

MICHIGAN
STATE HIGHWAY DEPARTMENT
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EXPERIMENTAL INSTALLATION OF STYROFOAM AND CORRUGATED PAPER
BOARD TO FORM A CONTRACTION JOINT GROOVE

PRIOR TO SAWING

Construction Project 38-7, C5

Conducted by Construction Division
Reported by Research Laboratory

Highway Research Project 51 F-21(1)
Sawed Joints on Concrete Pavement

Research Laboratory
Testing and Research Division
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EXPERIMENTAL INSTALLATION OF STYROFOAM AND CORRUGATED PAPER
BOARD TO FORM A CONTRACTION JOINT GROOVE
PRIOR TO SAWING

On August 18, 1955 several experimental joints were installed by the Construction Division on Construction Project 38-7, C5 on the new section of US-127 between M-50 and US-112 south of Jackson. The joints were installed between Stations 546+45 to 653+97. Nine transverse contraction joints were grooved by molding 1/2 by 2 inch strips of Styrofoam into the fresh concrete and eight joints by molding 1/2 by 2 inch two-ply strips of corrugated cardboard paper into the concrete. These materials were left in place until the concrete hardened.

The object of this experiment was to find a method whereby the sawing of transverse contraction joints could be accomplished without the usual procedure of sawing the concrete just as soon as it has reached the proper degree of hardness. In this experiment it was attempted to create a plane of weakness in the pavement at the desired location by the insertion of a temporary filler material. The filler material would be removed eventually by a concrete saw, thus forming the finished joint groove to be sealed with hot poured sealing material under normal procedure.

This experiment was followed by the Research Laboratory and the condition of the joints before and after removal of the filler materials were observed. The installation of the filler materials are shown in Figure 1 to 10 inclusive.

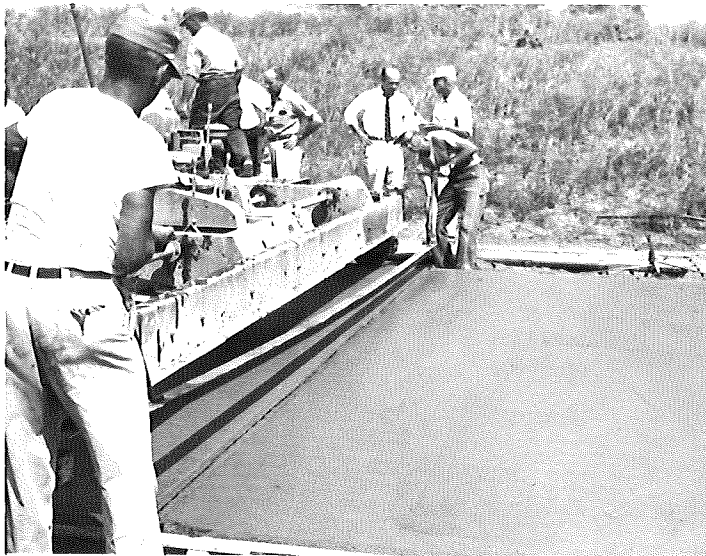
On August 31, experiments were carried out to determine the best way to remove the materials. It was noted that several of the joints contained a

spall averaging about six inches in length and one inch in width. Typical spalls are shown in Figure 11 and a joint with no spalls in Figure 12. The condition of each joint is listed in Table 1 (page 7). It can be seen that spalling was more frequent in the paper joints than in the Styrofoam joints.

Attempts to remove both Styrofoam and paper by means of a mechanical saw equipped with carborundum blades were not successful. The saw not only left a considerable amount of material in each joint, Figure 13, but was very difficult to guide in the joint groove without binding. From 5 to 15 minutes was consumed in sawing each joint and then the remaining material had to be removed with hand tools. The saw did leave clean joint faces to which joint seal should readily adhere.

A few joints were then cleaned of Styrofoam and paper by the use of hand tools alone, Figure 14. The Styrofoam was removed easily and completely in this manner. The paper could be removed completely with hand tools but with much more difficulty.

It was the consensus of those present during these experiments that the use of Styrofoam and its removal with hand tools looked the most promising for this type of joint construction. Sandblasting before sealing would probably then be necessary for good adhesion of joint seal.



▲ FIGURE 1. T-IRON USED TO GROOVE PAVEMENT SURFACE.



▲ FIGURE 2. GROOVE READY TO RECEIVE FILLER MATERIAL.



