

**3460000 – PORTLAND CEMENT CONCRETE
COMMENTS FROM INDUSTRY REVIEW**

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Comments:

Will the new Specification 346-9.3.1 incorporate the Materials Bulletin No. 08-06 regarding reduced frequency for acceptance testing?

Ghulam Mujtaba:

General Comment:

- 1- The nondestructive tests are used to estimate the strength of concrete. It should be verified by Destructive testing.
- 2- In the other proposed specifications the word "LOT" has been deleted. The proposed 346 specification includes the word "LOT"..

Specific comments

- 1- Subarticle 346-1 Last paragraph -Second Sentence

The words "in the" should be inserted between "changes" and "time" to read: There will be no changes in the time extension...."

- 2- Subarticle 346- 8 first paragraph, last sentence. Change the word "Prior" to "previously".

Rod Powers

Comment

Section 346.8 second sentence: change to read ".....compressive strength if **previously** approved....."

Additional Comment

Section 346-2.3 introduces ultra-fine flyash. There is no reference defining ultra-fine flyash and section 929 does not appear to cover this particular grade of flyash.

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Comments:

Section 346-1 Description

Current: There will be no changes time extensions or suspensions due to the suspension of a facility's QC plan.

Change to: There will be no time extensions or time suspensions granted due to the suspension of a facility's QC plan.

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Comment

In Subarticle 346-1 Description, third paragraph, the following proposed sentence does not appear to read correctly "There will be no changes time extensions or suspensions due to the suspension of a facility's QC plan." Should the word "changes" be eliminated?

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Comment

In regards to section 346-9.2 "Acceptance Using Maturity Method", stated in the eighth paragraph which states that;

"If the averages of the 28-days compressive strength, as determined by the three QC cylinders, compare within 750 psi, the strength-maturity calibration curve is validated,"

In order to maintain consistency with "Acceptance using Compressive Strength Cylinders" the sentence should be revised (in **Bold** and *Italic*) to say;

"If the averages of the 28-day compressive strength, as determined by the three QC cylinders, ***compare as determined by the Comparison Criteria in Table 8 of 346-9.1***, the strength-maturity calibration curve is validated,"

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Comment

346-9.5 Resolution Procedure

First Paragraph, last sentence....

“... The Engineer will ensure that the QC and verification “hold” cylinders are tested within seven days of the 28-day strength tests.”

Question: Who is responsible for transportation of the QC “hold” cylinder to the state lab should the “hold” cylinder require testing?

I know what we did in the past but do not want to assume it is the same.

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Comments

Section -2.5.4: Type G is a HRWR - Retarder.

Sec -5: Early Sampling ... ADD at FM 5-501 "and W/C ratio".

Sec -5: Re-visit footnote in Table 5 at ** "for all" LOTs, not just VT. Also REMOVE "precast" so all concrete can use 4x8 cylinders, and keep stipulation in 450-4.1, which could apply to any concrete using either 4x8 or 6x12. (I recommend adding 4x8 strength to already approved mixes [Districts can write-in 1st use so whomever needs to know will have record on mix]). NOTE As I read this now only VT LOTs in Precast can use 4x8 with stipulation, when we want all concrete with or without? (I recommend with stipulation in 450-4.1).

-6.4: CONSIDER ADD "Adjust or" Reject concrete with slump or air exceeding tolerances. MAJOR DEAL ... assists in saving good concrete with 1/4 to 1 inch below, if job site water will correct, and still under max W/C what harm ... will in-directly control cost and not add probably good concrete to land fill. IF allowable jobsite will not fix, then reject!

NEXT PARAGRAPH: ... concrete varies from target in excess of ADD "Table 6 values", immediately adjust ... REMOVE "3/4 inch and 1 inch" ... not needed; should apply to all concrete even Drilled Shaft.

Table 7: Foot note * ADD "Type II" with Type D, Type G. Some precast/prestress now use Ready-Mix trucks and/or Tuckers with agitators.

-8: Table 5, CONSIDER ... QC tests will include air, temp, slump and compressive strength cylinders ADD "6x12 or 4x8", and unit weight ...

-9.2, 1st para: CONSIDER Strength-Maturity Curve for each design mix CHANGE "including those with component source changes" ... too wordy as is now.

