Stud Crete, said that Metal Stud Crete has been used to produce more than 2 million square feet of precast concrete panels, ranging from one-story load-bearing tilt-up walls to curtain wall cladding for high rise buildings.

"This is the first time," he said, "that the Metal Stud Crete system has been used to create panels with such deep returns. It demonstrates the design flexibility of thin-shell precast concrete." The system, he notes, is approved by the International Code Council (ICC) Evaluation Service Report ER-5446.

Konoske agrees, crediting the Metal Stud Crete system with allowing the period look designed by Earl Corp. to be achieved. And, for all the technical requirements of the project, says Konoske, "larger, lighter weight panels utilizing the Metal Stud Crete system was the only choice. Metal studs and precast concrete is a nice marriage. It gives a lot of added strength to the thin section of concrete and looks wonderful."

The Research Center was completed on time and within budget. England says exterior walls accounted for just $1.5 million of the project's $220 million construction cost. Fabrication of the precast began while the steel structure was still being installed, and erection proceeded right behind steel erection. The precast was installed in less than two months, allowing the building to be enclosed quickly. This speedy pace was essential to meeting an overall project schedule that was determined by the installation of complex HVAC systems and laboratory equipment.

The technicians working in the Research Center's laboratories and the scholars poring over the Library's precious documents in the Library recognize the many benefits of the new structure. Perhaps the best testimony to the architectural merits of the project, however, is that thousands of visitors to the Institution walk past the Research Center every day without recognizing that it is a brand new structure, so well does it harmonize with the traditional architectural styles of the other buildings on the Institution's grounds. **CM**

Michael Chiesa is an architect and a Fellow of the Construction Specifications Institute. His Los Angeles-based company specializes in the development and marketing of innovative building products and systems. He can be reached at chiesa.com.