



Fort Carson DHQ earns LEED gold

The Fort Carson Brigade and Battalion Headquarters project in Colorado Springs, Colo., is helping to dispel the misperception that cement manufacture is not a green design choice. In fact, the project demonstrates that precast concrete can actually increase the sustainability of a building and help achieve LEED certification points.

The precast concrete used in the project reduced the weight of materials—thus lessening greenhouse gas emissions related to shipping—and dramatically reduced waste and debris on the site.

“The selection of a composite carbon-fiber precast wall panel system for the Fort Carson DHQ project reduced thickness and panel weight, and as such was a more sustainable option,” says Chad Van Campen, senior preconstruction engineer for EnCon United, the precaster on the project. “Reducing the carbon footprint by reducing the amount of cement required

was the preferred method selected by the design team.”

Along with being a good environmental choice—the project received LEED gold certification once it was complete—the precast concrete solution enabled the team to erect the building in the middle of a frigid Colorado winter, which compressed the construction schedule to just two months and cut costs compared with a conventional wall construction method.



For the Fort Carson Brigade and Battalion Headquarters in Colorado Springs, Colo., EnCon had the precast concrete panels shipped early from its Salt Lake City, Utah, plant and finished at a local EnCon plant to avoid potential weather delays on the drive through the Rocky Mountains. **Courtesy of Encon Utah.**

Shipping panels across the Rockies

The project consisted of 57 insulated composite wall panels with inset thin brick. Each panel included all of the electrical wiring so no conduits would be exposed. The panels were produced at EnCon's Salt Lake City, Utah, plant to meet the rapid schedule.

This ensured that the panels would be ready for construction but added the risk of delivery delays, especially because they would be shipped over the Rocky Mountains during the snowiest winter months. To reduce those risks, EnCon had the panels shipped and stored weeks in advance of construction and completed all of the finishing touches on the panels through the local EnCon plant.

"We had some trucks stuck in Wyoming for a few days, but it didn't impact the schedule," Van Campen says.

The precast concrete panels also delivered the required *R*-value of 13 with a wall thickness of just 8 in. (200 mm), which added significant energy savings to the structure.

"To do this in a standard metal truss or solid zone application and maintain the required *R*-value would be nearly impossible," Van Campen says.

Not only did the precast concrete panels meet the thermal requirements, they did it with less material and less waste. The panels included 2.75 in. (70 mm) of exterior wythe, 4 in. (100 mm) of insulation, and 2 in. (50 mm) of interior wythe, reducing the overall concrete thickness from 6 in. (150 mm) to 4.75 in. (121 mm).

"This offered a weight savings of close to 40% compared to the typical insulated wall panels sold in the region using metal trusses,"



Reduced materials weight and waste contributed to the LEED gold certification of the Fort Carson Brigade and Battalion Headquarters in Colorado Springs, Colo. **Courtesy of Chad Van Kampen/Encon Utah.**

Van Campen says. "That meant we could deliver the same construction task more efficiently with less material."

—Sarah Fister Gale

Forest House project a concrete garden

The Forest House apartment project in the Bronx, N.Y., did more than deliver affordable housing. Thanks to the use of precast concrete, the building demonstrates how designers can create durable, beautiful structures that meet LEED certification standards, all within an affordable housing budget. Blue Sea Development, working with abs Architects and Danois Architects, built the eight-story, 124-unit, affordable multifamily residential complex in a low-income neighborhood in the Bronx using a total-precast concrete solution.

The choice of precast concrete helped the developer collect many LEED credits and still left room in the budget for innovative sustainability features, says David Wan at Oldcastle Building Systems, the precaster on the project. Those features include a rooftop greenhouse, a filtered rainwater collection system, and 3000 ft² (280 m²) of solar panels.

"There is not a lot of money in these affordable housing projects," Wan says, "but by using a precast solution, we were able to deliver all the architectural elements, meet structural requirements, and still have budget available for some pretty impressive features that no other affordable housing project is doing."

Rooftop gardens

Forest House is the first precast concrete affordable housing project with a greenhouse on its roof, giving residents a peaceful spot to grow fresh produce using a hydroponic system in the crowded urban neighborhood. However, this feature of the project almost didn't happen.

Because greenhouses are made of aluminum and glass, the developer was worried that it could blow off its platform in heavy winds, Wan says. "These structures are not designed for wind loads 100 ft [30 m] off the ground."

Wan's team was able to solve the problem. They cast metal plates into the 12 in. (300 mm) hollow-core slabs on the roof and used anchor bolts to secure the greenhouse to the building, thus ensuring it will withstand even high winds on the rooftop.

They anchored the greenhouse 3 ft (910 mm) back from the edge of the building, giving developers the space to install a precast concrete rainwater basin with a filtration system to collect rain from the roof of the greenhouse to be used to water the plants.



The Forest House apartment project in the Bronx, N.Y., uses precast concrete to gain many of its sustainable features. Oldcastle Building Systems helped work out the details of achieving a rooftop greenhouse, a filtered rainwater collection system, and better insulation for lower energy costs. *Courtesy of Blue Sea Construction.*

“The greenhouse is still connected to the municipal water system, but it lowers the water costs for residents,” Wan says.

Exceeding thermal codes

The use of precast concrete will also lower energy costs for the building, says Wan. Working with an energy advisor, the team decided to install an extra layer of continuous insulation between the precast concrete wall panels and the studs, thus exceeding the building code requirement for *R*-values and eliminating any thermal bridging.

“This insulation gives residents much better thermal performance, and it will lower their energy bills,” Wan says.

The many sustainable features of the total–precast concrete solution tie directly into the developer’s LEED certification goals for the project.

The use of materials from local quarries, off-site fabrication, reduction of on-site debris, and the use of fly ash in the precast concrete mixture all contributed LEED credit points to the project, Wan says. “I’m proud of the fact that we were able to meet all of these building requirements and still have resources left over to do other things.”

—Sarah Fister Gale 