

Hot Weather Concrete in Florida: The I4/Selmon Expressway Connector

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Project Information

- Florida Department of Transportation
- PCL/Archer Western
- Cemex
- March 2010 – January 2014
- 100,000 CY
- Class VI 8500
- Slump 5.50 – 8.50
- W/C 0.31 or less

Concrete Information

- Class VI 8500
- Slump 5.50 – 8.50
- W/C 0.31 or less
- 60 – 90 Minute Placement Times
- Concrete Temperature 100F or Less

FDOT Concrete Specification

346-7.5 Concreting in Hot Weather: Hot weather concreting is defined as the production, placing and curing of concrete when the concrete temperature at placing exceeds 85°F but is 100°F or less.

Unless the specified hot weather concreting measures are in effect, reject concrete exceeding 85°F at the time of placement. Regardless of special measures taken, reject concrete exceeding 100°F. Predict the concrete temperatures at placement time and implement hot weather measures to avoid production shutdown.

FDOT Concrete Production Facilities Guide

9.2.5 GENERAL INFORMATION

Concrete production facilities that supply concrete to Department projects must have a QC Plan accepted by the Department in accordance with ***Specifications Section 105***. A list of concrete production facilities, herein after called plants, with accepted QC Plans that meet the requirements of this guide, will be maintained by the Department.

Concrete produced in accordance with ***Specifications Section 346*** and this guide shall be accepted with the proper certification and verification of job site acceptance criteria.

FDOT Concrete Production Facilities Guide

9.2.6.3.1 Wetting Coarse Aggregate Stockpiles, Storage Bins and Silos

The coarse aggregate shall be continuously and uniformly sprinkled with water for a period of 24 hours immediately preceding introduction into the concrete. Any request for deviations from the 24-hour sprinkling requirement shall be addressed in the Producer's QC Plan for consideration by the DMRE.

FDOT Concrete Production Facilities Guide

Make a separate submittal for each class of concrete and each particular combination of component materials to be used at a trial mix concrete temperature of 68°F to 86°F, for hot weather mixes at a minimum concrete temperature of 94°F or for hot weather concrete for extended transit time mixes. Slab replacement mixes shall not require hot weather verification for design mix approval. Use only design mixes approved by the SMO for Department use. Ensure that the 28-day strength (or strength at any other designated age) of all trial mixes meets the over design requirements to ensure that concrete sampled and tested at the point of placement has a strength exceeding the specified minimum strength.

FDOT Concrete Production Facilities Guide

Concrete trial mix temperature of 94°F (hot weather mixes):

- (1) Ensure that preparation and testing of the trial mixes is performed in accordance with ASTM C192, with the following exceptions:
- (2) Initial mixing shall be done in accordance with ASTM C192, except concrete materials shall be brought to a temperature that will ensure the mix temperature is not less than 94°F at any time.
- (3) Hold the trial mix in the mixer for 90 minutes after completion of initial mixing. During the extended mixing period, turn the drum intermittently for 30 seconds every five minutes. Cover the drum with wet burlap or an impermeable cover material during the rest periods. At the end of the 90-minute period, remix the trial mix for a minimum of one minute and make a slump test to verify that the concrete is within the specified range for slump. Ensure that the mix temperature is not less than 94°F at any time.
- (4) On completion of the extended mixing period, ensure that the trial mix concrete has a slump within ± 0.75 inch of the target value (± 1.0 inch for mixes utilizing a High Range Water-Reducing admixture), and an air content less than or equal to 6.0 percent. If below the target range, the producer may adjust the slump by a water addition. After the water addition, remix the concrete for a minimum of two minutes and perform slump and air content tests.
- (5) The total water used in initial mixing and the final slump adjustment constitutes the design mix water content. Perform water to cementitious ratio calculations in accordance with FM 5-501. Ensure that the total water to cementitious materials ratio does not exceed the maximum water to cementitious materials ratio in the **Specifications Section 346**, for the respective class of concrete.

FDOT Concrete Production Facilities Guide

Hot Weather concrete trial mix for extended transit time mixes:

Ensure that preparation and testing of the trial mixes are performed in accordance with the hot weather procedure, with the following additional requirements.

Upon completion of the hot weather procedure, no additional water shall be added to the batch. Hold the trial mix in the mixer for the additional time required after completion of the 90 minute mixing period. During the extended mixing period, turn the drum intermittently for 30 seconds every five minutes. Cover the drum with wet burlap or an impermeable cover material during the rest periods. At the end of the required additional time extension period, remix the trial mix for a minimum of one minute and perform a slump test to verify that the concrete is within the specified range for slump. Ensure that the mix temperature is not less than 94°F at any time.

Mixture Proportions

CONCRETE MIX DESIGN

Class: VI Mix Design Number: 07-1001 Minimum Strength: 8500 psi
 FDOT Approval Date: 04/05/2011 Hot Weather? Yes Issuer's Name: Sean Masters PE
 Status: APPROVED Slip Form?: No Project #: _____
 Producer: Cemex, Inc. Plant #: 10-008 & 10-007 Only

Source of Materials

Product Product Name	Quantity	Producer Plant #	QPL # Spec:	SSD FM	Geological Type
Cement:	750 LB	CEMEX BROOKSVILLE SOUTH		3.15	
Type II Cement		CMT08	AASHTO M 85 - Type II		
Fly Ash:	175 LB	SEPARATION TECHNOLOGIES-BIG BEND		2.48	
Class F Fly Ash		FA30	ASTM C 618 - Class F		
Coarse Aggregate: # 67 Stone	1725 LB	CEMEX 12008		2.50	Limestone
Fine Aggregate: Silica Sand	972 LB	CEMEX 16078		2.63 2.28	Silica Sand
Air Ent Admixture: Darex AEA	1.0 OZ	W R GRACE CO	S924-0002 AASHTO M 154 - AEA		
Type F Admixture: ADVA Cast 600	37.5 OZ	W R GRACE CO	S924-0575 AASHTO M 194 - Type F		
Type D Admixture: Recover	15.0 OZ	W R GRACE CO	S924-0332 AASHTO M 194 - Type D		
Water:	34.00 GA				
Water for Concrete					
Water:	283.2 LB				
Water for Concrete					

Specification Limits

Slump (Target Slump: 7 Inches) 5.50 to 8.50 inches
 Air Content 1.00 to 5.00 percent
 W/C Ratio Less than or equal to 0.31 LB per LB
 Temperature Less than or equal to 100 degree F
 Compressive Strength Greater than or equal to 8500 avgpsi
 Aggregate Correction Factor: 0.6
 Comments:

Producer Data

W/C Ratio 0.31 LB per LB
 Theoretical Yield 27.00 CF
 Temperature 97 degree F
 Slump 7.75 inches
 Density 144.6 LBperCF
 Chloride Content 0.135 LB per CY
 Air Content 2.70 percent
 Agg Corr Factor 0.6 percent
 28 DAY 9600 avgpsi

Design approved by standard deviation-Plant 10-008 & 10-007 Only

2% air used to achieve Theo. of 27cf
 Plant 10-008 Standard Deviation of: 447 psi
 Plant 10-007 Standard Deviation of: 669 psi

Keys to Successful Production

- Communication/Cooperation
- Specification
- Workability Retaining Admixtures
- Hydration Control Admixtures
- Chilled Water
- Experience



























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