



OFFICE MEMORANDUM

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DATE: December 5, 1978

TO: K. A. Allemeier
Engineer of Testing and Research

FROM: M. G. Brown

SUBJECT: Inspection of Low Slump and Latex Modified Overlays on I 94 in the Detroit Area. Research Projects 57 B-39 and 75 B-93, Research Report No. R-1103.

The following is a summary of a field inspection of a selected number of bridge deck overlay projects made on November 9, 1978, by D. L. Wickham and myself. This was per your request following reports that some of the low-slump high-density (LSHD) overlays recently finished by Denton Construction Co. on I 94 east of Detroit Metro Airport were coming loose, and that some failures had occurred in the 1972 latex concrete overlay on I 94 over the DeQuindre railroad yard (X01 of 82024).

The Denton Co. contract (I 82022-10943A) involved the use of LSHD concrete overlays on seven individual decks on I 94 in 1977 and 1978. The outer halves of these decks were done in October 1977, and the inner halves were finished in May 1978. These structures are as follows:

S04 of 82022	EB and WB I 94 over Merriman Rd
S05 of 82022	EB I 94 over Middlebelt Rd
S07 of 82022	EB I 94 over Inkster Rd
S08 of 82022	WB I 94 over Inkster Rd
S10 of 82022	WB I 94 over Ecorse Rd
S11 of 82022	EB I 94 over Beech-Daly Rd

We also inspected seven older latex mortar or latex concrete overlaid decks done in 1970 through 1976 which were in the same vicinity as the seven LSHD decks listed above. The latex overlaid decks are as follows:

X01 of 82022	EB I 94 over C&O RR (1976, latex concrete)
*X02 of 82022	WB I 94 over C&O RR (1970, latex mortar)
*S02 of 82022	EB I 94 over Wayne Rd (1972, latex mortar)
S03 of 82022	WB I 94 over Wayne Rd (1976, latex concrete)

* These two structures were patched in 1976 in selected areas with latex concrete mix under a repair contract. X01 and S03 originally done in 1970 were completely redone under the same contract.

S06 of 82022	WB I 94 over Middlebelt Rd (1971, latex mortar)
S09 of 82022	EB I 94 over Ecorse Rd (1972, latex mortar)
S12 of 82022	WB I 94 over Beech-Daly Rd (1972, latex mortar)

It became evident to us that the LSHD overlays recently completed on all seven decks done by Denton were in good condition and showed no evidence of delamination. However, we did see some occasional fine cracking, both longitudinal and transverse, in the outer 1977 pours on all seven structures. These cracks may have developed from incipient cracks formed in the first 24 hours of curing due to heavy traffic vibration on the inside lanes. We did not see any similar cracking in the May 1978 (inner) pours, although non-visible incipient cracks may be there. Some of the adjacent decks, especially S06, S09, and S12 which were overlain with 3/4 to 1 in. of latex mortar in 1971-72 may be the reason for the report that the new LSHD overlays were coming off. A number of areas on S06 and S09 have been patched by Wayne County forces and there are some additional spots that are in need of repair. Many of these early 1970-72 projects were done with a thin, 3/4 to 1 in. latex mortar and have developed many areas of cracking and bond loss due, in many cases, to insufficient increased cover over the steel.

The balance of our inspection trip was spent in making a cursory examination of all 36 spans (2,316 ft) of both the eastbound and westbound roadways of X01 of 82024 on I 94 just east of I 75. This entire structure was resurfaced with a minimum 1-1/4-in. latex modified concrete in 1972. This is rather thin (we now call for 1-1/2 in. minimum) and we know from project records that problems were encountered in areas where grade and crown adjustments had to be made. Some earlier overlay failure had been noted in February and October 1975, at the east end in span 36 where the overlay had to be tapered down to meet the pavement grade. This tapering for grade adjustment should be done off the end of the deck according to current practice, to assure adequate cover over the steel in spans 1 and 36. Our current inspection noted some concrete patching had been done by Wayne County since 1975 in both the eastbound and westbound lanes in span 36 but some additional overlay loss has developed; this is also true at the west end in span 1. A few other concrete patches were also noted in some of the easterly spans in both roadways with some additional areas of failure developing adjacent to them. These areas were primarily located in spans 24 through 36 on the eastbound roadways and spans 18 to 22 and 28 to 36 on the westbound roadway. Both transverse and longitudinal cracking was more extensive in these spans and in the areas of overlay loss. This overlay loss does not appear to be too extensive at this time, but is scattered over the above mentioned spans and four lanes in each direction. We would roughly estimate that 2 to 4 percent of the deck surface is in need of repair.

In summary, we believe that a latex concrete patching contract should be let next year to replace all loose overlay areas before the problem becomes more extensive. The latex concrete patching we observed on X02 and S02 of 82022 done in 1976 looks good, even though it was done under heavy traffic. We would strongly recommend that the current latex overlay contract on S26, S27, and S30 of 82251 scheduled for

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a January 1979 letting be delayed until about June so that the needed repair on X01 of 82024 could be done at the same time. These ramp structures are immediately west of X01 of 82024 and should be coordinated for traffic control. This would allow time for a complete delamination survey on X01 which would be required to define actual overlay areas for removal and patching with latex concrete. This survey could probably not be done until next spring when deck temperatures could be assured of being greater than 35 F necessary for this work. Our field sketches of November 9 are available to assist in planning this proposed spring survey.

TESTING AND RESEARCH DIVISION



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