

OFFICE MEMORANDUM

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MICHIGAN

STATE HIGHWAY DEPARTMENT

JOHN C. MACKIE, COMMISSIONER

September 22, 1964

To: E. A. Finney, Director
Research Laboratory Division

From: F. J. Bashore
R. H. Merrill

Subject: Test Application and First Inspection of Koppers Concrete Sealer on Northbound I 496 over the GTW RR (X06 of 33045). Research Project 63 NM-92. Research Report R-477.

At its March 5, 1963 meeting, the Committee for Investigation of New Materials recommended a test application of Koppers Concrete Sealer on a bridge deck to determine its ability to seal the concrete against water and brine, thereby reducing the deterioration of new concrete. The Research Laboratory Division was to review this with the Bridge Construction Division, to locate a test structure, and arrange for the application.

The Concrete Sealer is a special blend of tar and solvents which upon application will penetrate and seal the concrete surface. The Pennsylvania Department of Highways has been using this material since 1957, and according to a 1963 inspection report by E. W. McGovern the Concrete Sealer resisted the harmful effects of salt and calcium chloride over periods of one to four winters. The Concrete Sealer is made and supplied by the Koppers Company, Inc. of Pittsburgh, Pa., and for this initial field exposure was applied without charge by Koppers Chicago office, under J. F. Duffy.

The I 496 bridge was selected because of its close proximity to the Laboratory and the newness of the concrete (poured August 27-28, 1963). The original plan was to seal the structure carrying I 496 over Mt. Hope Ave. in Lansing, but the contractor used a sprayed white membrane curing material which was thought would prohibit penetration of the Concrete Sealer. The bridge eventually used was cured with wet burlap.

The south span of the railroad overpass bridge, 43 ft wide by 56.5 ft long, was sealed November 27, 1963, following thorough brooming to remove accumulated construction dirt. A 3-gal hand spray tank was tried, for sealer application, but found to be too slow, and consequently the sealer was poured on the deck in small amounts and spread at the specified thickness by brooming (Fig. 1). The area sealed, including the curb faces, was about 275 sq yd and the amount of sealer used was about 25 gal. This produced

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a coverage of about 0.091 gal per sq yd, which should be adequate although specifications call for 0.1 gal per sq yd for new concrete. Due to the cold concrete and air temperatures the sealer was heated to about 150 F before application to hasten its penetration into the concrete (Fig. 2). Even then, an inspection five days after the application showed wet areas along the curbs and construction joints. Air temperatures for the curing period ranged from slightly below freezing at night to a high of about 60 F during the day. This condition could be the cause of the slow curing rate. After five days of curing the bridge was opened to construction traffic on December 2, 1963.

The bridge was inspected by the writers on June 30, 1964, to evaluate the Concrete Sealer after one winter's exposure. No scaling or cracking could be found to indicate any failure of the seal coat. High areas, especially in the passing and turning lanes, had been scraped by snowplows leaving bare concrete exposed (Fig. 3). The traffic lane had only a few, small scraped areas. Although there appeared to be no seal on these areas, no deterioration of the concrete was noticeable. It is possible that the pores of the concrete are still sealed in the scraped areas. The center span, left uncoated as a control, was found to be in equally good condition with only light pitting along the east gutter. This probably is due to only moderate applications of deicing chemicals having been required this past winter and to good general air entrainment in the deck concrete.

It is still too early for complete evaluation of performance of this coating. Continuing annual inspections will be made to determine its merits after additional service and under heavier salt applications.

OFFICE OF TESTING AND RESEARCH

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Figure 1. Broom application of Koppers concrete sealer (south span).

