

# Strength-on-Demand Concrete

## I-75 Rehabilitation Project



A portion of Interstate 75 on the Kentucky-Ohio border needed to be replaced because of unsafe pavement conditions caused by the unstable ground under the existing pavement. This required removal and replacement of 26,000 yd<sup>3</sup> (19,900 m<sup>3</sup>) of concrete on Interstate 75 cut into the hill. This was the first concrete paving project for the contractor, who traditionally uses asphalt.

**Project:**

I-75 Rehabilitation Project

**Location:**

Kentucky/Ohio border

**Owner/s:**

Kentucky DOT

**Concrete Producer:**

Hilltop Basic Resources

**Construction Contractor:**

The John R. Jurgensen Company

**Requirements:**

Target compressive strength: 3,500 psi (24 MPa) at 6, 12 or 24 hours

Target air content: 6%

Target slump: 3-1/2 in. (90 mm)

**Products Used:**

MasterSure<sup>®</sup> Z 60

workability-retaining admixture

MasterGlenium<sup>®</sup> 7500

high-range water-reducing admixture

MasterAir<sup>®</sup> AE 200

air-entraining admixture

MasterSet<sup>®</sup> AC 534

accelerating admixture

**Market Sector:**

Paving

## Project Profile

I-75 Rehabilitation Project



### The Challenge

To minimize lane closure time on this high-traffic interstate highway, the contractor had to remove and replace approximately 1,600 yd<sup>3</sup> (1,230 m<sup>3</sup>) of concrete each weekend for a period of sixteen weeks. All old concrete had to be removed on Friday evening, followed by base stabilization, placement of new concrete and striping of lanes prior to reopening to traffic by 5 a.m. on Monday. For every hour of delay, the contractor was required to pay a penalty of \$50,000.

Logistically, the accelerating admixture could not be added at the jobsite because of space constraints, as this portion of the highway is cut into the hill. Hence, all the admixtures had to be dispensed at the concrete batch plant to avoid dosing admixtures in the dangerous and crowded construction zone.

### The Solution

To accommodate these strict requirements, KY DOT 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. With this technology, Master Builders Solutions and the concrete producer Hilltop Basic Resources developed a concrete mixture that was able to achieve the required compressive strength of 3,500 psi (24 MPa) at 6, 12 or 24 hours by simply adjusting the dosages of the admixtures. The concrete met all the plastic and hardened performance criteria set by the contractor and the KY DOT, and permitted the lanes to be reopened to traffic on schedule. Hilltop Basic Resources used MasterSure Z 60 workability-retaining admixture in the 4x4 Concrete mixture to maintain the concrete slump for up to one hour, even with the addition of the MasterSet AC 534 accelerating admixture at the batch plant, instead of at the jobsite as is typically done. With all the admixtures being added at the batch plant, Hilltop Basic Resources was able to avoid storing and dispensing admixture at the constricted construction site.

### High-Early-Strength Concrete Mixture Proportions

Type I Cement	800 lb/yd <sup>3</sup> (475 kg/m <sup>3</sup> )
Water	256 lb/yd <sup>3</sup> (152 kg/m <sup>3</sup> )
w/c	0.32

### Project Facts and Benefits

- Full depth, 4x4 Concrete mainline paving replacement
- Sixteen weekends to complete
- Slip-form paving application
- 26,000 yd<sup>3</sup> (19,900 m<sup>3</sup>) of 4x4 Concrete is being placed
- All admixtures dispensed at the batch plant
- Required slump of 3-1/2 in. (90 mm) maintained for up to one hour
- Pavement open to traffic quickly with minimal inconvenience to motorists

### 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 CO<sub>2</sub> 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.

#### Master Builders Solutions Admixtures US, LLC

23700 Chagrin Boulevard  
Beachwood, OH 44122 USA  
(800) 628-9990

[master-builders-solutions.com/en-us](http://master-builders-solutions.com/en-us)  
[admixtures@masterbuilders.com](mailto:admixtures@masterbuilders.com)

#### Master Builders Solutions Canada, Inc

1800 Clark Boulevard  
Brampton, Ontario L6T 4M7 CANADA  
(289) 360-1300

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