



## OFFICE MEMORANDUM

DATE: February 19, 1981

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

FROM: L. T. Oehler

SUBJECT: Final Report of Research Project 75 E-55, "Evaluation of Cold-Mix Emulsion Black Base at the Secondary Complex," Research Report No. R-1160.

This memorandum is the final report for Research Project 75 E-55, "Evaluation of Cold-Mix Emulsion Black Base at the Secondary Complex." This was an FHWA Category 2 experimental project whose purpose was to evaluate an emulsified asphalt cold-mix black base, in accordance with Work Plan No. 44.

The experimental work was included as part of Construction Project RF 23012-03635A, located at the intersection of US 27 and Canal Rd, southwest of Lansing. An MS-2S emulsion was used in the experimental cold-mix bituminous base course. The remaining base of the construction project was treated with a hot-mix penetration grade bitumen, as conventionally used by the Department. This afforded a means for comparing the handling, construction and performance of cold-mix base relative to conventional black base. The project was completed in 1976 and a construction report "Construction of Cold-Mix Black Base" (MDOT Research Report No. R-1044) was prepared. J. H. DeFoe was the research project leader for this work.

As described in the construction report, serious problems were encountered with the cold-mix base material. It was virtually impossible to dry the mixture to a point where adequate stability could be obtained. Compaction was extremely difficult and large areas cracked and rutted under construction traffic loads. After continued aeration failed to improve the mixture, alternate procedures were involved which, in effect, negated the value of the project for further research study. The first effort to improve the base involved mixing 2 percent portland cement (based on the weight of the asphalt treated aggregate) into the entire experimental base. This resulted in some improvement but certain areas continued to be soft and cracked. After several weeks about one-half of the test section was removed and replaced with conventional hot-mixed bituminous material. After completion of the modified construction the bituminous concrete leveling and wearing surfaces were placed. The test area has performed satisfactorily during the four years it has been in place.

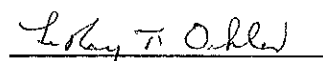
The basic conclusions reached during this study are:

- 1) There were no problems with preparing and stockpiling the asphalt emulsion mixture.
- 2) Moisture content of the emulsion mixture could not be controlled by normal construction methods. Excess moisture could not be removed effectively by manipulation and aeration, nor could the addition of portland cement provide effective stability for about half of the area.
- 3) The cement-emulsion mixture has performed satisfactorily since final construction.
- 4) Replacement and addition of portland cement added \$44,301 to the cost of the test area which, initially, involved 4,500 tons of cold-mix black base material.

The problems encountered during this project should not represent a condemnation of asphalt emulsion for other highway uses. Emulsions have been used throughout the State for prime, bond, and sealcoat applications. Impending Federal regulations prohibiting the use of cutbacks for highway construction might cause an increase in the use of emulsions for the above applications. However, Departmental use of cutbacks has been small. According to asphalt usage data only 3.5 percent of the asphaltic materials used by the Department in 1979 were in the form of cutbacks.

This project demonstrates that cold-mix emulsion black base is a very sensitive material to work with. Before any kind of practical use is possible a great deal of development work is obviously necessary. Seasonality, rainy weather and progress schedules are seen as unsolvable restrictions on the general use of cold emulsion black base.

TESTING AND RESEARCH DIVISION

  
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