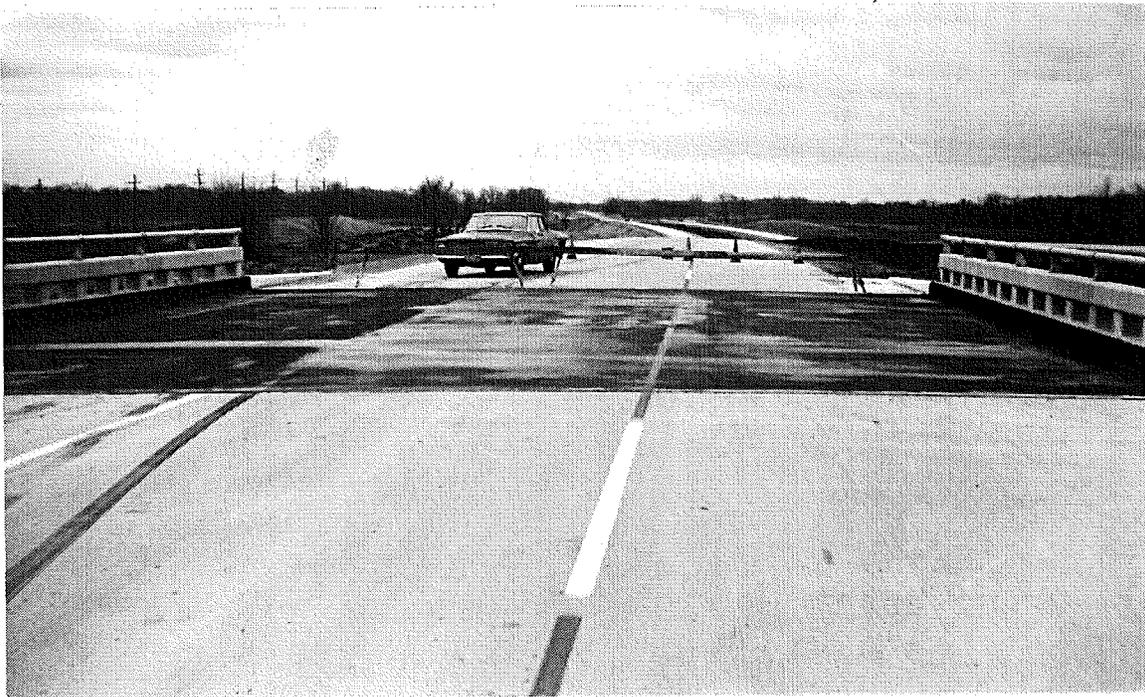


Figure 2. Wet surface (dark areas) in sealer after 24 hr (looking south on I 496).

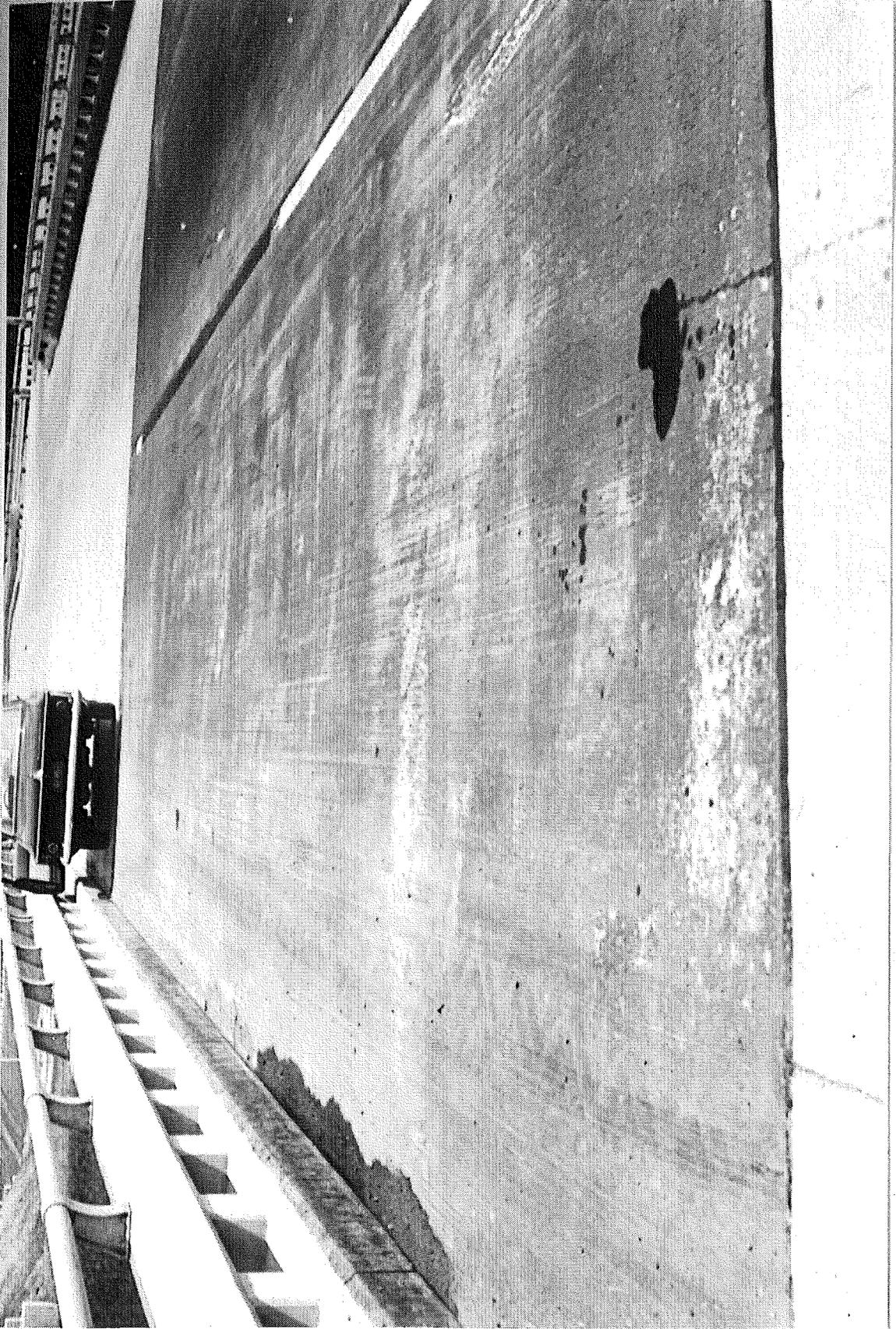


Figure 3. General view of sealed northbound passing lane showing scraped areas after six month's service.