

Precast Speeds School Construction Learning Curve



Designers use precast insulated sandwich wall panels to rapidly construct two similar 370,000-square-foot high schools

By the time school administrators in Lincoln, Neb., could act on their need to construct new facilities to house the expanding high-school population, the need already had become acute. The rapidly expanding teen demographic in Nebraska's capital city made it obvious that not one but two new 1,500-student buildings were needed to alleviate the situation. The solution to the city's overcrowding lay in the use of precast components for the two new buildings.

"The city charged us with finding a way to create two new schools that would last for a minimum of 80 years without major renovation and with minimum maintenance requirements," says Richard Toren, associate principal of Sinclair Hille & Associates Inc., the Lincoln-based architectural firm that teamed with another Lincoln firm, Bahr Vermeer Haecker, to design the project. "At the same time, the city charged us with meeting a fairly aggressive schedule."

To meet those needs, the team designed two 370,000-square-foot high schools that are virtually identical in design. They feature all-precast structural systems and exterior façades clad primarily in precast concrete insulated sandwich wall panels, which provided a number of benefits in appearance, speed and maintenance.

The most immediate concern was the schedule, which called for the first of the new schools, dubbed Lincoln Southwest, to open for the 2002-03 school year — just 21 months from the ground breaking. The second facility, Lincoln North Star, was to open for the next school year.

To meet the strict deadlines and to match the 80-year life-cycle requirement, the architects turned to precast, prestressed concrete panels produced by Rinker Materials Corp. in its Omaha, Neb., for both schools. The schools also include Flexicore hollowcore flooring and precast concrete columns and beams manufactured by Concrete Industries Inc. of Lincoln, Neb.

Inset Brick Used

Rinker cast the project's exterior wall panels with three-inch interior and exterior concrete faces sandwiched around four inches of insulation to create a 10-inch-thick panel. Interior walls for one hallway and the school gym of each building consist of 8-inch-thick solid concrete panels. The exterior panels feature thin brick cast into the bottom 11 feet. On the upper 20 feet of each panel, a lightly sandblasted, buff-colored finish was created with reveals cast in to simulate limestone blocks.

The decision to build the schools using precast concrete allowed the construction team to use its design flexibility to add attractive touches in various locations, Toren notes. A prime example at the

The project features 10-inch-thick precast insulated sandwich wall panels to speed construction and cost energy costs.

Southwest building was the creation of a distinctive circular entrance that features radiused precast panels cast with the school name.

The key to maintaining the fast-track schedule was to generate a highly interactive design process, he stresses.

Both schools (North Star shown at right) were built at relatively open sites, which afforded easy access for trucks carrying the more than 500 precast panels and for the cranes to work as they placed the panels in sequence.





The Lincoln North Star High School, scheduled to open this fall, features a rectangular entry.

The team, which included the architect, general contractor J.E. Dunn/Sampson of Lincoln, Neb., the precasters and city officials, met on a nearly weekly basis during the design phase.

A unique design solution aided the fast-track nature of the projects, says Toren. “While I was the principal assigned to oversee the project, we assigned separate architects to design various features of the building.” For instance, one designer worked on the gymnasium and locker facilities, while others created the auditorium and still others worked on the food service area. “This allowed us to speed the design process significantly.”

The schedule was aided further by awarding the contract for the precast panels to Rinker even before complete drawings were finished, Toren says. “It’s



important on this type of aggressive schedule to bring everybody on board as early as possible. We assembled the team as soon as we could while completing preliminary designs. This enabled us to get everybody’s input so that the job could proceed as quickly as possible.”

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The use of insulated sandwich panels also eliminated the need for interior wall finishes, as the interior wythe of concrete could serve that function. That approach minimized the amount of interior trades that had to work as construction continued and will reduce maintenance over the course of the buildings’ lives. The four inches of insulation embedded in the panels also will help reduce energy loads throughout the year.

In addition to the major construction elements, Rinker also fabricated precast window sills, headers and coping pieces, according to Andy Newell, engineer and project manager for the precaster. “The two schools are virtually identical

except for the entryways — the North Star entrance is rectangular, rather than circular. This allowed us to use the same casting beds for North Star as we did for Southwest.” That, in turn, saved money and sped up the process further.

Making the two schools virtually identical allowed the same casting beds to be used, saving money.

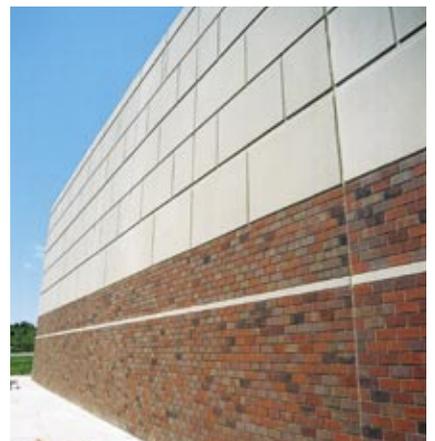
Erection Moved Smoothly

The precast components were produced in Rinker’s Omaha plant and then trucked to the site, where they were erected by crane. There were no particular erection problems, Newell says, since both sites afforded plenty of space in which to maneuver.

The close teamwork produced an attractive pair of learning facilities that not only meet the students’ needs but were



The main difference between the almost identical buildings was in the entrance. Lincoln Southwest featured a circular main entrance. The names of both schools were cast into the concrete in the plant.



Close-up of a finished wall at Lincoln North Star features the striking color and texture of the thin brick.



A single crane was needed for erection of both schools. Here, it swings panels into place at Lincoln Southwest High School after plucking them from Rinker's delivery truck.



Both Lincoln Southwest and its fraternal twin, North Star, featured panels with a buff-colored upper section with reveals to simulate blocks of stone.

Looking To The Future

The two new Lincoln schools are expected to be the harbinger of an aggressive building campaign over the next 10 years in the Nebraska capital. "The population of Lincoln is expected to continue to expand rapidly over that period," Toren says. "We think that the two new high schools may very well set a pattern for the anticipated construction boom."

That construction most likely will include a significant amount of precast concrete structures, he notes. "Certainly, the experiences we have had with precast concrete on these two buildings suggest a solution to future needs as well." Sinclair Hille has not historically been involved with the design of schools, but the firm has long recognized the efficacy of precast concrete for other structures it has designed, a familiarity that fueled the decision to use the material on the two school buildings. "Precast concrete was one of the few materials that could have gotten this job done," he says.

ready for class when the bell rang on the new school year. The first school opened on schedule last fall. The time line on the North Star facility was not as tight, with construction commencing in February of 2001 and expected to be completed for the fall 2003 term. Toren reports that the second building was nearing completion well ahead of schedule. ■

— Wayne A. Endicott



Panels at both schools featured thin brick on the lower portions. The brick was cast into the panels at Rinker's plant. The upper portions simulate limestone.



Panels averaged 30 feet high by 10 feet wide and were erected in sequence. Some panels, where greater clearance was needed (such as in the auditorium) were nearly 60 feet high. This shows an early phase of the construction at Lincoln Southwest.

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Lincoln North Star High School

This series of photos shows various stages of precast concrete construction during the work on the Lincoln North Star and Southwest High Schools. Rinker Materials supplied all of the precast components.



CASE STUDY

ASCENT

Lincoln Southwest High School



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