▲ FIGURE 3. INSERTING STYROFOAM FILLER.



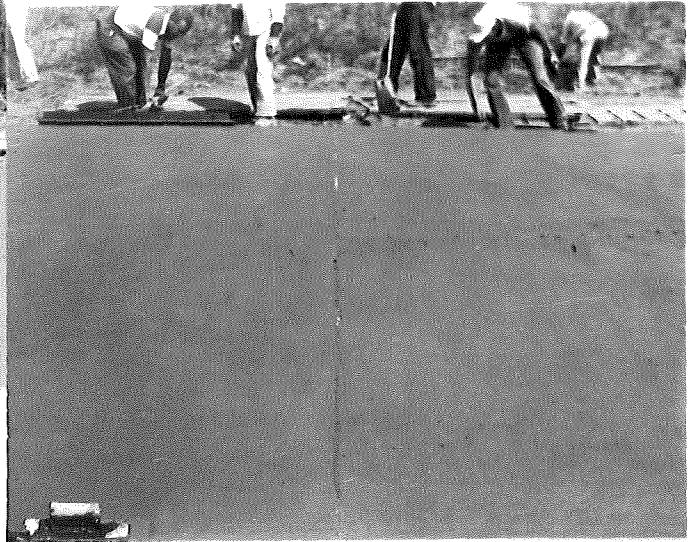
▲ FIGURE 4. INSERTING STYROFOAM FILLER.



◀ FIGURE 5. COMPLETED JOINT WITH STYROFOAM.



▲ FIGURE 6. FLOATING AND STRAIGHT-EDGING CONCRETE AT STYROFOAM JOINT.



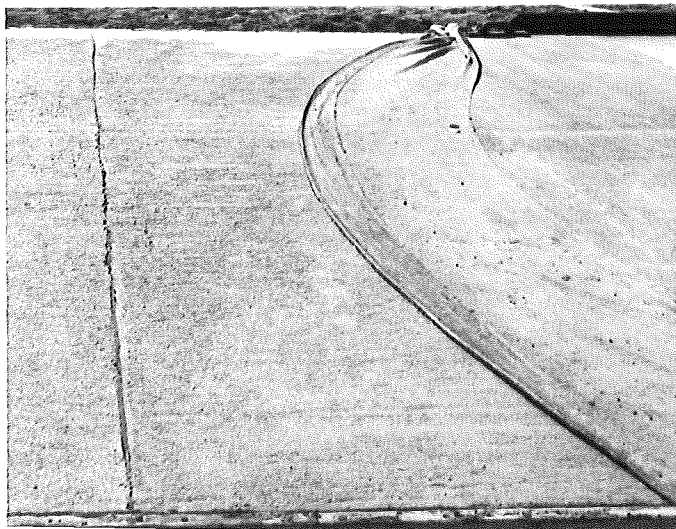
▲ FIGURE 7. COMPLETED JOINT WITH STYROFOAM.



▲ FIGURE 8. INSERTING CORRUGATED PAPER BOARD.



▲ FIGURE 9. COMPLETED INSTALLATION OF CORRUGATED PAPER BOARD.



▲ FIGURE 10. COMPLETED JOINT WITH CORRUGATED PAPER BOARD.

