

OFFICE MEMORANDUM



MICHIGAN
DEPARTMENT OF STATE HIGHWAYS

September 9, 1968

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To: L. T. Oehler, Director
Research Laboratory Section

From: A. J. Permoda

Subject: Latex-Cement Coating for Metal (Dow Co. SM-200). Research
Project 66 NM-157. Research Report No. R-682.

The original name of this product was "Surface Modified 1M Coating" before the producer, the Dow Chemical Company, changed it to the above. It is provided in 2 packages, one contains the Portland cement-aggregate mixture, the other contains the synthetic rubber latex. Additional water is not required.

Before receiving authorization to evaluate the product, the Laboratory's appraisal of this coating was presented to New Materials Committee in Research Report R-605 (September 12, 1966). The appraisal stated that the coating had possible potential use over, (a) galvanized beam guard rails since it was somewhat similar to Witcogard (63 NM-90), and (b) bridge structural steel.

It was noted on guard rails in Missaukee County that the coating under field test was subject to damage by snow plows (in which respect it was similar to Witcogard's performance). The Committee, with S. M. Cardone's recommendation, decided at its March 28, 1967 meeting to limit the evaluation to a specialized use; a structural steel coating on beam ends under problem bridge expansion joints.

The bridge selected for the test was S09 of 81103, built in 1962, which carries NB US 23 BR, north of Ann Arbor. This is a three-span structure, with the finger-type expansion joint offset in the center span (Fig. 1). The joint had lower level sliding-plates which were designed to serve as a trough to channel drainage off the beam ends. In use, however, the trough had become filled with debris and allowed some drippage onto the beam ends, deteriorating the paint system and causing premature rusting.

The Maintenance Division removed the trough plates by torch and prepared the beam-end panels for test repainting, up to the first vertical stiffener on either side of the joint, by blast-cleaning. The Dow Chemical Company provided the coating material and personnel for spray application. All steel was primed with straight latex after sandblasting to prevent rust-back before final coating, done in one application. The latex-cement coating, provided in two packages, was mixed in a concrete mixer and supplied in small batches to the hopper of the plaster-type spray gun. Subject coating was supplied in the natural grey cement color, reasonably matching the Aluminum topcoat on the rest

of the bridge steel. To make the spot repainting less noticeable, the outside of the fascia beams were not test recoated. Except for above, the six bridge beams plus connecting diaphragms were recoated, totaling about 1200 sq ft of surface. In addition to above coating, a latex putty was placed into cavities below the fingers of the expansion dam. The test work was done between mid-August and mid-September 1967, when weather permitted. After completion, the work and appearance were rated as very satisfactory.

Test Results

After an over-winter of service exposure, the test coating was inspected on May 24, 1968 by Messrs. E. C. Caldwell, L. C. Wheeler and N. Foor of the Dow Company and S. M. Cardone and A. J. Permoda of the Department.

They found that an estimated 10-20 percent of the 1/16- to 1/8-in. thick coating had blistered or delaminated from the steel (Fig. 2). A probable cause for the failure was that the coating, as applied by the test spray apparatus, is porous and permeable to water which causes saturation and expansion of the coating, plus undercutting; as subsequently verified by a laboratory test on the removed coating.

Recommendation

The subject coating, as applied by spray gun, has not performed satisfactorily after a severe exposure on bridge beam ends under an expansion joint, since more than 10 percent had failed after eight months of service. Other, future inspections will be made for information purposes. Besides, the performance of subject coating in a less severe exposure can be followed by inspection of a Muskegon County bridge, whose beams were repainted in 1967.

In the meantime, we feel the subject coating, in its current stage of development, does not merit additional field testing on structural steel.

TESTING AND RESEARCH DIVISION



A. J. Permoda, Supervisor
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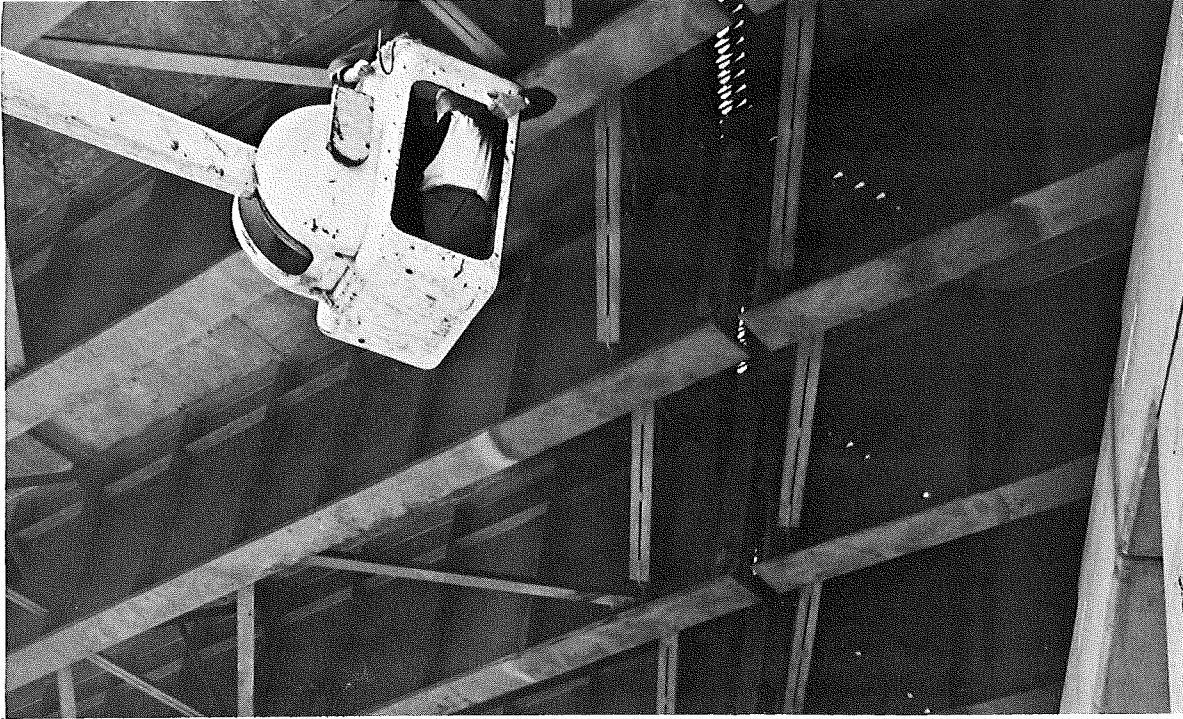


Figure 1. Beam panels on either side of bridge joint that were used in field test. Juncture of coatings is visible on bottom flanges. The boom was used for application on some areas, and for inspection.



Figure 2. Delamination of coating on bottom flange and blistering on beam web after 8 months of service, on test bridge.