-9.2 4th para: ... maturity value average??? Why whenever only one sensor/LOT. [Recommend 2 min, in-case one don't work & in different critical locations].

-9.2 5th para: ... test 3-cylinders after 1-day, meaning next day, or after 24-hours ??? I recommend too short for consistency, suggest @ "3-day" or "7-day" (too get cylinders conditioned in moist room to better compare with trial in lab whenever cylinders were in 'ideal' curing immediately).

-9.2 5th para: ... test 3-cylinders after 28-day curing (means outside ASTM C-39 parameters); suggest CHANGING after to "at".

-9.2 para 6: QC and Validation are different lab than VT??? Suggest ADDING "their" lab for possession.

-9.2 para 7: [Top page 18] ... {field} cylinder strength within 10% of {lab} maturity curve @ 1-day [cylinders are not comparable via different environments, too early to stabilize, condition to similar by curing ... suggest that "3 or 7" day as in paragraph 5].
-9.2 para 8: CHANGE 750 comparison to "Table 8".
-9.5 para 4: ... for each QC ... ADD "strength indicator" [meaning cylinder or maturity sensor or reading], lost, damaged, destroyed ADD "not functioning", payment for LOT reduced by 750/1000 psi... [TO OFFSET RESOLUTION INVESTIGATION COSTS TO PROVE ACCEPTANCE OTHERWISE].
-9.6 1st para: ... compressive strength testing ... ADD "maturity investigation" ...
-9.6 2nd para: ... whether QC strength ADD "maturity results", or verification can be relied upon...
End of Comments ... Thank-you!

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Comments

Update Article 346-9.3.1 by changing "15" to "10" in accordance with DCE memo 19-6 Revision to 346 "Reduced Frequency for Acceptance Tests"

Ghulam Mujtaba:

Additional Review Comments:

1. Page 1, 364-1 Description, Paragraph 2, Last Sentence
In the same paragraph, the word "approved" and "reapproved" have been changed to "acceptance" and "re-acceptance". Use the same terminology throughout.
2. Page 5, 364-2.5.3.3 Self Consolidating Concrete Admixture for Precast/Prestressed Concrete, Paragraph 1
In 346-1, the word "Section 9.2" has been used. Use the same terminology throughout. Either use "Chapter" or "Section" of Materials Manual.
3. Page 5, 346-3.1 General, Table, Cell "1-6n/a"
The terminology or notation "n/a" should be defined or use "lower case letters as footnote".
4. Page 6, 346-3.2 Drilled Shaft Concrete, Bottom of Page; Page 7, Top of page
The phrase "drilled shaft concrete elapsed time" has been defined in the next paragraph. But the terminology "concrete elapsed time is confusing". I recommend the use of terminology, "Concrete Operation elapsed time" or "concreting elapsed time".
5. Page 8, 346-3.3 Mass Concrete, On Page, Paragraph 2, Sentence 1

Insert the word “temperature before the word “differential”.

6. Page 9, Box at Top of Page, Sentence 1
Change “material” to “materials that are contained in the mix” and include “portland cement and ultra fine fly ash”.
7. Page 9, 346-4.2.2 Certification, Paragraph 1, Sentence 1
Change, “...all reinforced concrete produced meets...” to “...all produced reinforced concrete meets...”.
8. Page 9, 346-4.2.2 Certification, Paragraph 1, Paragraph 1, Sentence 2
The phrase, “...that supports the concrete meeting this Section” is redundant.
9. Page 9, 346-4.2.1 General, Paragraph 3, Sentence 4
The certification should be applicable only when the concrete production will be in progress.
10. Page 9, 346-4.2.3 Control Level for Corrective Action, Paragraph 2

Larry Sessions

Comments

General: The proposed revisions contain many good changes; however, concerns exist concerning the replacement of RCP with surface resistivity measurements and the use of ultra-fine fly ash.