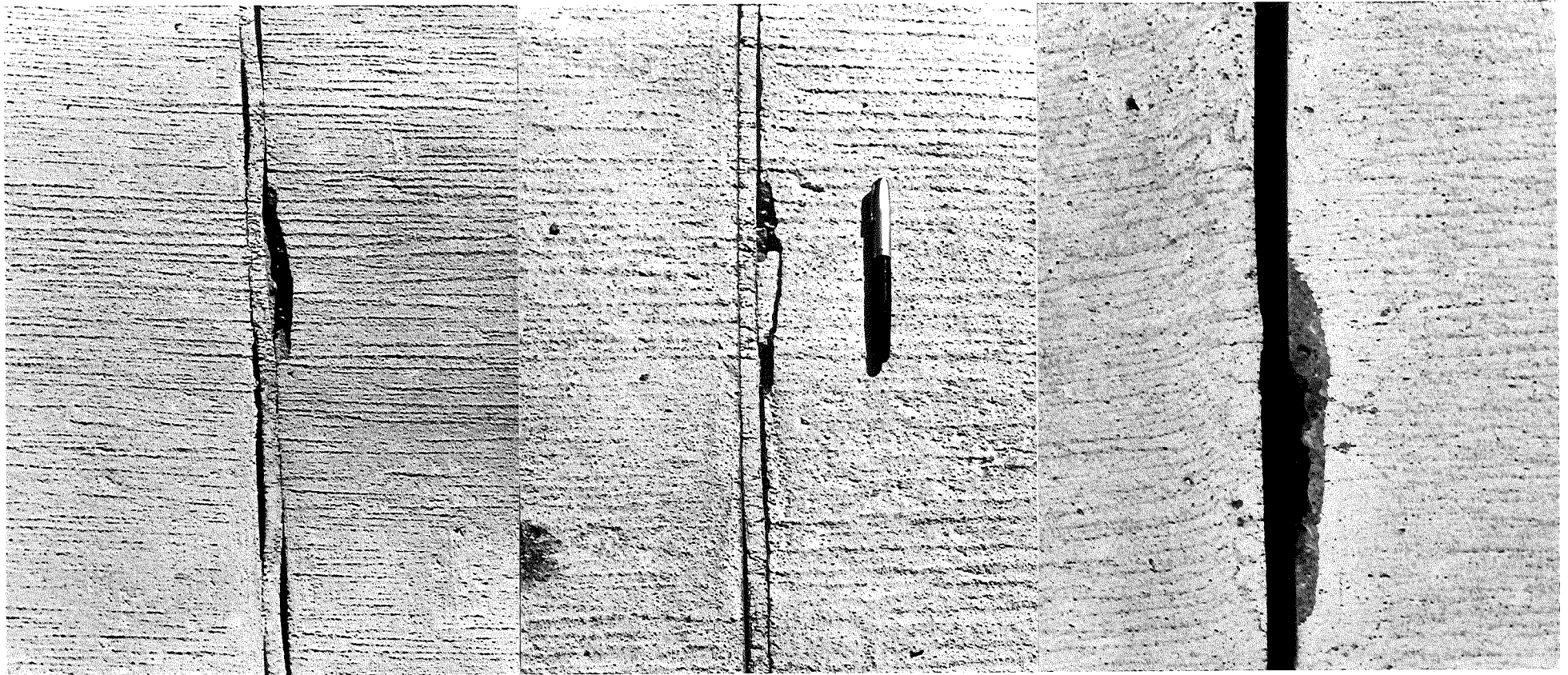
TABLE 1

Location and Condition of Styrofoam and Paper Joints.

<u>Station</u>	<u>Type</u>	<u>No. of Spalls</u>
546 + 45	Paper	0
547 + 45	Styrofoam	1
548 + 45	Paper	1
549 + 45	Styrofoam	0
550 + 41	Paper	0
551 + 40	Styrofoam	1
553 + 12	Paper	1
554 + 06	Styrofoam	0
555 + 07	Paper	1
556 + 07	Styrofoam	0
558 + 08	Styrofoam	0
559 + 07	Paper	1
560 + 04	Styrofoam	0
561 + 03	Paper	1
561 + 87	Styrofoam	0
562 + 96	Paper	1
563 + 97	Styrofoam	1

Summary

	<u>No. of Joints</u>	<u>No. of Joints with Spall</u>	<u>Percent of Joints with Spall</u>
Styrofoam	9	3	33-1/3%
Paper	8	6	75 %

