

1050404-MM8.4V2 CONTRACTOR QUALITY CONTROL GENERAL REQUIREMENTS –
COMPLIANCE WITH THE MATERIALS MANUAL
COMMENTS FROM INTERNAL/INDUSTRY REVIEW

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Comments: (4-5-17, Internal)

1. 8.4.1:

8.4.1 PURPOSE

This procedure provides guidance to the precast/prestressed concrete fabrication facilities (**Plants**) that are involved in the manufacturing of the products using ~~self-consolidating-concrete~~**SCC**. The procedure includes requirements related to the Plants' quality control (**QC**) plans, the submittal of

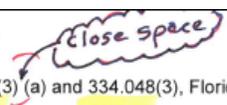


Response: Change made.

2. 8.4.2:

8.4.2 AUTHORITY

Sections 20.23(3) (a) and 334.048(3), Florida Statutes (F.S.).



Response: Change made.

3. 8.4.4:

8.4.4 SCOPE

This procedure establishes guidelines for Plants that are involved in the utilization of the ~~self-consolidating-concrete~~**SCC** for the manufacturing of the precast/prestressed concrete products. The Plants shall comply with the requirements of the Specifications, except as modified herein.



Response: We believe that it is better to leave the phrase open. The acronym “FDOT” before “Specifications” has been added.
Change made.

4. 8.4.5:

8.4.5 SELF-CONSOLIDATING-CONCRETE~~SCC~~ RELATED QUALITY CONTROL PLAN

The ~~Plants' Plant's~~ quality control **QC** plans should address the following items in addition to/or in lieu of the items that are included for conventional concrete mixes:

- (1) The mix design qualification process.
- (2) Routine quality control tests.
- (3) The concrete batching sequence, mixing methods and duration, delivery, placement, finishing, and curing methods.
- (4) The proposed concrete materials ingredient sources.
- (5) Concrete delivery and placement times. It is the responsibility of the producer to utilize the appropriate ~~self-consolidating-concrete~~**SCC**.



Response:

5. 8.4.6.1:

Topic No.: 675-000-000
Materials Manual
Precast/Prestressed Concrete Products

Effective: July 21, 2005
Revised: July 26, January 27, 2012, 2017

8.4.6.1 SPECIFIED 346 CLASS CONCRETE

SCC is allowed for the fabrication of precast prestressed concrete as a replacement for the ASTM, AASHTO, or ~~Florida Department of Transportation~~ **FDOT** Specification, Section 346 class of concrete. The Plant shall submit the proposed mix design with test data and other supporting documents to the Department for review. Upon the Department's approval of the mix design, the use of self-consolidating concrete SCC will be allowed for the fabrication of the precast/prestressed concrete products.

The proposed self-consolidating concrete SCC mixes require State Materials Office (SMO) approval. The District Materials Research Offices (DMRO) review the proposed concrete mix designs and verify they meet the requirements of the ~~Florida Department of Transportation~~ **FDOT** Specifications, Section 346, including the following:

(1) Concrete mix ingredients are from Department approved sources.
(2) ~~The high range water-reducing admixture Type F and Plasticizing admixture Type I Admixtures shall~~ meet the requirements of the ~~Florida Department of Transportation~~ **FDOT** Specifications, Section 924. For self-consolidating concrete SCC, the Type F or

Handwritten notes:
- "Sometimes it has an 'S' and sometimes without an 'S'. Prefer with an 'S'."
- "wouldn't it be better to include the word 'Standard'?"
- "with an 'S'"

Response: All references to specifications have been placed in the plural. The word "standard" is not used for consistency with other chapters of the FDOT Standard Specifications and Materials Manual.

Changes made.

6. 8.4.6.1:

(4) For the self-consolidating concrete SCC, replace the term "slump" with the "slump flow" in the Specifications and related sections of the Materials Manual. Instead of slump, the slump flow will be measured in accordance with ASTM C1611. The minimum proposed target slump flow after the addition of all material ingredients, including admixtures, shall be less than or equal to 27.0 inches. There is no maximum proposed target slump limit, provided the concrete meets the testing criteria in Table I. The tolerance on the proposed target slump flow is ± 2.5 inches. Therefore, the (minimum) slump flow for the concrete to be acceptable as SCC is 24.5 inches.

Handwritten note: "what about using 'absolute minimum'?"

Response: Change made.

7. 8.4.7:

8.4.7 LABORATORY TRIAL BATCH OF THE PROPOSED MIX DESIGN

The requirements of ASTM C192 are modified to allow the laboratory performance based batching and mixing time and sequence that produces the required properties.

During the trial batch process, determine the acceptable batching sequence and the mixing time associated with this batching sequence.

Response: Change made.

8. 8.4.8.1:

8.4.8.1 NUMBER AND QUANTITY OF BATCH SIZES

For the field demonstration, produce and place a volume of 9 cubic yards in a minimum of three batches of at least 3 cubic yards each. Plants that are producing concrete with batch sizes of less than 3 cubic yards are required to produce the necessary batches to reach the required volume.

For the field demonstration, produce and place at least three batches, each a minimum of 3 cubic yards, of proposed self-consolidating concrete mix. Plants that are producing concrete with batch sizes of less than 3 cubic yards are required to produce and place a minimum total amount of 9 cubic yards and perform the aforementioned tests on at least three randomly selected batches.

Handwritten notes: "Not clear" (circled around the first paragraph), "of 3 cubic yards?" (circled around the second paragraph).

Response: Change made.

