

BULKHEAD JOINTS FOR CONCRETE BASE SHOULDERS**Progress Report****C. J. Arnold
M. A. Chiunti****Research Laboratory Section
Testing and Research Division
Research Project 70 F-117
Research Report No. R-908
Work Plan No. 11****Michigan State Highway and Transportation Commission
E. V. Erickson, Chairman; Charles H. Hewitt,
Vice-Chairman, Carl V. Pellonpaa, Peter B. Fletcher
John P. Woodford, Director
Lansing, March 1974**

This yearly progress report covers the performance to date of experimental bulkhead joints for concrete base shoulders installed on I 94 at the LaPorte Rd interchange near New Buffalo and at the "On" and "Off" ramps of the nearby rest area. Details of construction, instrumentation, measurements and initial evaluations were described in Research Report R-857, issued in April 1973. The FHWA requires yearly reporting on "Category 2" projects. This brief summary will serve that purpose for the subject project, since final conclusions are not drawn as yet.

The most recent survey was performed in March 1974. Results of this survey along with those obtained in March 1973 are shown in Table 1.

TABLE 1
SUMMARY OF RAMP DATA

Ramp Designation	Hook Bolts	Average Joint Openings		Vertical Displacement
		1973	1974	
A	No	0	0.02	None
B	No	0.08	0.13	None
C	Yes	0.01	0.02	None
E	Yes	0	0.01	None
F	No	0.01	0.04	None
Rest Area* "On" Ramp	Yes	0.01	0.02	None*
Rest Area "Off" Ramp	Yes	0.01	0.02	None

* Average joint openings and displacement shown are with the initial three reference points deleted. Evidence shows that lane ties inadvertently may have been omitted in this area. See explanation below.

None of the shoulders show any vertical displacement at this time. During the 1973 survey, one location in the rest area "On" ramp was observed as showing a 1/4 in. difference in elevation. This measurement was located in the transition area from conventional to concrete base shoulders and the question arises as to whether the lane ties may have been inadvertently omitted at the time of construction. The 1974 survey showed this location to be in the same relative position as one year ago, that is, with the shoulder approximately 1/4 in. higher in elevation than originally constructed.

As was stated in the 1973 report, "It appears that once an opening is established, penetration of water into the base along with freeze-thaw cycles contribute to further opening of the joint." This statement was made in reference to ramp "B" which has been in service one year longer than the other instrumented ramps. The measurements obtained this year indicate that sufficient openings to allow water penetration may have been established at the remaining untied ramps, namely "A" and "F." Subsequent surveys should verify this assumption.

Ramp "B" shows a maximum opening of 0.304 in. Bulkhead joint openings for the other ramps range from zero to 0.146 in. and from zero to 0.079 in. for untied and tied shoulder base, respectively.

Observations on concrete base course with and without lane ties in the I 94 - I 69 interchange, show similar results, with the bulkhead joints spreading open where lane ties were omitted. Although little vertical movement of the shoulder has been recorded on the experimental sections; the use of lane ties appears to be worthwhile in maintaining tight bulkhead joints.

Performance data will continue to be collected and maintained by the Research Laboratory. Progress reports will be issued on approximately a yearly basis.