OFFICE MEMORANDUM

MICHIGAN
DEPARTMENT OF STATE HIGHWAYS

October 23, 1969

To: R. L. Greenman, Engineer of Testing & Research
Testing and Research Division

From: L. T. Oehler

Subject: Joint Load Transfer Test Road to Evaluate Acme Load Transfer Assemblies, Plastic Coated Dowels, and End-of-Pour Construction Joint Assemblies. Research Projects 67 F-95 and 68 F-104. Research Report No. R-718.

Objective No. 2 of the project's Work Plan was to determine the feasibility of using a new type of assembly in the end-of-pour joints. This memorandum reports the results of observations made during installation of this type of assembly while constructing the pavement. Construction of the subject test road Michigan Project S 262(10), State Project SS 76011, 009, Part 1, was completed in August, 1969. A complete report covering construction of the entire test pavement and initial measurements will be issued later.

Since 1960 the dowels used in end-of-pour joints have consisted of a 3-piece unit as shown in Figure 1. The 7-1/2 in. dowel was screwed into one end of

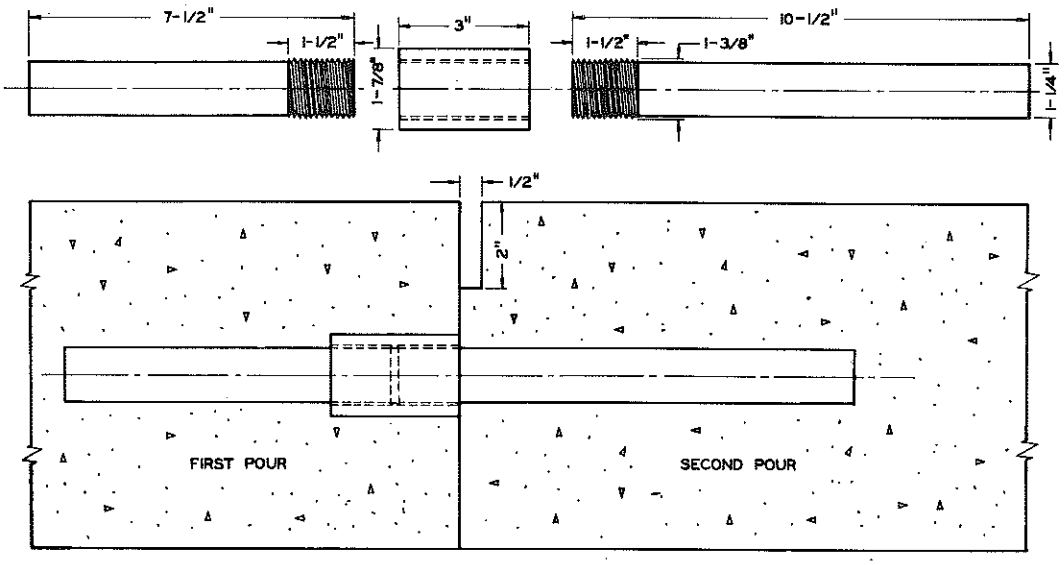

Figure 1. Details of currently used dowel units in end-of-pour joints.

the sleeve and both pieces installed in the first pour. When paving resumed, the 10-1/2 in. dowel was screwed into the sleeve and encased in the concrete of the second pour.

The dowels in the first pour were held in position by bolting to the bulkhead through slots or holes. Therefore, any movement of the bulkhead during concrete pouring and finishing operations would cause misalignment of the dowels. The assembly developed for the test pavement supports the dowels independently, thereby minimizing misalignment caused by movement of the bulkhead during concrete placement.

The assembly side frames were made in the same manner and of the same wire sizes as regular contraction and expansion joint assemblies. The dowel units were to conform to dimensions shown in Figure 1. However, because of the difficulty in making 1-3/8 in. diameter rolled threads on a 1-1/4 in. bar, the dowels were 1-3/8-in. diameter with machined threads. Also, the sleeves were hex-shaped instead of round. The 7-1/2 in. long dowels were welded to one side frame and the other side frame was clipped onto the 10-1/2 in. dowels. Figure 2 shows a complete assembly and Figure 3 shows the wire clips to be used to clip on the one side frame.

The end-of-pour load transfer assembly is intended to be used only when the second pour is placed more than seven days after the first pour. After the first pour has attained sufficient strength to remove the bulkhead, the clipped-on side and protruding dowels are also to be removed. When paving resumes the dowels are screwed into the sleeves in the first pour and coated to prevent the concrete from bonding to them.

To gain experience with the use of the assemblies the contractor was required to install an end-of-pour assembly at each transverse construction joint in the subject test pavement. Since the second pour generally was placed the following day the side frame and protruding dowels were left in place.

A total of eight joints were constructed using the end-of-pour assembly. The locations of these joints are: Sta. 436+98, 453+34, 464+97, 492+98, 546+00, 557+59, 568+78, and 586+89.

The procedure used in constructing the end-of-pour joints was as follows:

1. The assembly was placed at the desired location and aligned to proper position.

2. A slotted steel bulkhead was inserted through the assembly and staked to the subbase. The top elevation of the bulkhead was about 2 in. below the surface of the finished pavement to allow the paving equipment to pass over it.

3. After the concrete was poured and finished by the mechanical equipment the bulkhead was raised manually to within approximately 1/2 in. of the pavement surface. Pieces of 1/4 by 2 in. premolded filler were inserted behind the bulkhead and the joint edge finished to the required shape and elevation by hand.

4. Before placing the second pour the bulkhead and filler strips were removed and the protruding dowels coated with the debonding agent. As previously mentioned, the removeable side frame was generally left in place.

5. The joint groove was sawed and sealed in the same manner as the regular joints.

Unfortunately, personnel directly involved with the actual installation of the assemblies were not aware that the removable side frame was to be clipped onto the dowels. Thus the rigidity of the assemblies was impaired and some difficulty was experienced in obtaining satisfactory alignment of the dowels. However, in all but one instance (Sta. 568+78), inspection of the second pour side of the assemblies showed the dowels to be in good alignment. The misalignment noticed at Sta. 568+78 was minor and joint width measurements indicate that the joint is moving properly.

On the basis of the observations made during the construction of end-of-pour joints on this project it is concluded that the use of this type of assembly is feasible. It appears that by aligning and supporting the dowels independently of the bulkhead the overall quality of this type of joint will be improved.

It is recommended that the end-of-pour assembly be approved for use in transverse end-of-pour joints. If desirable from a construction point of view, dowels with 1-1/4-in. diameter threads would be satisfactory instead of the 1-3/8 in. diameter dowels furnished on this project.

TESTING AND RESEARCH DIVISION

L. Ray T. Oakley

Engineer of Research
Research Laboratory Section

LTO:JES:sjt

Figure 2. End-of-pour load transfer assembly.

Figure 3. Removable side frame wire clipped to dowels.