9. 8.4.8.3:

8.4.8.3 SLUMP FLOW LOSS TEST OF THE FIELD DEMONSTRATION CONCRETE

- (1) Determine the workability of the demonstration concrete batches by performing the slump flow tests. Take the samples at 15-minute intervals from each batch.
- (2) Continue sampling and testing until the slump flow measures ~~20.0~~24.5 inches or less.
- (3) From the plot of slump flow versus time, determine the time for each batch of concrete to reach its proposed target slump flow minus 2.5 inches.
- (4) The shortest time period determined from three demonstrated batches to reach the proposed target slump flow minus 2.5 inches is considered the cutoff time of the proposed concrete mix. The time for each batch is counted from the time that the concrete is batched at the concrete fabrication facility.
- (5) For production concrete, ensure that the time between the batching and depositing of each load of concrete is less than the cutoff time of the mix and that it does not exceed the allowable time limit specified in *Florida Department of Transportation FDOT Specifications, Section 346*.

Handwritten notes: "I thought 24.5 was the minimum? See 8.4.6.1 (4)" (with an arrow pointing to item 2), "Why would you allow less than 24.5?" (with an arrow pointing to item 2).

Response: Slump Flow below 24.5 inches is allowed, because that number is necessary to plot the results, and thus to interpolate the cut-off time corresponding to a 24.5-inch spread.
No change made.

10. 8.4.8.5:

Ensure that the demonstration concrete is mixed, delivered, placed, consolidated, and cured in accordance with the proposed method and sequence that are addressed in the quality control plan. Produce the ~~self-consolidating concrete~~ SCC batches at the proposed target slump flow \pm 2.5 inches. The minimum slump flow will be greater than or equal to 24.5 inches.

Perform inspection and testing of the demonstration concrete during batching, delivery, placement, and post placement. Observe the placement sequence and method of the ~~self-consolidating concrete~~ SCC. During placement, ensure that the concrete batches meet all plastic property requirements of the Specifications and maintain their cohesive nature without excessive bleeding, segregation, or abnormal retardation. Observe the finishing and curing methods of the concrete.

After performing the aggregate distribution test in accordance with FM 5-617, or FM 5-615 as appropriate, if there is an indication of a segregation problem, reject the proposed mix design, determine the cause of the segregation and submit a corrective action plan to prevent the recurrence of the problem during the production. The DMRO will review the plan and will require retesting the mix until the aggregate distribution reaches the required values.

Response: Change made.

11. 8.4.11:

(8)(9) Ensure that the following plastic properties are measured for every Lot of concrete per class as defined in the ~~FDOT the Florida~~ Department of Transportation Specifications, Section 346 class of concrete.

(a) Slump Flow
(b) Relative Viscosity (T_{50})
(c) Visual Stability Index (VSI)

with an "S"

Response: Change made.

12. 8.4.11:

methods of placement that prevent segregation or other detrimental effects. These methods must be identified in the QC Plan.

(11) ~~The concrete should not overflow.~~

(12)(13) ~~The water~~ Water should not be added to re-temper the concrete.

(13)(14) The appropriate curing method should be applied in accordance with the Specification Sections 400 or 450 as soon as practical.

(14)(15) Perform the finishing of concrete to prevent the occurrence of the cracks, honeycombs, voids, and a lack of bonding between the concrete and reinforcing steel.

"S" ?

FDOT

Response: Change made.

13. 8.4.13:

8.4.132 TRAINING

The Plant shall ~~include~~ necessary guidelines to the production and quality control personnel related to the production and quality control inspection and testing of ~~the self-consolidating concrete~~ SCC. The guidelines should be included as part of the Plant's quality control plan.

provide

Response: Change made.

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Comments: (4-27-17)

My concerns are with the addition of three new tests to every lot of production (Table II). These include the Relative Viscosity (T50), Rapid Assessment Static Segregation (Pd), and Visual Stability Index (VSI). SCC mixes for FDOT must be poured out in a relatively short period of time. Currently I have mixes that must be poured out in as little as 30 minutes. By adding these test we are taking away valuable time that could be used pouring. I also have concerns with having to buy new testing equipment for the field that is normally used only in the lab. The Rapid Assessment Static Segregation (Pd) ASTM C1712 requires a new piece of equipment and is a process that is not currently taught in the ACI Concrete Field Technician Test. I have concerns about having an ACI certified tech performing tests that are not covered in the training. I believe that these tests are important, but that the data is of more value in the lab environment where conditions are better controlled.

Response: All the tests required in this document for every lot of production can be performed in less than 5 minutes, which has already been proven. The technician must fill out the mold twice:

- The first one to check ASTM C1611 tests. These three tests can be evaluated in less than 2 minutes because the cone does not need to be compacted in layers like the traditional concrete.
 - o Slump Flow
<https://www.youtube.com/watch?v=Gm9Adz5EPE4>
 - o VSI
 - o T50
- The second one for ASTM C1712 can be completed in 110 seconds (less than 2 minutes).
 - o Rapid Assessment of Static Segregation.
<https://www.youtube.com/watch?v=fTj-XNIpA0o>

Therefore in less than 5 minutes all the tests can be performed, without affecting the placement time of SCC.

ASTM C1712 needs a device that plants have to buy if they want to use the SCC in FDOT projects. The device cost is insignificant compared to the benefits that the Plants will obtain by eliminating the restrictions on the maximum slump flow.

<https://www.humboldtmg.com/penetration-apparatus-self-consolidating-concrete.html>
