Precast Helps Data Center Meet 'Warp Speed' Schedule

All-precast structure helps State Farm Insurance consolidate regional data-processing into a durable, reliable facility and create major savings

When projects need to be completed quickly, they are designed and built on a fast-track system. When State Farm Insurance Co. wanted to consolidate its regional data-processing into one reliable center, however, fast-track systems weren't fast enough: They needed warp speed. The all-precast structure in Alpharetta, Ga., proved so successful that the design was duplicated for two more centers across the country for the large insurance carrier.

The "warp speed" description started as a joke, but it was one the team took seriously, says Rick Morgan, senior project manager at Holder Construction, the design-builder on the State Farm project. The speed was required because the new facility would save the company millions of dollars as soon as it was ready. In essence, every day the project took to finish cost the company money. So in late 1995, the company set a rigorous goal of moving into the building by late 1996, even though it hadn't yet designed it, or even found the land.

State Farm's new processing center in Alpharetta, Ga., was constructed on a fast-track schedule in which design began even before a site was selected. Every system in the all-precast structure is redundant to ensure no interruption to the facility, which coordinates the insurance company's operations for the entire East region.

Reliability Was Uppermost

The project included significant challenges, even without the constricted time frame. State Farm wanted to build a 254,000-square-foot, one-story building that could handle all of its needs in data processing, remittance processing and PIM (printing, inserting and mailing) for the Eastern United States. This would allow it to consolidate a host of smaller offices, saving substantial redundant costs. But because of the increased critical importance of such a consolidated facility, the building had to be assured of never failing to operate, no matter what was thrown at it.

"This can't be a 24/7 [as in 24 hours, seven days a week] building," stresses Chris Meece, a State Farm construction administrator who worked on the project. "We call it a 24/forever building. We needed a building that would never go down, ever." To achieve that, services were made fully redundant. That includes two battery systems, six 2,000-KVA Caterpillar generators, back-up mechanical systems, two complete feeds from utility and water companies, and a back-up roofing system. It also meant building the structure so it could withstand 200-mph winds, and designing and constructing all of that in less than 11 months.

Even in a traditional fast-track design-build scenario, Morgan estimates that such a project would take approximately 20 months. State Farm needed it finished in 11 months, and it was being designed without knowing exactly where it would be located or how the site might be configured.

Design-Build System Needed

Adding to the challenge was the fact that State Farm always had worked in a hard-bid situation with its architect of 40 years, Minneapolis-based Ellerbe Becket. "But in this case, when we started, we had no design, or even land. We had nothing!" explains Meece. "We knew we would need to operate in a design-build situation to complete the project on the schedule we had created, but we were anything but design-build familiar at the time. It wasn't our genre."

State Farm selected Atlanta's Holder Construction to oversee the project, in part because of its experience in similar projects, including a nearby data-processing center for United Parcel Service, Meece explains. "Their suggestion, in order to meet the pace of construction and fulfill our other requirements, was to use a precast concrete structure," he says. That, in turn, led to bringing in Metromont Material Corporation's Prestress

Division in Greenville, S.C. "They were brought in very early to coordinate footings and help with design logistics," Meece says. "Everybody, and I mean everybody, had to be involved from day one on this project. We literally were developing it daily and drawing X-Y footprints on butcher paper on the wall as we went. Even the size changed three times before we wound up with the square footage we wanted."

Adds Holder's Morgan, "We brought Metromont on board quickly, and they were designing structural components before we had the interior laid out." For its part, Metromont officials saw a lot of advantages to working this way on this project. "Working in a design-build format allows us to ensure the design of the building plays to the strengths of our standard sizes and shapes for structural members, like beams, columns and tees," explains John Wenkel, project manager at Metromont. "That saves time in the design stage for everyone, since we can pull our existing drawings and make them fit the job specs. It also allows us to use our existing forms rather than have to create new ones. That speeds up the pours and also saves money."

Precast Offered Advantages

Precast met all the requirements as no other approach could have, notes Meece. "We were completely satisfied with Holder's desire to use precast concrete, because the footprint and one-story size, along with our need for speed and durability, definitely made it a good choice." That was particularly true due to the unusual timing of the project. "We were building during much of the Olympics construction in the area," he points out. "Steel is notoriously slow to arrive, and when you add in the demand from other projects in the area, we knew it would be difficult."

Adds Morgan, "We've had good experience with precast on other data centers we've built, and we knew it was what we needed this time. Especially with the speed required here, there is nothing you can put up as quick as precast." Precast also helped with interior mechanical work, he says. "By using a precast structure, we could hang the chilled water piping from the roof structure. If we had used a steel frame, we'd have needed beams with joists to attach it to, and we wouldn't have gotten the same loading effect."

The all-precast structure was designed to withstand 200-mph winds. The 995 precast components were erected in only five weeks, bringing the 254,000-square-foot facility on line in record time. *Photos: © Aerial Innovations of Georgia Inc.*

Precast Erected In Five Weeks

The building's basic structural design did not present any significant challenges, Wenkel notes. "The most challenging part for us was the schedule. Our phase of construction was really tight." Indeed, the company was given nine weeks in which to erect the 254,000-square-foot precast structure and hang 995 architectural precast panels. But in fact, it accomplished the job in only five weeks.

