



Florida Department of Transportation

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MEMORANDUM

DATE: November 10, 2016

TO: Specification Review Distribution List

FROM: Dan Hurtado, P.E., State Specifications Engineer

SUBJECT: Proposed Specification: **3460302 Portland Cement Concrete.**

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

This change was proposed by John Westphal of the State Construction Office to update the language.

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 online at <http://www2.dot.state.fl.us/ProgramManagement/Development/IndustryReview.aspx> . Comments received after **December 8, 2016**, may not be considered. Your input is encouraged.

DH/dt
Attachment

PORTLAND CEMENT CONCRETE.
(REV 9-20-16)

SUBARTICLES 346-3.2 and 346-3.3 are deleted and the following substituted:

346-3.2 Drilled Shaft Concrete: Notify the Engineer at least 48 hours before placing drilled shaft concrete. Obtain slump loss tests results demonstrating that the drilled shaft concrete maintains a slump of at least 5 inches throughout the concrete elapsed time before drilled shaft concrete operations begin. Ambient temperature conditions for placement of drilled shaft concrete for summer condition is 85°F or higher, and below 85°F for normal condition.

Perform the slump loss test at the anticipated ambient temperature for drilled shaft placements greater than 30 cubic yards and an elapsed time of greater than five hours.

Obtain slump loss test results from an approved laboratory or from a field demonstration. Slump loss test results for drilled shafts requiring 30 cubic yards of concrete or less and a maximum elapsed time of five hours or less may be done in a laboratory. Obtain all other slump loss test results in the field. Technicians performing the slump test must be ACI Field Grade I qualified.

The concrete elapsed time is defined in Section 455. Obtain the Engineer's approval for use of slump loss test results including elapsed time before concrete placement begins.

Test each load of concrete for slump to ensure the slump is within the limits of 346. Initially cure acceptance cylinders for 48 hours before transporting to the laboratory.

If the elapsed time during placement exceeds the slump loss test data, submit an ~~eEngineering aAnalysis~~ Scope preformed by a Professional Engineer, registered in the State of Florida in accordance with 6-4 by a Specialty Engineer, and knowledgeable in the area of foundations, to determine if the shaft is structurally sound and ~~there are no voids in the drilled shaft concrete~~ free from voids. At the direction of the Engineer, excavate the drilled shaft for inspection. Obtain approval from the Engineer before placing any additional shafts.

346-3.3 Mass Concrete: When mass concrete is designated in the Contract Documents, use a Specialty Engineer to develop and administer a Mass Concrete Control Plan (MCCP). Develop the MCCP in accordance with Section 207 of the ACI Manual of Concrete Practice to ensure concrete core temperatures for any mass concrete element do not exceed the maximum allowable core temperature of 180°F and that the temperature differential between the element core and surface do not exceed the maximum allowable temperature differential of 35°F. Submit the MCCP to the Engineer for approval at least 14 days prior to the first anticipated mass concrete placement. Ensure the MCCP includes and fully describes the following:

1. Concrete mix design proportions,
2. Casting procedures,
3. Insulating systems,
4. Type and placement of temperature measuring and recording devices,
5. Analysis of anticipated thermal developments for the various mass concrete elements for all anticipated ambient temperature ranges,
6. Names and qualifications of all designees who will inspect the installation of and record the output of temperature measuring devices, and who will implement temperature control measures directed by the Specialty Engineer,
7. Measures to prevent thermal shock, and

8. Active cooling measures (if used).

Fully comply with the approved MCCP. The Specialty Engineer or approved designee shall personally inspect and approve the installation of temperature measuring devices and verify that the process for recording temperature readings is effective for the first placement of each size and type mass component. The Specialty Engineer shall be available for immediate consultation during the monitoring period of any mass concrete element. Record temperature measuring device readings at intervals no greater than six hours, beginning at the completion of concrete placement and continuing until decreasing core temperatures and temperature differentials are confirmed in accordance with the approved MCCP. Leave temperature control mechanisms in place until the concrete core temperature is within 50°F of the ambient temperature. Within three days of the completion of temperature monitoring, submit a report to the Engineer which includes all temperature readings, temperature differentials, data logger summary sheets and the maximum core temperature and temperature differentials for each mass concrete element.

Upon successful performance of the MCCP, reduced monitoring of similar elements may be requested. Submit any such requests to the Engineer for approval at least 14 days prior to the requested date of reduced monitoring. If approved, the Specialty Engineer may monitor only the initial element of concrete elements meeting all of the following requirements:

1. All elements have the same least cross sectional dimension,
2. All elements have the same concrete mix design,
3. All elements have the same insulation R value and active cooling measures (if used), and
4. Ambient temperatures during concrete placement for all elements is within minus 10°F or plus 5°F of the ambient temperature during placement of the initial element.

Install temperature measuring devices for all mass concrete elements. Resume the recording of temperature monitoring device output for all elements if directed by the Engineer. The Department will make no compensation, either monetary or time, for any impacts associated with reduced monitoring of mass concrete elements.

