

Strength-on-Demand Concrete

Boat Section – Interstate 5



California's Interstate 5 is the main north-south highway on the West Coast. The three-quarter mile stretch of I-5 along the Sacramento River is often referred to as the "Boat Section" since it lies below water level and required draining of the area when it was originally built in the 1960s. Since then, the Boat Section has been plagued by river silt and sand blockages in its drainage system, which allowed water to be pushed up through the pavement and cause cracking and deterioration. In 2008, the California Department of Transportation (Caltrans) decided to replace the Boat Section of the interstate to better accommodate the nearly 200,000 trucks and motorists that drive the stretch daily.

Project:

Interstate 5 pavement replacement

Location:

Sacramento, CA

Owner/s:

California Department of Transportation (Caltrans)

Concrete Producer:

CEMEX

Concrete Contractor:

C.C. Myers, Inc.

Requirements:

3,630 psi (25 MPa) compressive strength in 24 hours

50% slag cement replacement

Products Used:

MasterGlenium[®] 7500

high-range water-reducing admixture

MasterSet[®] DELVO

extended set-controlling admixture

MasterLife[®] SRA 20

shrinkage-reducing admixture

MasterSet[®] AC 534

accelerating admixture

MasterLife[®] CI 30

corrosion-inhibiting admixture

Market Sector:

Paving



The Challenge

Caltrans wanted to minimize disruption to motorists, and reduce congestion and resulting emissions as much as possible. In addition, to support local sustainability initiatives, Caltrans specified a “greener” mix design for the replacement slabs, calling for 50% slag cement replacement and 3,630 psi (25 MPa) compressive strength for concrete use on the “seal slab.” For the amount of repair that needed to take place, most of the bids came in with year-long schedules. However, C.C. Myers, Inc., a contractor famous for meeting short timelines on other Caltrans projects, proposed completion in roughly four months and was awarded the contract. Subsequently, C.C. Myers, Inc. submitted an even more aggressive value engineered plan that would be safer for the public and work crews: full lane closures and ramp restrictions, a 24/7 work schedule and a timeline to repair the Boat Section in less than two months. In addition, C.C. Myers, Inc. chose the 24-hour strength option in the specification, which was quite a challenge given the requirement for 50% slag cement replacement. All parties, including government officials, the media, the public, material suppliers and contractors would need to partner together to ensure this project’s success.

The Solution

Concrete producer CEMEX worked with admixture supplier Master Builders Solutions to develop the rapid-setting and rapid-strength gaining concrete mixtures used for the job. To overcome the difficult design requirements for the seal slab mixture, CEMEX and Master Builders Solutions tested several trial batches before developing a mixture that included MasterLife SRA 20 shrinkage-reducing admixture, MasterSet DELVO hydration-controlling admixture, and MasterGlenium 7500 high-range water-reducing admixture and was mixed at CEMEX’s nearby plant. On-site, the CEMEX-Master Builders Solutions team added a non-chloride accelerator to make high-early-strength concrete. Concrete was placed round the clock depending on the overall project schedule. Typically, the concrete achieved compressive strength 3,630 psi (25 MPa) within 12 to 14 hours, meeting all the requirements of the Caltrans specification. More importantly, the early strength allowed C.C. Myers to open the newly-placed concrete to construction traffic so that operations could continue nonstop.

Results

CEMEX and Master Builders Solutions were able to develop concrete mixtures that gained strength rapidly to keep to the short timeline, in spite of the 50% slag cement replacement required by Caltrans. The concrete also met Caltrans’ strict specifications for shrinkage. With the cooperation and round the clock hard work of all parties, the I-5 project was finished on time, with as little disruption to motorists as possible. This project is an early success of California Governor Arnold Schwarzenegger’s initiative to fight global climate change by reducing the quantity of cement in concrete.

Project Facts and Benefits

- Nearly 200,000 vehicles travel through downtown Sacramento on I-5 daily
- Cost for repairs was approximately \$37 million
- Caltrans installed a new electronic monitoring drainage system as part of the project to help prevent against future water-related damage.
- More than 12,000 yd³ (9,200 m³) of concrete placed

About Master Builders Solutions

Master Builders Solutions is a leading global manufacturer of concrete admixtures, as well as other sustainable solutions for the construction industry, focussed on delivering its vision: **Inspiring people to build better.** Master Builders Solutions provides value-added technology and market-leading R&D capabilities to improve the performance of construction materials and to enable

the reduction of CO₂ emissions in the production of concrete. Founded in 1909, Master Builders Solutions has ca. 1600 employees operating 35 production sites globally, supporting their customers in mastering their building challenges of today – for a decarbonised future.

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