

Project:

Interstate 80 and Highway 505 Lane Replacement

Location:

Vacaville, California

Owner/s:

California Department of Transportation (Caltrans)

Concrete Producer:

Rinker Materials

Concrete Contractor:

C.C. Myers, Inc.

Requirements:

High-early strength, durable concrete
400 psi (2.8 MPa) flexural strength @ 4 hours

Products Used*:

MasterSet® DELVO - extended set-controlling admixture

MasterGlenium® 3030 - high-range water-reducing admixture

MasterSet® AC 534 - accelerating admixture

Market Sector:

Paving

Project Profile

Strength-on-Demand Concrete

Interstate Lane Replacement in Sub-Zero Temperatures



The Challenge

Portions of Interstate 80 at the Highway 505 intersection were in need of repair. The California Department of Transportation specified the use of “Rapid Strength Concrete” to minimize lane closures and disruption to traffic for these applications. The challenge during this project was that the concrete needed to achieve the required flexural strength even though the overnight temperatures were expected to be below freezing.

Interstate Lane Replacement in Sub-Zero Temperatures

The Solution

To meet the project requirements and minimize lane closure time, Rinker Materials along with their admixture supplier, BASF, developed a quality, high-early flexural strength concrete mixture using 4x4 Concrete technology. Even in record low overnight ambient temperatures of 26 °F (-3.3 °C), the 4x4 Concrete mixture achieved a flexural strength of 400 psi (2.8 MPa) in as little as 2.75 hours, 560 psi (3.9 MPa) in 5 hours, and an average 7 day flexural strength of 1,100 psi (7.6 MPa). During a 45-day period between December 2006 and January 2007, Rinker Materials and C.C. Myers, Inc. successfully placed over 4,000 yd³ (3,060 m³) of 4x4 Concrete in challenging environmental conditions.

High-Early Strength Concrete Mixture Proportions

| | |
|------------------------|--|
| Cement Type III | 800 lb/yd ³ (475 kg/m ³) |
| Water | 240 lb/yd ³ (142 kg/m ³) |
| w/cm | 0.30 |
| Coarse aggregate (#57) | 1,890 lb/yd ³ (1120 kg/m ³) |
| Fine aggregate | 1,064 lb/yd ³ (630 kg/m ³) |
| s/a | 0.36 |

Plastic Properties

- Slump: 6 - 10 in. (150 - 250 mm)
- Concrete arrived at job site typically between 4 – 6 in. (100 – 150 mm) slump; after the accelerator was added, the slump increased to between 6 and 10 in. (150 – 250 mm)
- Air Content: 1.5%



Project Facts and Benefits

- Lab and truck trials were evaluated in early December 2006
- Custom trailer was built to deliver and dose out of four, 275 gal (1040 L) totes of MasterSet AC 534 accelerator on the job site
- MasterGlenium 3030 was available on the job to adjust the slump if necessary
- Record low 26 °F (-3.3 °C) temperatures were experienced during the project
- No major problems or delays were encountered
- Flexural Strength achieved
 - @ 2.75 h: 400 psi (2.8 MPa)
 - @ 5 h: 560 psi (3.9 MPa)
 - @ 7 days: 1,100 psi (7.6 MPa)
- The minimized lane closure time resulted in early opening to traffic
- Over 4,000 yd³ (3,060 m³) of concrete was delivered and placed successfully
- The owner was provided with what they desired in a timely manner while the contractor, ready mix supplier and admixture supplier turned a good profit

More Information

The Master Builders Solutions brand brings all of BASF's expertise together to create chemical solutions for new construction, maintenance, repair and renovation of structures. Master Builders Solutions is built on the experience gained from more than a century in the construction industry.

The know-how and experience of a global community of BASF construction experts form the core of Master Builders Solutions. We combine the right elements from our portfolio to solve your specific construction challenges. We collaborate across areas of expertise and regions and draw on the experience gained from countless construction projects worldwide. We leverage global BASF technologies, as well as our in-depth knowledge of local building needs, to develop innovations that help make you more successful and drive sustainable construction.

The comprehensive portfolio under the Master Builders Solutions brand encompasses concrete admixtures, cement additives, chemical solutions for underground construction, waterproofing solutions, sealants, concrete repair & protection solutions, performance grouts, performance flooring solutions.

*Effective January 1, 2014, the names of BASF's Master Builders Solutions brand products have changed: DELVO became MasterSet DELVO
Glenium 3030NS became MasterGlenium 3030
Pozzolith NC 534 became MasterSet AC 534

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