Florida Department of Transportation

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KEVIN J. THIBAULT, P.E.
SECRETARY

February 19, 2019

MATERIALS BULLETIN NO. 05-19
DCE MEMORANDUM NO. 05-19
(FHWA Approved: 2/19/2019)

This Memo has expired

TO: **DISTRICT MATERIALS AND RESEARCH ENGINEERS**
DISTRICT CONSTRUCTION ENGINEERS

Timothy J Ruelke Digitally signed by Timothy J Ruelke Date: 2019.02.19 16:01:37 -05'00'

FROM: Timothy Ruelke P.E., Director, Office of Materials
Amy Tootle, P.E., State Construction Engineer

Kristin M Brown Digitally signed by Kristin M Brown Date: 2019.02.19 15:52:15 -05'00'

COPIES: Courtney Drummond, Amy Tootle, Ananth Prasad, Chad Thompson, Nick Finch, Patrick Upshaw, Jose Armenteros, Patrick Carlton

SUBJECT: **USE OF FLYASH AT PRESTRESSED CONCRETE PRODUCTION FACILITIES**

Fly ash production is currently low as powerplants have reduced production during the low winter demand. We expect production and availability to increase in the coming months.

Fly ash has been a key component in the durability of FDOT structural concrete for many years. It has been particularly important for those components going into Extremely Aggressive environments on our projects. The Department has, and will continue to adjust the specification as needed to get through this shortage, but at the same time continue to produce durable concrete.

For contracts let prior to May 1, 2019, Prestressed Concrete Producers can use mixes with no supplementary cementitious materials for components to be placed in Slightly and Moderately Aggressive environments. These environments are designated on the project plans. The cement for these mixes must meet all requirements of Type IL or Type I/II (MH). This change does not apply to components in Extremely Aggressive environments. Producers must comply with the contract specification requirements for Extremely Aggressive environments in all respects.

This is a temporary change due to the above described shortage. For contracts let after May 1, 2019, Prestressed Concrete Producers must meet the contract specification requirements for all environments in all respects.

This memo serves as a blanket approval to process this change as a no cost specification revision and shall be attached to the work order or supplemental agreement required for its processing.

Should you have any questions please contact Jose Armenteros, State Materials Office at 352-955-6666, or Patrick Carlton, State Materials Office at 352-955-6676.

TR/ja
Specification revision follows:

SECTION 346 PORTLAND CEMENT CONCRETE

(REV 2-18-2019)

SUBARTICLE 346-2.3 AND 346-3.1 ARE DELETED AND THE FOLLOWING SUBSTITUTED:

346-2.3 Pozzolans and Slag: Fly ash or slag materials are required in all classes of concrete when used in extremely aggressive environments. The quantity of portland cement replaced with supplemental cementitious materials must be on an equal weight replacement basis of the total cementitious materials with the limitations, shown in Table 2.

Table 2
Cementitious Materials Concrete Mix Proportions (%)
(Environmental exposures are extremely aggressive, unless otherwise noted.)

Application	Portland Cement	Fly Ash Type F	Slag	Highly Reactive Pozzolans		
				Silica Fume	Metakaolin	Ultra-Fine Fly Ash
General Use	70-82	18-30				
	66-78	15-25		7-9		
	66-78	15-25			8-12	
	66-78	15-25				8-12
	30-40	10-20	50-60			
	30-75(1)		25-70(1)			
	30-50		50-70			
	36-43		50-55	7-9		
	33-42		50-55		8-12	
	33-42		50-55			8-12
Precast Prestressed	100(4)					
	70-85(1)	15-30(1)				
	70-82	18-30				
	66-78	15-25		7-9		
	66-78	15-25			8-12	
	66-78	15-25				8-12
	30-40	10-20	50-60			
	30-50		50-70			
	36-43		50-55	7-9		
	33-42		50-55		8-12	
	33-42		50-55			8-12
Drilled Shaft	63-67	33-37				
	38-42		58-62			
	30-40	10-20	50-60			
Mass Concrete	50-82(2)	18-50(2)				
	50-65(3)	35-50(3)				
	66-78	15-25		7-9		
	66-78	15-25			8-12	
	66-78	15-25				8-12
	30-40	10-20	50-60			
	30-50		50-70			
	36-43		50-55	7-9		
	33-42		50-55		8-12	
	33-42		50-55			8-12

(1) Slightly Aggressive and Moderately Aggressive environments.
(2) Concrete Core Temperature T≤165°F.
(3) Concrete Core Temperature T≥165°F.
(4) Slightly Aggressive and Moderately Aggressive environments for prestressed concrete products.

346-3 Classification, Strength, Slump and Air Content.

