

4002100, Disposition of Cracked Concrete

Response to Comments from Industry Review

Will Watts
386-961-7012
will.watts@dot.state.fl.us

Comment

Text: New decks require grinding and grooving. Would the disposition (PS or M) be applied before or after grooving?

Response:

These could be applied either before or after grinding and grooving depending on when cracks are discovered. It has been done both ways in the past with success.

John Previte

Are we using the specifications to instruct the engineer or the contractor? My understanding is that specifications are written to the contractor. I would recommend that this paragraph and similar ones be written directly to the contractor telling him what to expect, receive and do, of and for the engineer.

The reference to 'all' cracks leaves me unclear as to what is expected with, for example, fine map-cracking. We may be asking the (FDOT) Engineer to provide the 'precise' location of a huge number of structurally insignificant cracks.

The Engineer will inspect concrete surfaces as soon as surfaces are fully visible after casting, between 7 and 31 days after the component has been burdened with full dead load, and a minimum of 7 days after the bridge has been opened to full unrestricted traffic. The Engineer will measure the width, length, and depth of each crack and establish termination points and the precise location of the crack termination points relative to permanent reference points on the member. all cracks and display, to scale, the results on a drawing referred to as a crack map. The Engineer will determine if coring of the concrete is necessary when an accurate measurement of crack depth cannot be determined by use of a mechanical probe. The Engineer will monitor and document the growth of individual cracks at an inspection interval determined by the Engineer to determine if cracks are active or dormant after initial inspection. The Engineer will perform all final bridge deck crack measurements once the deck is free of all debris and before transverse grooves are cut and after planing is complete for decks that require planing. Provide the access,

Response:

Text will be added to CPAM Section 10.3.5 to address the issue of what to do about cracks that are not significant. This will be added to CPAM because this issue affects the responsibility of CEI staff and not the Contractor.

John S. "Jack" Knowlton, P.E.
727.864.5585
813.449-1905 cell
WilsonMiller.com

Comments:

We specify that the Engineer inspect the cracks a minimum of 7 days after full unrestricted traffic has been placed on the bridge. Unless we also make a change in the specification for Final Completion of the project, this is after many projects are completed. We need to make sure that this is included in the specifications (like we do for the 14 days between applying FC and allowing thermoplastic striping) and accounted for in the project schedules.

Also, that is an open ended time frame for the Engineer to perform the inspection..."a minimum of 7 days after traffic is placed on the bridge...". We need an end date such as before Final Acceptance of the project.

Response:

The issue of exactly when and where to inspect for cracks is covered in CPAM Section 10.3.5 which is intended for the use of CEI staff. CEI staff is clear that cracks must be identified on or before final acceptance.

Duane Brautigam

Comment:

In the first sentence: "The disposition of cracked concrete is described in this Section" - Suggest leaving "herein" or using "Article", not changing to "Section". Either would be more accurate, since "Section" would refer to all of Section 400, and the clear intent is within 400-21. In the last sentence of 400-21.1, provide more accurate cross reference(s) instead of "See other Sections". For example, if the correct reference is within Section 450, please provide that specific reference.

Response:

Regarding comment one: will change to **Article** from Section.
Regarding comment two: it was worded as suggested when originally submitted to the Specs Office but was changed by the State Specifications Engineer, Rudy Powell, to the current wording so Mr. Powell will have to address this comment.

Ghulam Mujtaba
(352) 955-6685
ghulam.mujtaba@dot.state.fl.us

Comments:

1. The specification should describe that the disposition of cracks in concrete structures are applicable prior to final acceptance of the project or during the warranty period. After the final acceptance of the project, contractor is not obligated to provide personnel and equipment for the department to perform the crack survey review or perform the repair, unless the contract has a warranty period.

Response:

Disagree - It is understood that the specification only applies until final acceptance.

2. The survey of the cracks should have been done by the contractor and verified by the department. It will make it complicated that the work and evaluation are done by the department. The contractor can review the crack survey and evaluation and the department will make the final determination.

Response:

Disagree - The Director Office of Construction decided that the CEI staff will do inspection and documentation of cracks and not the Contractor.

3. It is not indicated if there is going to be a resolution in case of disagreement between the department and contractor's evaluations.

Response:

None was intended since the resolution process will be the same as with any disagreement between the Department and the Contractor: appropriate Department and Contractor officials will negotiate a resolution.

Specific Review Comments:

1. 400-21.3, Sentence 2 Change to read, "...the Engineer will determine if the crack greater than ½ inch deep for the particular structure and particular location belongs to the category of nonstructural cracks."

Response:

Disagree - current wording has the meaning that is intended

2. 400-21.4, Title Change "Cracking Significance of Nonstructural Cracks" to "Intensity of Nonstructural Cracks". The word, crack or cracking, have been repeated two times in same title. In my opinion, the word "Intensity" is more appropriate to describe the crack survey than "Significance". The word "Intensity" describes the magnitude and extent of the crack. The word

“significance” describes the importance of crack. In case of agreement with this suggestion, replace the word “significance” with “Intensity” throughout the document.

Response:

Agree - Title should be changed to: “400-21.4 Nonstructural Cracking Significance” instead of current

Disagree - The word intensity does not describe as well what the spec is trying to convey which is the importance of the number of cracks; therefore, significance is a better choice.

3. 4.-21.4, Last Paragraph Explain the reason for contractor’s comment. If the engineer will make final determination, what is the reason for contractor’s review?

Response:

To let the Contractor know that the Department is interested the Contractor’s opinion about this matter.