Mass concrete control provisions are not required for drilled shafts supporting sign, signal, lighting or intelligent transportation (ITS) structures. At the Contractor's option, instrumentation and temperature measuring may be omitted for any mass concrete substructure element meeting all of the following requirements:

1. Least cross sectional dimension of six feet or less,
2. Insulation R value of at least 2.5 provided for at least 72 hours following the completion of concrete placement,
3. The environmental classification of the concrete element is Slightly Aggressive or Moderately Aggressive,
4. The concrete mix design meets the mass concrete proportioning requirements of 346-2.3, and
5. The total cementitious content of the concrete mix design is 750 lb/cy or less.

If either the maximum allowable core temperature or temperature differential of any mass concrete element is exceeded, implement immediate corrective action as directed by the Specialty Engineer to remediate. The approval of the MCCP shall be revoked. Do not place

any mass concrete elements until a revised MCCP has been approved by the Engineer. Submit an ~~Engineering a~~ Analysis Scope in accordance with 6-4 ~~prepared by a Specialty Engineer to the Engineer~~ for approval, which addresses the structural integrity and durability of any mass concrete element which is not cast in compliance with the approved MCCP or which exceeds the allowable core temperature or temperature differential. Submit all analyses and test results requested by the Engineer for any noncompliant mass concrete element to the satisfaction of the Engineer. The Department will make no compensation, either monetary or time, for the analyses and tests or any impacts upon the project.

SUBARTICLE 346-4.2.2 is deleted and the following substituted:

346-4.2.2 Control Level for Corrective Action: If chloride test results exceed the limits of Table 4, suspend concrete placement immediately for every mix design represented by the failing test results, until corrective measures are made. ~~Perform~~ Submit an ~~e~~ Engineering a Analysis Scope in accordance with 6-4 by a Specialty Engineer knowledgeable in the areas of corrosion and corrosion control, to ~~demonstrate that~~ determine if the material meets the intended service life of the structure on all concrete produced from the mix design failing chloride test results to the previous passing test results. ~~Supply this information within 30 business days of the failing test results from a Professional Engineer registered in the State of Florida, and knowledgeable in the areas of corrosion and corrosion control.~~

ARTICLE 346-10 is deleted and the following substituted:

346-10 Investigation of Low Strength Concrete and Structural Adequacy.

346-10.1 General: When a concrete acceptance strength test result falls 500 psi or less below the specified minimum strength, coring will not be allowed and the concrete will be considered structurally adequate.

When a concrete acceptance strength test result falls more than 500 psi below the specified minimum strength, submit ~~either submit an~~ structural ~~Engineering a~~ Analysis Scope performed by the Specialty Engineer in accordance with 6-4 to establish strength adequacy or; at the Engineer's discretion, obtain drilled core samples as specified in 346-10.3 to determine the in-place strength of the LOT of concrete in question, at no additional expense to the Department. The Engineer will determine whether to allow coring or require an structural engineering analysis.

When the concrete is deemed to have low strength, obtain and test the cores and report the data to the Engineer within 14 calendar days of the 28 day compressive strength tests. Core strength test results obtained from the structure will be accepted by both the Contractor and the Department as the in-place strength of the LOT of concrete in question. The core strength test results will be final and used in lieu of the cylinder strength test results for determination of structural adequacy and any pay adjustment. The Department will calculate the strength value to be the average of the compressive strengths of the three individual cores. This will be accepted as the actual measured value. Obtain the Engineer's approval before taking any core samples.

346-10.2 Investigation and Determination of Structural Adequacy: When the Department determines that an investigation is necessary, make an investigation into the structural adequacy of the LOT of concrete represented by that acceptance strength test result, at

no additional expense to the Department. The Engineer may also require the Contractor to perform additional testing as necessary to determine structural adequacy of the concrete.

If core strength test results are 500 psi or less below the specified minimum strength, consider the concrete represented by the cores structurally adequate. If the core strength test results are more than 500 psi below the specified minimum strength, ~~the Department will consider the concrete represented by the cores structurally questionable. Submit an~~ structural Engineering Analysis Scope performed by the Specialty Engineer in accordance with 6-4 that includes a full structural analysis. If the results of the structural analysis indicate adequate strength to serve its intended purpose with adequate durability, and is approved by the ~~Department~~ Engineer, the Contractor may leave the concrete in place subject to the requirements of 346-11, otherwise, remove and replace the LOT of concrete in question at no additional expense to the Department.

346-10.3 Coring for Determination of Structural Adequacy: Notify the Engineer 48 hours prior to taking core samples. The Engineer will select the size and location of the drilled cores so that the structure is not impaired and does not sustain permanent damage after repairing the core holes. Sample three undamaged cores taken from the same approximate location where the questionable concrete is represented by the low strength concrete test cylinders. Repair core holes after samples are taken with a product in compliance with Section 930 or 934 and meeting the approval of the Engineer.

346-10.4 Core Conditioning and Testing: Test the cores in accordance with ASTM C42. Test the cores after obtaining the samples within seven calendar days.