EXPECTED IMPLEMENTATION JULY 2007

DRAFT

400 DISPOSITION OF CRACKED CAST-IN-PLACE CONCRETE.
(REV 1-23-07) (FA 2-5-07) (7-07)

ARTICLE 400-21 (Pages 390 and 391) is deleted and the following substituted:

400-21 Disposition of Cracked Cast-in-Place Concrete.

400-21.1 General: The investigation and disposition of cracked cast-in place concrete are described herein.

400-21.2 Investigation, Documentation and Monitoring: The Engineer will perform a thorough inspection of the concrete surfaces for cracks. If cracks are found, the Engineer will measure crack lengths and widths. 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, termination points and precise location of all cracks and display, to scale, the results on a drawing referred to as a crack map. After initial inspection, the Engineer will monitor and document the growth of individual cracks at an inspection interval determined by the Engineer. Provide the access, equipment and personnel needed for the Engineer to perform this work.

400-21.3 Classification of Cracks: The Engineer will classify cracks as either nonstructural or structural. In general, nonstructural cracks are shallow depth cracks (between the surface of the concrete and the first layer of reinforcement), which form during curing. Structural cracks are cracks that extend beyond the depth of the reinforcing steel, which can form as a result of excessive load or inadequate support conditions during casting or from uncontrolled temperature gradients. The Contractor will be given an opportunity to review and comment on the Engineer's classification of cracks. The Engineer will make the final determination as to whether cracks are nonstructural or structural.

400-21.3.1 Cracking Significance: The Engineer will determine the cracking significance on the basis of total crack area as a percentage of concrete surface area. Cracking shall be categorized as Isolated, Occasional, Moderate or Severe according to the criteria in Tables 1 and 2. Computations for purposes of determining cracking significance shall be done on a LOT by LOT basis where a LOT is made up of not more than 100 square feet of concrete surface area on bridge substructures, or not more than 400 square feet of bridge deck. Where cracking is localized, the LOT will be reduced to encompass only the immediate area of cracks. Individual evaluation and repairs will be performed on a LOT by LOT basis as directed by the Engineer.

The area to be used in Tables 1 or 2 is the summation of the product of the crack length times the average crack width of all the cracks in a LOT computed in square feet.

The Engineer will identify cracks that are not representative of the overall typical cracking of the LOT(s) and evaluate these separately.

The Contractor will be given an opportunity to review and comment on the Engineer's determination of cracking significance. The Engineer will make the final determination of cracking significance with regard to Tables 1 and 2.

400-21.4 Resolution: Repair nonstructural cracks in accordance with Tables 1 or 2 where applicable. For disposition of structural cracks provide a structural evaluation and written recommendation by a Specialty Engineer.

EXPECTED IMPLEMENTATION JULY 2007

Where Table 1 or 2 requires investigation to determine adequate repair or rejection, either replace the defective concrete or engage a Specialty Engineer to determine the structural and durability significance of the cracking and develop recommended repair methods for approval of the Engineer.

Cracks shown in Table 1 or 2 with no repair methods listed are considered unacceptable and the affected portions of the structure are required to be removed and replaced.

The Engineer will make the final determination of whether the cracked concrete shall be repaired or replaced, and must approve repair methods prior to start of the work.

No additional compensation or contract time shall be allowed for repairing or replacing cracked concrete that was caused by inadequate curing effort or inadequate construction practice as determined by the Engineer.

