

Strength-on-Demand Concrete

I-44 Pavement Repair



This was a full-depth pavement replacement project along Interstate 44 in Greene, Webster and Laclede counties in Missouri. Substantial penalties would be assessed by the Missouri Department of Transportation for delay in re-opening the highway for traffic. It was necessary to use innovative technologies to minimize the impact on commuters.

Project:

I-44 Pavement Repair

Location:

Springfield, MO

Owner/s:

Missouri Department of Transportation
(MODOT)

Concrete Producer:

City Wide Construction Products,
Ozark, MO

Construction Contractor:

Jourmagen Construction

Requirements:

Compressive strength: 3,500 psi
(24 MPa) in 4 hours after placement

Target air content: 6%

Target slump: 6-7 in. (150-175 mm)

Products Used:

MasterAir[®] VR 10
air-entraining admixture

MasterGlenium[®] 7500
high-range water-reducing admixture

MasterPolyheed[®] 997
mid-range water-reducing admixture

MasterSure[®] Z 60
workability-retaining admixture

Market Sector:

Paving



The Challenge

The concrete producer had to deliver a total of 1,500 yd³ (1,200 m³) of consistent quality concrete that would achieve a compressive strength of 3,500 psi (24 MPa) in 4 hours after placement.

Timing was an important challenge on this job, as the contractor could not begin demolition before 11:00 p.m. each night. The contractor needed to saw-cut and remove the existing pavement sections, clean the placement area and install dowel pins at night, before placing new concrete.

The Solution

MODOT approved the use of Master Builders Solutions 4x4 Concrete technology, a unique method of achieving 400 psi (2.75 MPa) flexural strength in 4 hours or as needed. Concrete producer City Wide Construction Products, and their admixture partner, Master Builders Solutions, developed a modified 4x4 Concrete mixture utilizing Type I cement, fly ash and Master Builders Solutions admixtures that was able to achieve the compressive strength of 3,500 psi (24 MPa) in 4 hours after placement. MasterSure Z 60 workability-retaining admixture was included in the mixture to retain slump thus eliminating the need for re-tempering at the jobsite, which would have compromised the quality of the concrete mixture. The concrete met all the requirements of MODOT, and the highway was re-opened each day at 6:00 a.m. for rush-hour traffic.

Portland Cement Concrete Pavement High Early Strength Mixture Proportions

Type I Cement	846 lb/yd ³ (502 kg/m ³)
Fly ash	150 lb/yd ³ (89 kg/m ³)
Water	319 lb/yd ³ (189 kg/m ³)
Calcium Chloride	2% by mass of cementitious materials
w/c	0.32

Project Facts and Benefits

- Full depth pavement replacement on I-44 in Springfield, MO
- 1,500 yd³ (1,200 m³) of 4x4 Concrete used
- Work began each night at 11:00 p.m. and the highway was re-opened for traffic at 6:00 a.m. the following morning

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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