A design-builder, Holder offered a bonus program if the precaster could complete its work in less than the prescribed time. "We were concerned because it was such a critical function, and the weather had been very rainy and difficult to work through," Morgan says. To work at peak efficiency, Metromont scheduled two crews, which worked together to erect about 85 percent of the framing system. At that point, one of the crews dropped back to begin hanging the panels.

Because of the design-build format, such incentives didn't need to be approved by State Farm, which speeded things up further. "Holder ran all the contracts, and they had complete authority to do whatever it took to meet our drop-dead date, as long as it remained under our maximum price cap," Meece says.

Unique Design Elements

Two significant design details did differ from a standard project. First, the precast double tees used for the roof structure were designed with steel embedments every 10 feet. This ensured that no matter how interior piping layouts were designed, they could be attached easily. "It gave us flexibility that will be useful in the future as systems are upgraded or replaced," Morgan says. "And it provided a significant advantage for this project, since we weren't sure how it would lay out when we started."

The second difference was in the roof structure, which had an extra layer of protection added. This consisted of a sheet-applied membrane that was attached once the double tee was set and the topping poured over it. The membrane is essentially a peel-and-stick layer that attached to the concrete and rolled up the sides, providing a watertight layer. Then the standard insulation board and regular roof membrane was applied, supplying the necessary wind loads. "The lower level offers a second line of defense in case the primary roof fails in some portion," Morgan explains. "It provides the reliability and redundancy that the structure needed in every aspect."

Design Fits Need

As might be expected of a one-story facility built to withstand whatever nature can throw at it, the building doesn't offer the soaring, majestic architecture of many other precast concrete designs. "It's not a glass and chrome tower, it's a bunker," admits

Meece. "But it's an attractive bunker, it really is. In many ways, it's a showcase building."

The building features an antique-white finish with an aggregate comprising 3/8-inch river gravel and Columbia silica sand. Three different finishes were used: flat and medium-sandblasted textures plus a one-inch ribbed detail set over the entrance. The reveals weren't sandblasted with the rest of the panels, to add further textures. "Basically, the reveal molds were left in place when the sandblasting was done," Morgan explains. "Then they removed the blockouts, leaving an unblasted depth." On site, the entire panel received a "sugar blast" to blend the individual panels together.

Design Replicated Twice

The project proved so successful that the design and construction is being replicated for State Farm in two more regional facilities, in Dallas and Phoenix, which are being completed this spring. The designs follow the layout of the Alpharetta facility, with the exception of a different foundation structure in Dallas, where expansive soil required a structural slab and crawl space to be built on caissons. The buildings also differ slightly in color to pick up regional tones. The Phoenix building features a tan, earthtone coloration and the Dallas design uses a tone somewhere between that and the brighter Atlanta design.

But in most other aspects, the buildings are the same except for the intensive timing. "These projects have a little more time built into their schedules," says Meece. "We'll also be able to tell the designers the scope of the work going in, which we couldn't do on the first one." The similarities extend to the use of embedments in the double tees, notes Morgan. "Even though we knew how these spaces would lay out before we started building the structure, we decided that this idea offered too much of an advantage for future flexibility not to continue."

Aiding the process was a handbook Holder created during the Alpharetta project called "Lessons Learned." "It's not often you get a chance to replicate one project two more times," Meece explains. "We wanted to be sure everything we learned the first time was passed along to the other projects to

keep us as efficient as possible and improve on the process." In addition, precasters on the other two projects visited Metromont's facility to see how the process had worked from its end. "Those buildings have different wind and seismic requirements," notes Wenkel, "but the basic construction methods remain the same, and we could show them how we made the project work for us."

State Farm was so impressed with the results of its first design-build project that it will be using it again in the future, Meece says. "We have new projects being fleshed out now that will use a hybrid negotiated-contract approach," he explains. These will feature many front-end specs, general conditions, and supplementary situations bid as hard-bid items, with the final cost of the design and construction done on a cost-plus basis. "We believe that this type of contract format will save on the tail-end audit by having everyone working to the same end," he says. "Even good team members can perform better when everyone knows what's expected by spelling it out on the front end."

More Precast Projects

This won't be the last time Holder recommends precast concrete for a data-processing center, either, Morgan notes. In fact, it's already involved in another one, this time for America Online's major computer center in Virginia. That facility is smaller, covering 180,000 square feet, but it retains many of the design demands of State Farm's trio of structures.

"When we got involved there in December, they already had planned on a cast-in-place structure with a brick-and-block exterior," says Morgan. "We convinced them to switch to a precast concrete design by showing them that they would get a savings of well over $1 million and trim six weeks from their schedule." Adds Wenkel, "It seems like this type of project is becoming more popular as computerization and communication needs grow. Precast offers an ideal way to meet their schedules and structural needs—but I just wish they would add more time into the schedules." ■

— Craig A. Shutt