4. 400-21.5.1, Last Sentence “Reject and Replace” in Table 1 or 2 means there is no acceptable repair method.” Move this note to the footnote of the table.

Response:

Disagree - Rather than bury the comment in a footnote where the Contractor might miss it, it has been included in the spec text to increase the probability that the Contractor will be aware of the provision.

Anjani Girwarr
Assistant General Counsel
(863) 519-2825

Comment:

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400-21.2

The Engineer will determine if coring of the concrete is necessary when an accurate measurement of crack depth cannot be determined by use of a mechanical probe. The Engineer will monitor and document the growth of individual cracks at an inspection interval determined by the Engineer to determine if cracks are active or dormant after initial inspection. The Engineer will perform all final bridge deck crack measurements once the deck is free of all debris and before transverse grooves are cut and after planing is complete for decks that require planing.

Comment:

Use of word "determined" and "determine" in the same sentence is awkward.

Suggest: "The Engineer will monitor and document the growth of individual cracks at inspection intervals within Engineer's discretion to determine whether cracks are active or dormant after initial inspection."

Response:
The wording may be awkward but the meaning is clear.

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400-21.3 Classification of Cracks: The Engineer will classify cracks as either nonstructural or structural *and determine the cause. In general, nonstructural cracks are cracks 1/2 inch or less deep from the surface of the concrete; however, the Engineer may determine that a crack greater than 1/2 inch deep is nonstructural.*

Comment:

It does not make sense to say 1/2" cracks or less are non-structural, but later you give the Engineer discretion to classify cracks <1/2" as non-structural. Why? Under what circumstances would a crack <1/2" be non-structural?

Response:
In the case where a member is very thin such as a 4" thick diaphragm, a 1/2" deep crack is serious and could be considered structural.

Christopher Wood
(904) 360-5673
Christopher.Wood@dot.state.fl.us

Comments:

This ONLY applies to STRUCTURAL CONCRETE right? Not CONCRETE PAVEMENT or INCIDENTAL CONCRETE right? How about precast drainage structures?

Response: Specification 400 is entitled Concrete Structures which does not include concrete pavement or incidental concrete construction as stated in 400-1. Some precast drainage structures such as culverts are covered by 400-21 and whether they are or not is covered in their respective sections such as 410.

400-21.5.1 Nonstructural Cracks: *Repair each crack using the method as determined by the Engineer for each LOT in accordance with Table 1 or 2. When further investigation is required to determine repair or rejection, either remove and replace the cracked concrete or provide a structural evaluation signed and sealed by the Contractor's Engineer of Record (is this the Design EOR or any PE the contractor gets?) If it is just any PE then say "Registered Professional Engineer", otherwise, just say Design Engineer of Record, not Contractor's Engineer of Record*

Response: Contactor's Engineer of Record is defined in Specification 1-3 and since cracks are in a permanent member this individual is required by the specification to perform the analysis and recommendations on behalf of the Contractor.

- that includes recommended repair methods and a determination of structural capacity and durability to the Engineer. Upon approval by the Engineer, repair the cracked concrete. Upon approval by the Engineer use epoxy injection in accordance with Section 411 to repair cracks in a member inside a dry cofferdam prior to flooding of the cofferdam. Upon approval by the Engineer, repair the cracked concrete in accordance with Section 411 using epoxy injection. When repairing cracks in a member inside a dry cofferdam do so prior to flooding the cofferdam. (why mandate epoxy injection when treatment really depends on criteria shown in Tables 1 and 2?) "Reject and Replace" in Table 1 or 2 means there is no acceptable repair method.

Response: Cracks that will be underwater during the service life of the member can only be satisfactorily repaired by epoxy injection: penetrant sealers and methacrylate will not work.

400-21.5.2 Structural Cracks: *Provide a structural evaluation signed and sealed by the Contractor's Engineer of Record (is this the Design EOR or any PE the contractor gets?) If it is just any PE then say "Registered Professional Engineer", otherwise, just say Design Engineer of Record, not Contractor's Engineer of Record -*

Response: Contactor's Engineer of Record is defined in Specification 1-3 and since cracks are in a permanent member this individual is required by the specification to perform the analysis and recommendations on behalf of the Contractor.

that includes recommended repair methods and a determination of structural capacity and durability to the Engineer. Upon approval by the Engineer, repair the cracked concrete. Complete all repairs to cracks in a member inside a cofferdam prior to flooding the cofferdam.

Douglas J Holdener, P.E.
Florida Region Engineer
Rinker Materials Concrete Pipe Division
561.352.8959
dholdener@cemexusa.com

Comments:

Per correspondence with the State Office of Construction, it is our understanding that the proposed specification 4002100 changes are not intended to apply to evaluation of cracks in reinforced concrete pipe (RCP). During the review period, we contacted Engineer Plotkin, whom indicated that precast RCP was not considered during the development of this specification change. The Department has acknowledged, however, that the specification language could be possibly misinterpreted to apply to RCP. We are therefore requesting clarification that this specification change is not to be applied to precast RCP.

Of concern is Section 400-21.1 General where it is stated "*this Section, and applies to all cast-in-place concrete members and to all precast and prestressed concrete members after installation.*" We are concerned that the reference to "all precast" will be easily misinterpreted by Engineers in the field to apply to precast RCP.

So as to prevent confusion in the field and to ensure "institutional knowledge," we request a statement in the specification that advises that this specification is not to apply to pipe.

RESPONSE: The spec has been revised to exclude RCP.