346-2.3: Based on the testing sent to me to justify the use of ultra-fine fly ash (UFFA), I believe the testing in its current form does not justify the use of UFFA as an equal to the other pozzolans that have been tested. The reason to support this statement is based on the following observation: the UFFA was tested with a mix design using a w/c ratio of 0.29 and all other pozzolans were tested at a w/c ratio of 0.35. It is well known within the concrete testing community that concrete with a w/c ratio of 0.3 is almost impermeable without the use of any pozzolan. UFFA should be tested with a mix design like all other pozzolans. If it is now practicable to produce concrete with a w/c ratio of 0.3, then our mix designs for class IV, V and VI concretes for use in marine environments should be lowered to produce more durable concrete. The Materials Office in the past has objected to this action. Has something changed?

346-2.2.3.3: It is not clear that the use of flowing concrete is an option for precast concrete. Suggest the first sentence be prefaced with the following phrase " When the flowing concrete option is selected use a.....

346-2.5.3.3: A revised sentence could be desirable. I suggest the last sentence be revised as follows: Use self consolidating concrete admixtures meeting.....Facilities Guidelines (viewed at the following URL: www.....section 84.pdf).

346-3.1 (d): Is it premature to require the use of surface resistivity since the method has not been adopted by ASTM? I recommend either only RCP or both methods be allowed.

In addition, FTM 5-578 could be strengthened with a little editing. Figure 1 should clearly indicate the alignment of the CL of the probe and the center of the sample. Section 3.1 should use the word shall instead of should when referring to the probe spacing. In general, this test is only valid when the cylinders are thoroughly saturated with water. The test method should include a means to determine if the test cylinders are saturated with water or there should be a maximum time between extraction of the cylinders from the curing chamber and the performance of the test.

Based on the paper "Resistivity Measurements of Water Saturated Concrete as an Indicator of Permeability" the resistivity for 4"x 8" cylinders should be 37 KOhm-cm not 29 KOhm-cm (29 KOhm-cm was suitable for 6" x 12" cylinders).

346-4.1: The cheapest method to achieve durability is to lower the w/c ratio. Since it is now palatable to utilize a w/c ratio of 0.3 for ultra-fine fly ash, this is a good time to improve the durability of class IV, V and VI concretes by lowering the w/c ratio. I suggest the w/c ratio be lowered for marine concrete from the current ratio of 0.41 for class IV to 0.37 and from the current ratio of 0.37 for classes V and VI to 0.35 without the use of pozzalans and 0.33 with the use of pozzalans. Experiments have shown the pre-casters were comfortable with 0.33 w/c and the general contractors were comfortable with a w/c of 0.35 for cast-in-place concrete.

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Comments:

(1) Is "Precast" intended to apply to precast concrete box culverts (either wet or dry cast)? Please note that these are not pre-stressed structures. Or is precast intended to apply to other structures such as bridge decks?

(2) Section 346-2-3 (3) states that Precast concrete to use MAXIMUM 25% fly ash. What is the basis for this maximum? Could 30 or 35% be used so long as required strengths are met?

(3) It is my understanding that in cases of slightly aggressive environment, the Engineering Plans should indicate a concrete class of Class II for the cast-in-place design. Class II is the default concrete class for slightly aggressive for box culverts. The precast box culvert manufacturer may submit a precast alternative in accordance with standardized designs. Those standardized designs are based on a minimum compressive strength of concrete, which I believe is 5,000 psi. As long as our standard design precast

alternative meets the structural requirements, then Class II property of cementitious ratio applies to precast. Is this correct? Therefore, i.e, if we can make 5,000 psi concrete with a 470 lbs/cubic yard mix, then that is permissible for slightly aggressive environments that specify class II concrete.

Jae Jaeger
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Comments

1. 346-4.2.3 Control Level for Corrective Action

The last paragraph in this section states that “if chloride test results exceed the limits of Table 4, reject all from the first passing chloride test to the present, or perform engineering analysis to demonstrate that the material meets the intended service life of the structure”.

Suggest adding a statement regarding permissible investigative work. If there is an apparent chloride result exceeding the limits of Table 4, will there be another means of validating the failing result? For example, if historical data indicates normal chloride contents for a given production facility and a potentially anomalous result is indicated, the anomaly should be reviewed. To verify an anomaly, concrete with an apparent high chloride content may be analyzed using the remains of one of the acceptance strength specimens cast during that placement, or perhaps even a core from the structure itself.

Also suggest that the “first passing chloride test” be replaced with the “last passing chloride test”.
