CalPortland Company Uses GCP Concrete Admixtures for Ambitious Continuous Pour

Project	Bay State Grain Silos
Client	Bay State Milling
Ready-mix producer	CalPortland Company
Concrete contractor	McCormick Construction Company
GCP solutions	RECOVER®, WRDA® 64, and DARACEM® 55 admixtures
Concrete mix and specifications	4,500 psi
Volume	5,480+ metres of concrete

The Project

4,500

PSI

5,480+

Metres of Concrete

McCormick Construction was hired to construct 24 slipform concrete grain silos that would each rise 140 feet (42m) in the air. The creation of the silos was set to be a continuous pour spanning nine straight days, 24 hours a day. For this type of complex construction, McCormick Construction used an intricate slip forming process.

For the ready-mix concrete, McCormick awarded the project to CalPortland Company, the largest cement and construction material producer on the west coast. “We worked with CalPortland on a project in Washington years ago, and their staff and attention to detail were top notch,” said McCormick Construction Chief Operating Officer Steve Swanson. “They are all about making sure customers get what they want.”

The Challenge

The sheer size of the slip footprint and the small (21'/ 6.4m) diameter of the silos made it critical to select the right mix design. "We needed concrete that would flow easily through the congested rebar and would perform well in extreme temperatures," said Swanson.

"The biggest challenge of the project was pouring concrete in ambient conditions exceeding 100° F (37.8°C), which required pre-trials on set times throughout the day," explained CalPortland Company Director of Quality Control in Arizona Lauro Rivas, P.E. "We needed large quantities of chilled water and ice for temperature control measures. Having pre-conditioned/tested aggregates was also key for cooling the coarse aggregate and maintaining SSD moisture."

For this intensive project, the concrete had to set fast enough to support the concrete above it, and also needed to remain pumpable. "We pour concrete at sites across the U.S., and each one requires its own 'brew,'" said Swanson. "For this project, we performed numerous test pours with CalPortland and were pleased to get the mix the right way we wanted it."

The process required a fair bit of mix optimization, as well as stringent quality control to maintain the mix. CalPortland performed laboratory and field trials to test for optimum set time, slump retention, and temperature control. Throughout concrete production, a CalPortland QC technician worked at the plant and at the jobsite at all times, checking and adjusting concrete loads to maintain consistency.

https://player.vimeo.com/video/448842128

Construction of Bay State Grain Silos, video courtesy of McCormick Construction.

"We needed concrete that would flow easily through the congested rebar and would perform well in extreme temperatures,"

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Steve Swanson, McCormick Construction Chief Operating Officer Steve Swanson.

The Solution

CalPortland chose RECOVER®hydration stabilizer, WRDA®64 water reducing admixture, and DARACEM®55 mid-range water-reducing admixture for the project. "GCP admixtures all worked together with the appropriate dosages to improve slump retention and set time extension, which were optimal for hot weather conditions," Rivas said.

- The RECOVER® admixture is a chemical compound designed to stabilise the hydration of Portland cement concretes.
- The WRDA® admixture improves concrete performance, making it more workable and easy to place and finish. It is often chosen for mix designs requiring high compressive and flexural strength.
- DARACEM® 55 water-reducing admixture produces concrete with low water content and improved placement properties. It also imparts a "slickness" to the surface of the concrete, making it a good choice for slip form work.

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CalPortland Company Director of Quality Control in Arizona Lauro Rivas, P.E.

The Results

“It takes a huge team effort to maintain consistency when you supply a 24-hour, eight-nine day continuous pour,” said CalPortland’s Phoenix Ready-mix Operations Manager Paul Marsh. “Our batch plant operators, drivers, and quality control team did a great job working together to ensure a successful finish.”

“It was a successful pour and our customer was pleased with the consistency and the mix performance,” Rivas said. “With GCP admixtures, I felt like we had control of the set time in the mix,” Swanson said. “The results were stellar.”

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