

ORIGINATION FORM

THE INFORMATION BELOW IS TO BE PROVIDED BY THE ORIGINATOR

Modify Specification _____ 400 _____.
Section/File number

New Section _____.
Section number

Subject: Concrete Structures – Curing Concrete; Placing Concrete;
Protection of Concrete

Origination date: May 8, 2006

Originator: Steven Plotkin

Office/Phone: Office of Construction/(850) 414-4155, 994-4155

Email address/ steve.plotkin@dot.state.fl.us

Userid: cn982ps

Problem statement: 400-7.1 – Concrete evaporation rates cannot be effectively controlled when the wind velocity during placement is too high.
400-16.1 – Specification requirements about controlling evaporation rates were not clear enough so Contractors have been misinterpreting or ignoring them. Evaporation rate limits are too high for FDOT low bleed concretes.

400-17.3 – Recent State Materials Office data shows that substructure concrete can gain strength much more slowly than previously thought.

Information source: The latest ACI & FDOT State Materials Office research on concrete moisture evaporation rates and Florida wind velocity data as well as strength gain data.

Background data: 400-7.1 -- This spec is being revised to prohibit bridge deck, and the like, concrete placements if the wind velocity exceeds 15 mph because recent experience shows that moisture evaporation control measures are not effective if the wind velocity exceeds 15 mph.
400-16.1 – This spec is being revised to reflect the latest industry and FDOT thinking on controlling concrete moisture evaporation during placement and includes evaporation monitoring at all times and not just if wind velocity exceeds 10 mph as well as a lower evaporation rate limit that if exceeded requires counter measures to be employed.

400-17.3 -- This spec is being revised to extend the time for first application of bridge superstructure loads on substructures from 3 days to 10 days. Recent review of State Materials Office data on concrete strength gain shows that modern substructure concrete mixes can take up to 10 days to meet the minimum strength needed for application of loads.

**Recommended
Usage Note:**

On all projects governed by the Standard Specification

**Estimated fiscal
impact, if
implemented:**

400-7.1 – Average wind speeds in excess of 15 mph are rare in Florida during concrete placements and; therefore, Contractors will rarely be prohibited from placing concrete because of wind velocity so the fiscal impact will be minimal.

400-16.2 – Contractors were already required to monitor evaporation rates so they should already have the equipment required for doing so. Therefore, there will be no fiscal impact.

400-17.3 – This spec change is being taken as a precaution since it is very rare that Contractors wish to impose superstructure loads on the substructure in 3 days or less. If they do wish to do so they have always had the option of breaking sample beams to establish the actual concrete strength which may allow loading sooner than 3 days. Because loads rarely need to be applied in sooner than 3 days, the fiscal impact will be minimal.

Implementation of these changes, if and when approved, will begin with the July 2007 letting.



Florida Department of Transportation

JEB BUSH
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

DENVER J. STUTLER, JR.
SECRETARY

MEMORANDUM

DATE: September 12, 2006

TO: Specification Review Distribution List

FROM: Duane F. Brautigam, P.E., State Specifications Engineer

SUBJECT: Proposed Specifications Change: 4000700, Placing, Curing and Protecting Concrete

In accordance with Specification Development Procedures, we are sending you a copy of a proposed specification change to Section 400.

This change was proposed by Steve Plotkin of the State Construction Office to modify the requirements for placing, curing and protecting concrete.

Please share this proposal with others within your responsibility. Review comments are due within four weeks and should be sent to Mail Station 75 or to my attention via e-mail at SP965DB or duane.brautigam@dot.state.fl.us. Comments received after October 10, 2006 may not be considered. Your input is encouraged.

DFB/dr

Attachment

COMMENTS:

Submitted by:

Phone #:

CONCRETE STRUCTURES.

(REV 8-11-06)

SUBARTICLE 400-7.1 (Pages 368 and 369) is deleted and the following substituted:

400-7.1 Temperature-*Weather* Restrictions:

400-7.1.1 Concreting in Cold Weather: Do not place concrete when the temperature of the concrete at placement is below 45°F.

Meet the air temperature requirements for mixing and placing concrete in cold weather as specified in Section 346. During the curing period, if NOAA predicts the ambient temperature to fall below 35°F for 12 hours or more or to fall below 30°F for more than 4 hours, enclose the structure in such a way that the concrete and air within the enclosure can be kept above 60°F for a period of 3 days after placing the concrete or until the concrete reaches a minimum compressive strength of 1,500 psi.

Assume all risks connected with the placing and curing of concrete.

Although the Engineer may give permission to place concrete, the Contractor is responsible for satisfactory results. If the placed concrete is determined to be unsatisfactory, remove, dispose of, and replace the concrete at no expense to the Department.

400-7.1.2 Concreting in Hot Weather: Meet the temperature requirements and special measures for mixing and placing concrete in hot weather as specified in Section 346.

When the temperature of the concrete as placed exceeds 75°F, incorporate in the concrete mix a water-reducing retarder or water reducer if allowed by Section 346.

Spray reinforcing steel and metal forms with cool fresh water just prior to placing the concrete in a method approved by the Engineer.

Assume all risks connected with the placing and curing of concrete.

Although the Engineer may give permission to place concrete, the Contractor is responsible for satisfactory results. If the placed concrete is determined to be unsatisfactory, remove, dispose of, and replace the concrete at no expense to the Department.

400-7.1.3 Wind Velocity Restrictions: *Do not place concrete for bridge decks, slabs or footings if the forecast of average wind velocity at any time during the planned hours of concrete placement exceeds 15 mph. Obtain weather forecasts from the National Weather Service "Hourly Weather Graph" for the city closest to the project site.*

SUBARTICLE 400-16.1 (Page 384) is deleted and the following substituted:

400-16.1 General: Cure cast-in-place and precast (non-prestressed) concrete as required herein for a minimum duration of 72 hours. If forms are loosened or removed before the 72 hour curing period is complete, expand the curing to cover these surfaces by either coating with curing compound or extending the continuous moist cure area.

Until curing has begun, retain ~~Maintain~~ concrete surface moisture at all times *by maintaining a surface moisture evaporation rate less than 0.1 lb/ft²/hr. until curing is begun.* ~~Prevent water sheen loss on flat work by use of an evaporation retarder and/or by applying supplemental moisture by misting. During the construction of footings and bridge decks when the forecasted or actual wind speed exceeds 10 mph, evaporation counter measures are required. The Quality Control Plan shall ensure evaporation counter measures which will limit evaporation to less than 0.20 lb/ft²/hr.~~ *Periodically, at the site of concrete placement prior to and during the*

operation, measure the ambient air temperature, relative humidity and wind velocity with industrial grade weather monitoring instruments to determine the on-site evaporation rate. If the evaporation is, or is likely to become 0.1 lb/ft²/hr or greater, employ measures to prevent moisture loss such as application of evaporation retarder, application of supplemental moisture by fogging or reduction of the concrete temperature during batching. Compute the evaporation rate by using the nomograph in the ACI manual of Concrete Practice Part 2, Section 308R Guide to Curing Concrete, or by using an evaporation rate calculator approved by the Engineer.

SUBARTICLE 400-17.3 (Page 388) is deleted and the following substituted:

400-17.3 Time of Placing Superstructure: In the case of piers or bents with concrete caps, do not place the weight of the superstructure or of beams on the caps until they have reached the *age of 10 days*. ~~ages required in the following table:~~

Superstructure	seven days
Beams	three days