EXPECTED IMPLEMENTATION JULY 2007

Table 1
CAST-IN-PLACE SUBSTRUCTURES AND SUPERSTRUCTURES OTHER THAN DECKS

	Crack Width [2] (inch)	Crack Total Area (In Percent of Concrete Surface) [1]											
		<0.005%			0.005%-0.017%			0.017%-0.029%			>0.029%		
		Isolated			Occasional			Moderate			Severe		
		Environment			Environment			Environment			Environment		
		SA	MA	EA	SA	MA	EA	SA	MA	EA	SA	MA	EA
Elevation 0 to 6 ft AMHW	x≤0.004	NT	NT	PS	NT	PS	PS	PS	PS				
	0.004< x ≤0.008	NT	PS	EI[3]	PS	EI[3]	EI[3]	PS					
	0.008< x ≤0.012	PS	PS	EI									
	0.012< x ≤0.016	PS	Investigate to Determine Appropriate Repair [4, 5] or Rejection										
	0.016< x ≤0.020												
	0.020< x ≤0.024									Reject and Replace			
	0.024< x ≤0.028												
	0.028< x												
Elevation 6 to 12 ft AMHW	Crack Width	SA	MA	EA	SA	MA	EA	SA	MA	EA	SA	MA	EA
	x ≤0.004	NT	NT	PS	NT	PS	PS	PS	PS	PS	PS		
	0.004< x ≤0.008	NT	PS	EI[3]	PS	PS	EI[3]	PS	EI[3]				
	0.008< x ≤0.012	NT	PS	EI	EI	EI							
	0.012< x ≤0.016	PS	EI	EI	EI								
	0.016< x ≤0.020	EI											
	0.020< x ≤0.024		Investigate to Determine Appropriate Repair [4, 5] or Rejection							Reject and Replace			
	0.024< x ≤0.028												
	0.028< x												
Elevation 12 ft plus AMHW	Crack Width	SA	MA	EA	SA	MA	EA	SA	MA	EA	SA	MA	EA
	x ≤0.004	NT	NT	NT	NT	PS	PS	PS	PS	PS	PS		
	0.004< x ≤0.008	NT	PS	PS	PS	PS	EI[3]	PS	EI[3]	EI[3]	PS		
	0.008< x ≤0.012	NT	PS	EI	EI	EI	EI	EI	EI				
	0.012< x ≤0.016	PS	EI	EI	EI	EI	EI						
	0.016< x ≤0.020	EI	EI	EI	EI								
	0.020< x ≤0.024	EI	Investigate to Determine Appropriate Repair [4, 5] or Rejection										
	0.024< x ≤0.028									Reject and Replace			
	0.028< x												

EXPECTED IMPLEMENTATION JULY 2007

Table 2
CAST-IN-PLACE BRIDGE DECK

	Crack Width [2] (inch)	Crack Total Area (In Percent of Concrete Surface) [1]											
		<0.005% Isolated Environment			0.005%-0.017% Occasional Environment			0.017%-0.029% Moderate Environment			>0.029% Severe Environment		
		SA	MA	EA	SA	MA	EA	SA	MA	EA	SA	MA	EA
Up to 12 feet AMHW	x ≤0.004	NT	NT	PS	NT	PS	PS	PS	PS	PS			
	0.004< x ≤0.008	NT	NT	EI/M[3]	NT	PS	EI/M[3]	EI/M[3]	EI/M[3]	EI/M[3]			
	0.008< x ≤0.012	NT	PS	EI/M	PS	EI/M	EI/M	EI/M	EI/M				
	0.012< x ≤0.016	PS	PS	EI/M	PS	EI/M							
	0.016< x ≤0.020	PS	PS	EI	EI								
	0.020 < x ≤0.024	PS	EI	EI	Investigate to Determine Appropriate Repair [4, 5] or Rejection						Reject and Replace		
	0.024< x ≤0.028	PS	EI										
	0.028< x												
12 feet plus AMHW or over Land	Crack Width	SA	MA	EA	SA	MA	EA	SA	MA	EA	SA	MA	EA
	x ≤0.004	NT	NT	PS	NT	NT	PS	PS	PS	PS			
	0.004< x ≤0.008	NT	NT	PS	NT	PS	EI/M[3]	PS	EI/M[3]	EI/M[3]			
	0.008< x ≤0.012	NT	NT	EI/M	PS	PS	EI/M	EI/M	EI/M				
	0.012< x ≤0.016	NT	PS	EI/M	PS	EI/M							
	0.016< x ≤0.020	NT	PS	EI	PS								
	0.020< x ≤0.024	NT	PS	EI	Investigate to Determine Appropriate Repair [4, 5] or Rejection						Reject and Replace		
	0.024< x ≤0.028	NT	PS										
	0.028< x												

PS = Penetrant Sealer
EI = Epoxy Injection
NT = No Treatment
M = Methacrylate
AMHW = Above Mean High Water
SA = Slightly Aggressive
MA = Moderately Aggressive
EA = Extremely Aggressive

Table Notes (Both Tables)

(1) Calculate total crack area by multiplying the average of 3 width measurements on each crack by the length of the crack and adding the results of all the cracks within the designated representative LOT.

(2) Use the average width of all the cracks representative of the LOT to determine the table crack size.

(3) For cracks 0.004 inch to 0.008 inch, determine if injectable. If not injectable, use penetrant sealer or methacrylate as directed by the Engineer.

(4) (a) Perform epoxy injection of cracks in accordance with Section 411. Seal cracks with penetrant sealer or methacrylate as per Section 413. (b) Use methacrylate or penetrant sealer to repair cracks that are compatible with previously applied materials or remove such materials. (c) Use sealers to repair riding surfaces that are designed for that purpose.

(5) Seal the cracks after it has been determined that no additional growth will occur.

(6) Investigate cracks which occur underwater or at elevations below zero to determine appropriate repair.