



**DEVELOPMENTAL SPECIFICATIONS
FOR
IMPROVED DURABILITY CONCRETE FOR BRIDGE DECKS**

**Effective Date
October 20, 2009**

THE STANDARD SPECIFICATIONS, SERIES 2009, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE DEVELOPMENTAL SPECIFICATIONS AND THEY PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

09011.01 DESCRIPTION.

Provide improved durability concrete for bridge decks. Specific requirements are required when curing to prevent shrinkage cracks and to improve permeability. The work includes establishing longitudinal grooving into the hardened concrete of the bridge floor.

Apply Sections 2403 and 2412 of the Standard Specifications with the following modifications.

09011.02 MATERIALS.

- A.** Use coarse aggregate consisting of crushed limestone, quartzite, or granite meeting Class 3i durability.
- B.** Use water to cementitious ratio of 0.45 maximum.

09011.03 CONSTRUCTION.

A. Placing Concrete.

Apply Article 2412.03, C of the Standard Specifications with the following exceptions:

Replace the first sentence of Paragraph 4:

Do not begin placing concrete if the theoretical rate of evaporation for that day exceeds 0.1 pounds per square foot per hour (0.5 kg/m² per hour).

Add as new Paragraphs 5, 6, and 7:

- 5.** Monitor the theoretical evaporation rate at a maximum interval every 3 hours during the placement at a location as near the deck as possible. If the rate exceeds 0.15 lbs. per square foot per hour (0.75 kg/m² per hour), cease placement at the next location acceptable to the Engineer.
- 6.** If concrete is to be placed by pumping, submit measures for reducing exit velocity of the pumped concrete and minimizing damage to epoxy coated reinforcement to the Engineer for approval prior to pumping.

7. Protect epoxy coated reinforcement from damage caused by placing and handling equipment.

B. Curing.

Apply Article 2403.03, E of the Standard Specifications with the following exceptions:

Add as Paragraph 8:

8. Leave forms in place for 168 hours of curing.

Replace Article 2412.03, E of the Standard Specifications with the following exceptions:

Cure concrete floors as follows:

1. Do not place curing compound on the floor.
2. Place two layers of pre-wetted burlap on the floor immediately after finishing, with a maximum time limit of 10 minutes after the finishing process. Ensure a manufactured evaporation retardant is readily available during placement for application as directed by the Engineer.
3. Apply water to the burlap covering for a period of 168 hours. Use a pressure sprinkling system that is effective in keeping the burlap wet during the moist curing period. The system may be interrupted only to replenish the water supply, during periods of natural moisture, or during construction contiguous to the concrete being cured. The Engineer may approve interruptions for periods longer than 4 hours on the basis of the method for keeping the concrete moist.
4. Maintain continuous contact, except as noted above, between all parts of the concrete floor and the burlap during the curing period.

C. Cold Weather Protection.

1. Ensure concrete and its surface temperature is maintained at a temperature no less than 50°F (10°C) for 168 hours of continuous wet sprinkling system curing. Curing time will not be counted if the concrete temperature falls below 50°F (10°C).
2. Continuously monitor the surface temperature of concrete during the curing period with recording type thermometers approved by the Engineer. Furnish the information to the Engineer.

09011.04 METHOD OF MEASUREMENT.

Improved Durability Concrete, in cubic yards (cubic meters), will be the quantity shown in the contract documents.

09011.05 BASIS OF PAYMENT.

- A. Payment will be the contract unit price for Improved Durability Concrete per cubic yard (cubic meter).
- B. The cost for manufactured evaporation retardant is included in the contract unit price for Improved Durability Concrete.