

Self-Consolidating Concrete

I-4 Pedestrian Overpass



Officials in Seminole County, Florida, involved with the construction of a new pedestrian overpass spanning Interstate 4 wanted a structure that would be functional, but also attractive. When Florida Department of Transportation engineers specified a concrete mixture that was virtually impossible to vibrate, the ready-mix producer and contractor on the project knew that aesthetics would be compromised. The solution was self-consolidating concrete made using innovative Master Builders Solutions brand admixtures to create a highly flowable, yet strong, concrete mixture that would properly fill the forms, and ensure a smooth, visually appealing finished product.

Project:

Pedestrian Overpass (I-4)

Location:

Orlando, FL

Owner/s:

Seminole County

Engineer:

Harding ESE (a Matec Company)

Concrete Producer:

RMC Ewell

Contractor:

Martin K. Eby Construction Co, Inc.

Requirements:

DOT Class IV concrete mixture

5,500 psi (37.9 MPa) @ 28 days

3 in. (75 mm) maximum slump

Products Used:

MasterGlenium® 3030

high-range water-reducing admixture

MasterMatrix® VMA 362

viscosity-modifying admixture

MasterPozzolith® 80

water-reducing admixture

Market Sector:

Ready-mixed concrete



The Challenge

Anchor block sections measuring 22 ft (6.7 m) high, 1 ft 10.5 in. (0.6 m) wide and 58 ft (17.7 m) long were constructed as a cable support base for a new pedestrian overpass spanning Interstate 4 in Orlando, Florida. The anchor block form contained two steel channel sections, located near the top, that ran the entire length of the block. A 3 in. (75 mm) maximum slump concrete mixture, specified by the Florida DOT, made it virtually impossible to use an immersion vibrator for proper consolidation of the concrete.

The Solution

The contractor proposed using self-consolidating concrete to properly fill and consolidate the concrete for this reinforced concrete structure. The only change to the specification was eliminating the slump requirement thereby allowing the use of self-consolidating concrete.

SCC Mixture Proportions

Cement	520 lb/yd ³ (309 kg/m ³)
Fly Ash	130 lb/yd ³ (77 kg/m ³)
Coarse Aggregate	1,152 lb/yd ³ (684 kg/m ³)#57 542 lb/yd ³ (322 kg/m ³)#89
Fine Aggregate	1,277 lb/yd ³ (758 kg/m ³)
Water	278 lb/yd ³ (165 kg/m ³)
w/cm	0.43
s/a	0.41
MasterGlenium 3030 high-range water-reducing admixture	15 fl oz/cwt (980 mL/100 kg)
MasterMatrix VMA 362 viscosity-modifying admixture	2 - 3 fl oz/cwt (130 - 195 mL/100 kg)
MasterPozzolith 80 water-reducing admixture	0.5 - 1.5 fl oz/cwt (35 - 100 mL/100 kg)

Project Facts

- Haul time was approximately 30 - 45 minutes
- 22 ft (6.7 m) high walls, 58 ft (17.7 m) long
- Engineered cold joint at 11 ft (3.4 m)
- SCC allowed to free fall 15 ft (4.6 m)
- Slump Flow: 24 - 28 in. (610 - 710 mm)
- During one delay, SCC in excess of 90 °F placed @ 23" spread into pump hopper was already near 90 minutes old. The mix maintained workability in the pump line for another 60 minutes before the next truckload arrived
- Compressive Strength @ 24 h: 1,800 psi (12.4 MPa)
@ 30 h: 2,500 psi (17.2 MPa)
@ 28 days: 7,460 psi (51.5 MPa)

Benefits

- SCC flowed easily into place
- Excellent aesthetics
- No mechanical vibration needed
- Reduced labor requirement

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. 1,600 employees operating 35 production sites globally, supporting their customers in mastering their building challenges of today – for a decarbonised future.

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