346-3.1 General: The separate classifications of concrete covered by this Section are designated as Class I, Class II, Class III, Class IV, Class V, Class VI, and Class VII. Strength and slump are specified in Table 3. The air content for all classes of concrete is less than or equal to 6.0%.

Substitution of a higher class concrete in lieu of a lower-class concrete may be allowed when the substituted concrete mixes are included as part of the QC Plan, or for precast concrete, the Precast Concrete Producer QC Plan. The substituted higher-class concrete must meet or exceed the requirements of the lower-class concrete and both classes must contain the same types of mix ingredients. When the compressive strength acceptance data is less than the minimum compressive strength of the higher design mix, notify the Engineer. Acceptance is based on the requirements in Table 3 for the lower-class concrete. Do not place concrete with a slump more than plus or minus 1.5 inches from the target slump value specified in Table 3.

TABLE 3
Concrete Class, Compressive Strength, and Slump

Class of Concrete	Specified Minimum Strength (28-day) (psi)	Target Slump Value (inches) (c)
Structural Concrete		
I [(a)]	3,000	3 [(b)]
I (Pavement)	3,000	2
II [(a)]	3,400	3 [(b)]
II (Bridge Deck)	4,500	3 [(b)]
III [(e)]	5,000	3 [(b)]
III (Seal)	3,000	8
IV [(d)(f)(g)(h)]	5,500	3 [(b)]
IV (Drilled Shaft)	4,000	8.5
V (Special) [(d)(f)(g)(h)]	6,000	3 [(b)]
V [(d)(f)(g)(h)]	6,500	3 [(b)]
VI [(d)(f)(g)(h)]	8,500	3 [(b)]
VII [(d)(f)(g)(h)]	10,000	3 [(b)]

(a) For precast three-sided culverts, box culverts, endwalls, inlets, manholes and junction boxes, the target slump value and air content will not apply. The maximum allowable slump is 6 inches, except as noted in (b). The Contractor is permitted to use concrete meeting the requirements of ASTM C478 4,000 psi in lieu of Class I or Class II concrete for precast endwalls, inlets, manholes and junction boxes.

(b) The Engineer may allow a maximum target slump of 7 inches when a Type F, G, I or II admixture is used. When flowing concrete is used, the target slump is 9 inches.

(c) For a reduction in the target slump for slip-form operations, submit a revision to the mix design to the Engineer. The target slump for slip-form mix is 1.50 inches.

(d) When silica fume, ultrafine fly ash, metakaolin, or a ternary blend cement is used in Class IV, Class V, Class V (Special), Class VI, or Class VII concrete, ensure that the concrete meets or exceeds a resistivity of 29 KOhm-cm at 28 days, when tested in accordance with AASHTO T358. Submit three 4 x 8 inch cylindrical test specimens to the Engineer for resistivity testing

before mix design approval. Take the resistivity test specimens from the concrete of the laboratory trial batch or from the field trial batch of at least 3 cubic yards. Verify the mix proportioning of the design mix and take representative samples of trial batch concrete for the required plastic and hardened property tests. Cure the field trial batch specimens similar to the standard laboratory curing methods. Submit the resistivity test specimens at least 7 calendar days prior to the scheduled 28 day test. The average resistivity of the three cylinders, eight readings per cylinder, is an indicator of the permeability of the concrete mix.

(e) When precast three-sided culverts, box culverts, endwalls, inlets, manholes or junction boxes require a Class III concrete, the minimum cementitious materials is 470 pounds per cubic yard. Do not apply the air content range and the maximum target slump shall be 6 inches, except as allowed in (b).

(f) Highly reactive pozzolans may be used outside the lower specified ranges to enhance strength and workability. Testing in accordance with AASHTO T358 is not required.

(g) For Class IV, Class V, Class V (Special), Class VI, or Class VII prestressed concrete mixes without supplementary cementitious materials, the following are the applicable requirements:

- Cast nine 4 x 8-inch test cylinders from the concrete of the laboratory trial batch concrete or from the field trial batch of at least 3 cubic yards (three for surface resistivity testing, three for compressive strength at 28 days, and three for early date compressive strength, if needed).
- Submit three cylinders to the Engineer for surface resistivity testing at least 7 calendar days prior to the scheduled 28-day test (informational purposes).
- All products produced must be labeled as CO (cement only) next to the Plant QC stamp.

(h) The Engineer may authorize cement only mixes prior to receiving 28-day compressive strength information and this early approval will be at the Contractor’s risk. Final approval requires the mix to meet the strength overdesign requirement. This exception only applies when fly ash of an existing approved mix design has been substituted with portland cement, while keeping the rest of the component materials, water cement ratio and plastic properties within the acceptable tolerances. The Engineer will witness the trial batches. Submit 28-day compressive strength results and cylinders for surface resistivity testing.