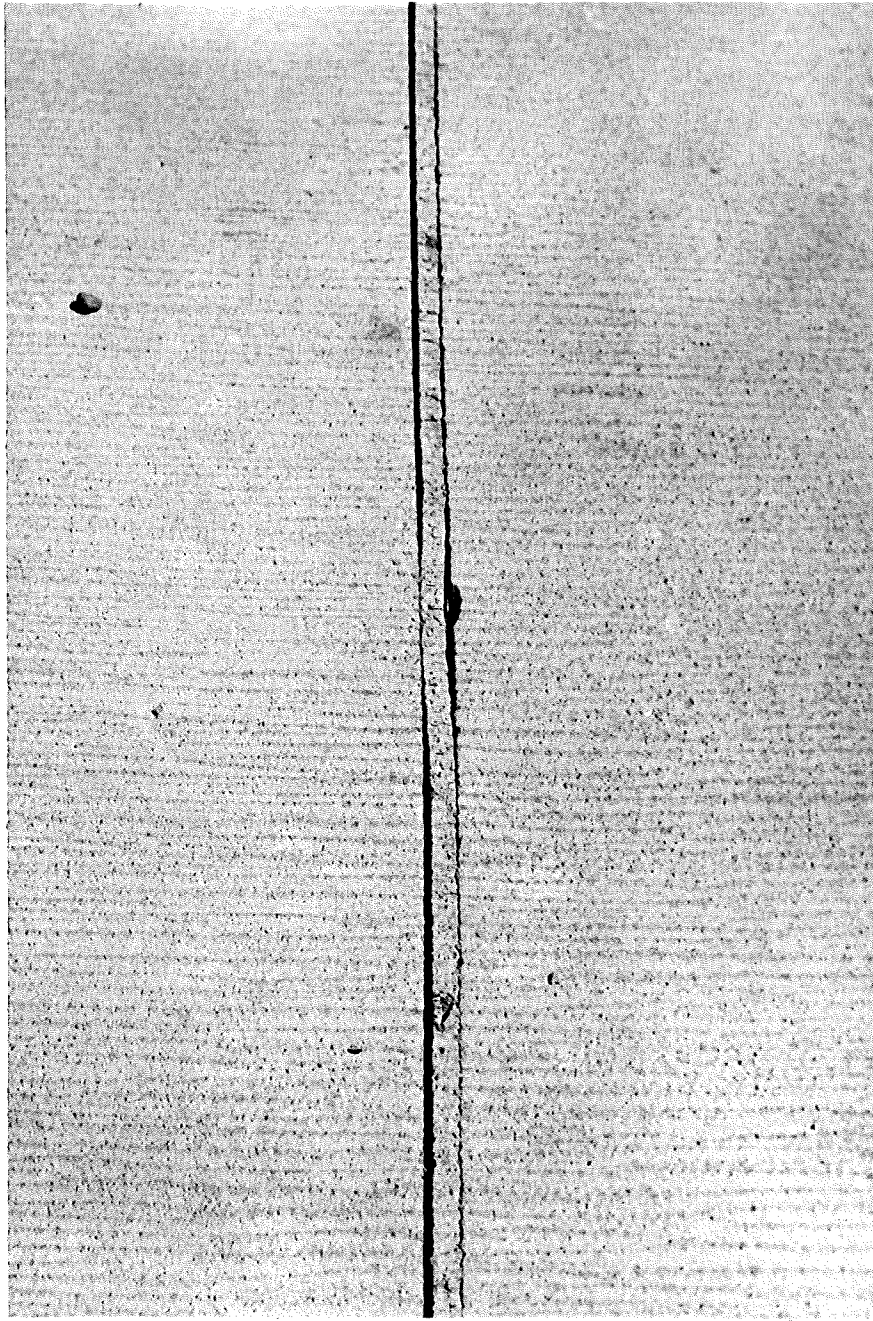


(A) STATION 547+45 STYROFOAM.

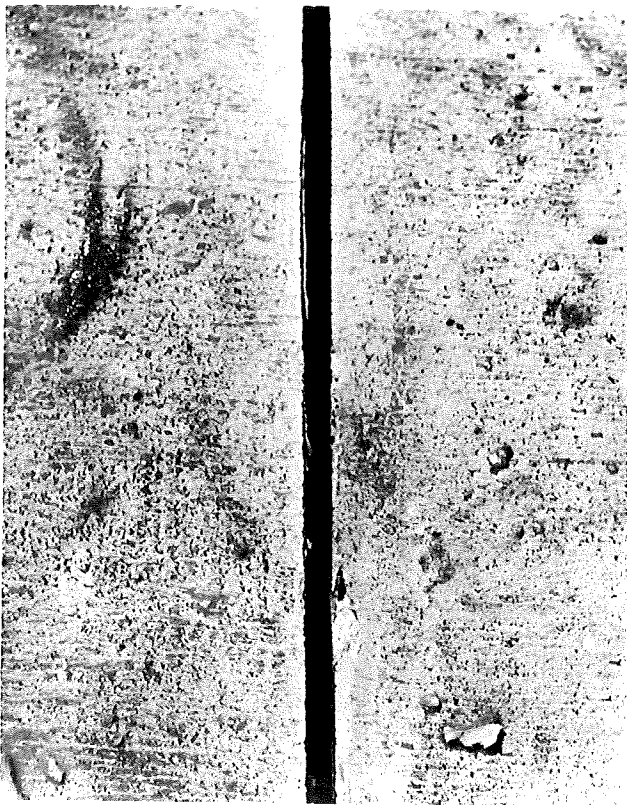
(B) STATION 551+40 STYROFOAM.

