

1.0 DESCRIPTION

This work consists of furnishing and placing an overlay of latex modified concrete over conventional existing concrete or repair concrete on bridge decks and approach pavement. Perform this work in accordance with this Special Provision and the applicable parts of the Standard Specifications. *For material, equipment, proportioning and mixing of modified compositions, see Section 1000-8 of the Standard Specification.*

2.0 MATERIALS

Use materials that meet the requirements for the respective items in the Standard Specifications with the following exceptions:

- A. Cement - Do not use Type III (high early strength).
- B. Aggregate – Follow Section 1014 of the Standard Specifications, except provide coarse aggregate that meets the gradation for standard size No. 78M.
- C. Fine Aggregate – Follow the Standard Specifications.
- D. Latex Emulsion Admixture – Use a formulated latex admixture that is a non-hazardous, film forming, polymeric emulsion in water and is homogeneous and uniform in composition. Add all stabilizers at the point of manufacture.

Use a latex modifier conforming to the following requirements:

Polymer Type.....	Styrene Butadiene
	68 ±4% Styrene
	32 ±4% Butadiene
Average Polymer Particle Size	1500 to 2500 Angstroms
Emulsion Stabilizers	Anionic and non-ionic surfactants
Percent Solids	46.5 to 49.0
Weight per gallon, lbs at 75°F	8.40 to 8.60
(per liter, kg at 25°C).....	(1.007 to 1.031)
pH.....	9.5 to 11.0
Shelf Life	2 Years
Color.....	White

1000-8

- E. Provide a Type 5 Supplier’s Certification for each load of latex emulsion admixture in accordance with Article 106-3 of the Standard Specifications. Test admixture samples to verify compliance with the specification requirements before use. Allow 7 days for sampling and testing after delivery to the project.
- F. Do not allow the temperature of latex emulsion admixture to fall below 35°F (2°C) at any time or exceed 85°F (29°C) after delivery to the project.

G. For latex emulsion that has been in storage, use a transfer pump and lines to recirculate it before using.

H. Latex Modified Concrete – Use a workable mixture that meets the following requirements:

Cement Content, lbs/yd ³ (kg/m ³)	658 (390)
Latex Emulsion Admixture, gal/yd ³ (liters/m ³)	24.5 (121)
Air Content of Plastic Mix, %	3.5 - 6.5
Slump, inches (mm)	3 – 6 (75 – 150)
% Fine Aggregate as percent of total aggregate by weight	50 - 55
Minimum 7 day compressive strength, psi (MPa)	3000 (20.7)
Water-Cement Ratio by weight, maximum	0.40

Measure the slump 4 to 5 minutes after discharge from the mixer.

Submit the latex modified concrete mix design, completed by the latex emulsion manufacturer, to the Engineer for review.

3.0 EQUIPMENT

Prior to beginning any work, obtain approval for all equipment to be used for deck preparation, mixing, placing, finishing, and curing the latex modified concrete.

Use sandblasting equipment capable of removing all clay, salt deposits, oil and grease deposits and all other foreign matter. Provide traps or separators to remove oil and water from the compressed air. Use traps or separators of adequate size and drain them periodically during operations.

For proportioning and mixing, use a self-propelled, mobile, and continuously mixing equipment that meets the following requirements:

1. Use a self-propelled mixer that is capable of carrying sufficient unmixed dry, bulk cement, sand, coarse aggregate, latex modifier, and water to produce at least 6 yd³ (4.6 m³) of concrete on site.
2. Use a mixer that is capable of positive measurement of cement introduced into the mix. Use a recording meter that is visible at all times and equipped with a ticket printout to indicate the quantity of cement.
3. Calibrate the mixers to accurately proportion the specified mix. Prior to placing latex modified concrete, perform calibration and yield tests under the Engineer's supervision in accordance with the Department's written instructions. Copies of these written instructions are available from the Materials and Tests Unit. Perform the calibration and yield tests using the material to be used on the project. Recalibrate the mixer after any major maintenance operation, on the mixer, anytime the source of materials changes, or as directed. Furnish all materials and equipment necessary to perform the calibrations and yield tests.

