

REVISION OF SECTION 601 LATEX MODIFIED CONCRETE

Revise Section 601 of the Standard Specifications for this project to include the following:

DESCRIPTION

This work consists of placing a bridge deck overlay using a latex modified concrete following fast-track selective hydrodemolition removal of the delaminated and deteriorated bridge deck concrete.

MATERIALS

Latex Modified Concrete (LMC) for use on bridge deck overlays shall meet the aggregate and cementitious requirements for Class DT concrete. Additives and water shall be adjusted to include 24.5 gallons of latex emulsion additive per cubic yard of concrete.

Latex Modified Concrete shall also meet the following:

Water cement ratio 0.40 max. All non-solids from latex emulsion are considered as water.

% Air 0-7% Use of the latex manufacturer's recommended defoamer may be allowed as needed.

Latex emulsions for use with latex modified concrete shall be materials which have been tested and prequalified by the Turner-Fairbanks Highway Research Center (TFHRC), Office of Research and Development, Federal Highway Administration, or emulsions which have been tested in accordance with and meet the requirements of FHWA Report RD-78-35, "Styrene-Butadiene Latex Modifiers for Bridge Deck Overlay Concrete.

The Contractor shall furnish a certified test report (CTR) showing the actual results obtained for the various tests.

Field samples, when tested by the methods described in FHWA Report RD-78-35, shall have the following properties:

- Solids, percent by weight, minimum.....46
- Polymer particle size..... 1,400 - 2,500 Angstroms
- pH.....8.5-12
- Color.....White
- Unit Weight @77o F (25o C), minimum..... 8.4 lbs. per gal. (1 kg/L)

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CONSTRUCTION REQUIREMENTS

(a) *Test Panel.* The Contractor shall make one or more trial batches of overlay material at least 5 working days before the overlay is to be placed. The Contractor shall cast one or more test panels demonstrating the ability to finish and texture, if required, the Latex Modified Concrete test slab. These test slabs shall be a minimum of 8 feet long and 3 feet wide and 1 ¼ inches thick.

Following curing, overlay pull bond testing shall be performed on the test panel(s) in accordance with the acceptance testing herein. Acceptable test results shall be achieved on a trial application before the placement of the LMC can proceed.

(b) *Mixing.* The mixer shall measure and control the flow of ingredients being introduced into the mix and shall record these quantities on approved visible recording meter equipped with a ticket printer. Water flow shall be readily adjustable to compensate for minor variations in aggregate moisture content and shall be displayed by an approved flow meter. The flow of latex modifier shall also be displayed by an approved flow meter.

The mixer shall automatically proportion and blend simultaneously all ingredients of the specified mix on a continuous or intermittent basis as required by the finishing operation. Latex modified concrete shall be discharged directly in front of the finishing machine.

The Contractor shall collect a ticket for each pass or portion of a pass that is provided by each mixer, and ensure that the following information is shown on each ticket:

- (1) Project Number
- (2) Bridge Number
- (3) Date and Time
- (4) Ticket Number
- (5) Material Type
- (6) Location of Placement (Lane and Station Limits)
- (7) Aggregate Weight
- (8) Latex Modified Emulsion by weight

A copy of each batch ticket shall be given to the CDOT inspector at the time of placement. The Contractor shall retain a copy of each batch ticket.

(c) *Placement.* A Pre-Placement Conference shall be held at a time mutually agreed upon before the initial placement of LMC overlay. Representatives of the mixer company and the Contractor shall meet with the Engineer to discuss the following topics:

- (1) Concrete mix ingredients and proportions (cement content, effect of admixtures, etc.)
- (2) Work Schedule
- (3) Applicable Specifications and Special Notes

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- (4) Delivery Details
- (5) Planned Construction Joint Locations
- (6) Role of all Personnel
- (7) Construction Details - surface preparation, finish, joint locations, etc.
- (8) Testing Requirements
- (9) Acceptance Criteria
- (10) Contingency Plans for Wind, Rain, Breakdown, etc.
- (11) Curing Details

LMC shall not be placed when the ambient temperature is above 85° F during placement.
LMC shall not be placed when the ambient temperature is less than 45° F during placement.

(d) *Curing.* Latex Modified Concrete bridge decks shall be cured in accordance with subsection 601.16 (a) 2. Wet burlap shall be placed within 15 minutes of strike off and finishing.

For Latex Modified Concrete Overlays, the Water Cure Method shall be used. The minimum curing period shall be 48 hours of wet cure. The temperature of the overlay shall be maintained between 40° F and 85°F during the curing period.

Traffic from either the public or the contractor should not be allowed on the Latex Modified Concrete for a minimum of 5 days or until the compressive strength has reached a minimum of 4,000 psi as measured by cast cylinders cured on site or an approved maturity meter method, or as directed by the Engineer.

(e) *Overlay Pull Bond Testing.* Following the completion of curing, vertical axis pull bond tests shall be performed by the Contractor in accordance with ASTM C1583, Standard Test Method for Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-Off Method). At a minimum, 2 pull bond tests shall be performed on each bridge. For bridges with deck areas greater than 25,000 square feet, additional tests shall be performed at a frequency of one test per 25,000 square feet of additional deck area, rounded up. Additional testing may be required as directed by the Engineer.

The test result shall be the average of the number of tests for each structure, drilled a minimum of 0.25 inch but no greater than 0.50inch below the bond line.

The bond strength of the LMC overlay system on normal weight concrete shall be 250 psi. An acceptable test will demonstrate that the overlay bond strength is sufficient by producing a concrete subsurface failure area greater than 50 percent of the test surface area. The Contractor shall repair all bond test locations with LMC overlay in accordance with this specification.

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METHOD OF MEASUREMENT

Latex Modified Concrete Placement will not be measured but will be the quantity designated in the plans.

Latex Modified Concrete will be measured as the actual quantity of latex modified concrete completed and accepted.

BASIS OF PAYMENT

The accepted quantities of Latex Modified Concrete Placement will be paid for at the contract unit price.

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Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
Latex Modified Concrete Placement	Square Yard
Latex Modified Concrete	Cubic Yard

Payment for Latex Modified Concrete Placement will be full compensation for all labor, materials, tools, equipment, and incidentals required to prepare the concrete surface and complete the placement including the cost of test panels and pull testing.

Payment for Latex Modified Concrete will be full compensation for all costs required to furnish the material, including freight, to the project site and disposal of any unused material.

INSTRUCTIONS TO DESIGNERS (delete instructions and symbols for final draft):

This pilot Specification for Latex Modified Concrete is not intended for general use. Use of this specification must be approved by Staff Bridge and is only used when combined with the pilot specification for Hydrodemolition (Fast Track).

PERMANENT CHANGES TO PROJECT DATED SPECIAL PROVISIONS

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<u>DATE</u>	<u>AUTHOR</u>	<u>DESCRIPTION OF CHANGE</u>
1/14/19	BPM Cons.	Initial Website Issue
04.11.2023	M. Kayen	Revisions to make spec online ADA-compliant. 5.22.23 Additional ADA.