(C) STATION 555+07 PAPER.
THIS SPALL GOES TO BOTTOM
OF JOINT GROOVE

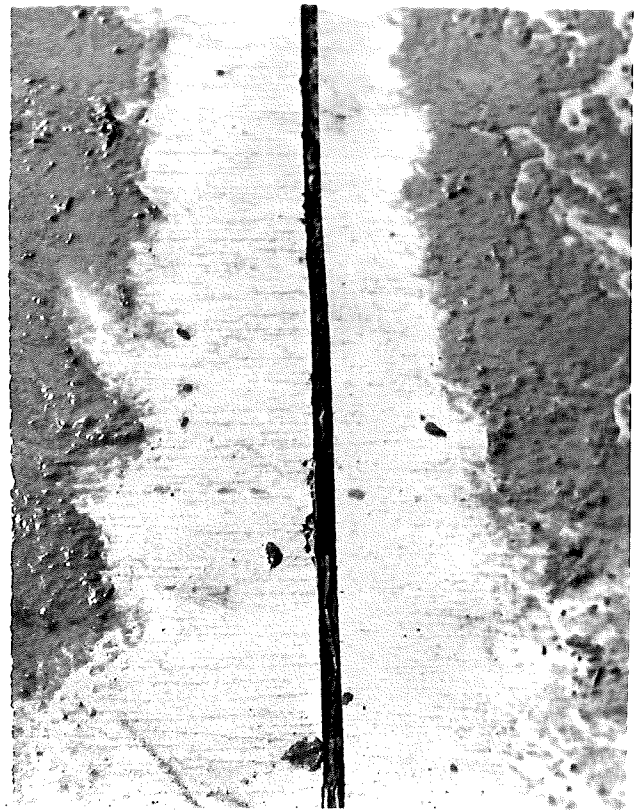
FIGURE II. TYPICAL SPALLS IN STYROFOAM AND PAPER JOINTS



▲ FIGURE 12. STATION 556 + 07 - TYPICAL STYROFOAM
JOINT CONTAINING NO SPALLS.



(A) STATION 547+45 STYROFOAM

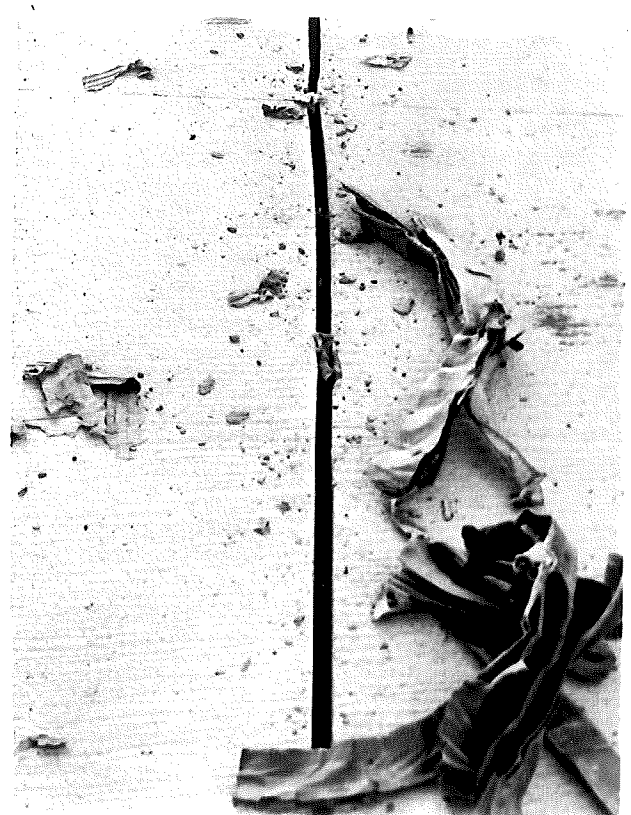


(B) STATION 548+45 PAPER

FIGURE 13. STYROFOAM AND PAPER REMAINING IN JOINTS AFTER ROUTING WITH CARBORUNDUM.



(A) STATION 549+45 STYROFOAM



(B) STATION 553+12 PAPER

FIGURE 14. JOINTS FROM WHICH STYROFOAM AND PAPER WERE REMOVED WITH HAND TOOLS.