4. Use a mixer that controls the flow of water and latex emulsion into the mix. Measure the flow rate of water and the latex emulsion with a calibrated flowmeter coordinated with both the cement and aggregate feeding mechanisms and the mixer. Adjust the flow rate, as necessary, to control the slump and ensure that the water-cement ratios are met. In addition to flowmeters, use mixers with accumulative water and latex meters capable of indicating the number of gallons (liters), to the nearest 0.1 gallon (0.4 liters), introduced into the mixer. Filter water and latex with a suitable mesh filter before it flows through the accumulative water and latex meters.
5. Calibrate the mixer to automatically proportion and blend all components of the indicated composition on a continuous or intermittent basis as the finishing operation requires. Provide a mixer that discharges mixed material through a conventional chute and is capable of spraying water over the placement width as it moves ahead to ensure that the surface to be overlaid is wet prior to receiving the modified material.
6. Mount a tachometer on the unit to indicate the drive shaft speed.

Use adequate hand tools for placing and leveling concrete down to approximately the correct level for striking off with the screed.

Use a finishing machine that meets the approval of the Engineer and the requirements of this Special Provision. Use a self-propelled finishing machine capable of forward and reverse movement under positive control. Use a machine with at least two finishing devices, one that is a vibrating screed and the other either a vibrating screed, oscillating screed, or one or more rotating cylindrical drums 48 inches (1.2 m) long or less and operating between 1500 and 2500 vpm. Make certain the finishing machine can finish the surface to within 1 foot (0.3 m) of the edges of the area being placed. Raise all screeds when the finishing machine is moving backwards over the screeded surface.

Use screeds with a vibration frequency that is variable between 3,000 and 6,000 vpm with positive controls. Use screeds with a metal covered bottom face not less than 4 inches (100 mm) wide. Provide screeds with positive control of the vertical position.

Use supporting rails for travelling of the finishing machine rigid enough to eliminate deflection from the weight of the machine.

4.02.0 PREPARATION OF SURFACE

Completely clean all surfaces within the 48 hours prior to placing the overlay unless otherwise approved.

Thoroughly soak the clean surface for at least 2 hours immediately prior to placing the latex modified concrete. After soaking the surface for at least 2 hours, cover it with a layer of white opaque polyethylene film that is at least 4 mils (0.100 mm) thick. Immediately prior to placing the latex modified concrete, remove standing water from the surface.

5.0 ~~PROPORTIONING AND MIXING OF MODIFIED COMPOSITIONS~~

Meet the following requirements when proportioning and mixing modified materials:

Use mobile continuous mixers that accurately proportion all materials for the specified mixture. Operate the proportioning equipment at the manufacturer's recommended speed verified with the tachometer during calibration and normal operations.

Yield checks and other checks are permitted.

6.03.0 PLACING AND FINISHING

Prior to placing modified material, install a bulkhead of easily compressible material at expansion joints to the required grade and profile. Placing material across expansion joints and sawing it later is not permitted.

Place and fasten screed rails in position to ensure finishing the new surface to the required profile. Do not treat screed rails with parting compound to facilitate their removal.

Separate screed rails and/or construction dams from the newly placed material by passing a pointing trowel along their inside face. Carefully make this trowel cut for the entire depth and length of rails or dams after the modified composition has sufficiently stiffened and cannot flow back.

Brush a latex cement mixture onto the wetted, prepared surface. Carefully give all vertical and horizontal surfaces a thorough, even coating and do not let the brushed material dry before it is covered with the additional material required for the final grade.

Construction joints other than those shown on the plans are not permitted.

When a tight, uniform surface is achieved and before the concrete becomes non-plastic, further finish the surface of the floor by burlap dragging or another acceptable method that produces an acceptable uniform surface texture.

Do not allow more than 15 feet (4.5 m) of exposed latex concrete behind the screed. In the event of a delay of 10 minutes or more, temporarily cover all exposed latex concrete with wet burlap and white opaque polyethylene.

As soon as the surface supports burlap without deformations, cover the surface with a single layer of clean, wet burlap.

Do not place the latex modified concrete before the burlap is saturated and approved by the Engineer. Drain excess water from the wet burlap before placement.

Within 1 hour of covering with wet burlap, place a layer of 4 mil (0.100 mm) white opaque polyethylene film on the wet burlap and cure the surface for 48 hours. Then remove the curing material for an additional 96 hours air cure.

As soon as practical, after the concrete has hardened sufficiently, test the finished surface with an approved rolling straightedge that is designed, constructed, and adjusted so that it will accurately indicate or mark all floor areas which deviate from a plane surface by more than 1/8 inch in 10 feet (3 mm in 3 m). Remove all high areas in the hardened surface in excess of 1/8 inch in 10 feet (3 mm in 3 m) with an approved grinding or cutting machine. Where variations are such that the corrections extend below the limits of the top layer of grout, seal the corrected surface with an approved sealing agent if required by the Engineer. If approved by the Engineer, correct low areas in an acceptable manner.

Unless otherwise indicated on the plans, groove the bridge floor in accordance with Article 420-145(B) of the Standard Specifications.

7.04.0 LIMITATIONS OF OPERATIONS

The mixer is not permitted on the bridge deck unless otherwise approved.

No traffic is permitted on the finished latex modified concrete surface until the total specified curing time is completed and until the concrete reaches the minimum specified compressive strength.

Do not place latex modified concrete if the temperature of the concrete surface on which the overlay is to be placed is below 40°F (4°C) or above 85°F (29°C). Measure the surface temperature by placing a thermometer under the insulation against the surface.

Prior to placing latex modified concrete, the Engineer determines the air temperature and wind speed. Do not place latex modified concrete if the ambient air temperature is below 45°F (7°C) or above 85°F (29°C), or if the wind velocity is in excess of 10 mph (16 km/h). If working at night, provide approved lighting. Provide aggregates for use in the latex modified concrete that are free from ice, frost and frozen particles when introduced into the mixer.

Do not place latex modified concrete when the temperature of the latex modified concrete is below 45°F (7°C) or above 85°F (29°C).

Do not place latex modified concrete if the National Weather Service predicts the air temperature at the site to be below 35°F (2°C) during the next 72 hours. If this predicted air temperature is above 35°F (2°C) but below 50°F (10°C), then use insulation to protect the latex modified concrete for a period of at least 48 hours.

Use insulation that meets the requirements of Subarticle 420-79(C) and, if required, place it on the latex modified concrete as soon as initial set permits.

When using insulation to protect latex modified concrete during the wet curing period, do not remove the insulation until the ambient air temperature is at least 40°F (4°C) and rising. Leave the latex modified concrete uncovered for the 96 hour air curing period.

Assume all risks connected with the placement of latex modified concrete under cold weather conditions referred to above.

Stop all placement operations during periods of precipitation. Take adequate precautions to protect freshly placed latex modified concrete from sudden or unexpected precipitation. Keep an adequate quantity of protective coverings at the worksite to protect the freshly placed pavement from precipitation.

8.05.0 METHOD OF MEASUREMENT

The quantity of “Latex Modified Concrete Overlay” paid for will be the number of cubic yards (cubic meters) of latex modified concrete satisfactorily placed in the completed deck.

The quantity of “Placing and Finishing of Latex Modified Concrete Overlay” will be measured for payment by the number of square yards (square meters) of surface satisfactorily covered.

The quantity of “Grooving Bridge Floors” will be measured for payment by the actual number of square feet (square meters) shown on the plans for “Grooving Bridge Floors”. Where the plans are revised, the quantity to be paid for is the quantity shown on the revised plans.

9.06.0 BASIS OF PAYMENT

The pay item “Latex Modified Concrete Overlay” will be paid for at the contract unit price bid per cubic yard (cubic meter) which price will be full compensation for furnishing all latex modified concrete.

The pay item “Placing and Finishing of Latex Modified Concrete Overlay” will be paid for at the contract unit price bid per square yard (square meter), which price will be full compensation for furnishing all labor, materials, tools, equipment and incidentals required to complete the work in accordance with this Special Provision and applicable parts of the Standard Specifications.

The pay item “Grooving Bridge Floors” will be paid for at the contract unit price per square foot (square meter).