An Installation of an Experimental Joint for Concrete Pavements

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on

AN INSTALLATION OF AN EXPERIMENTAL
JOINT FOR CONCRETE PAVEMENTS

by

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INTRODUCTION

The experimental joint described in this paper involves the use of a new type load transfer set-up which was developed by the Oxford Manufacturing Company, Oxford, Indiana, and produced by the Reynolds Metals Company. The producers designed this apparatus on the assumption that the present joints used in concrete pavement construction are not adequate. For example, from the standpoint of load bearing, the dowel bars which theoretically carry the load from one slab to the other are not sufficient in that the very shape of the bars (circular) allows only a limited bearing surface. In order to eliminate the rusting which often renders the dowel bars useless, this apparatus is made of aluminum. Two of these experimental joints were laid early last fall in Paducah, Kentucky, under the supervision of the Division of Construction.

MATERIAL

The section is manufactured of aluminum by an extrusion process, the vertical member is 3-15/16-inches high and 1/16-inch thick; the horizontal member which provides the load bearing features is 2-1/16-inch wide and 3/16-inch thick. The member is in the shape of an inverted "T" and rests on a system of chairs (ferrous metal) which in turn must be placed so that
the heel is pointed in the direction of the pour. The chair height may be varied with the thickness of the concrete and the length of the member is governed by the pavement width.

An example of the bearing surfaces provided by the standard dowel devices as compared to the aluminum joint is given below:

Conditions:
20 feet pavement width
10 feet slab sections (width)

Standard Joint
1/2" dowel bars 8 per 10 ft. section
Approximate amount of bar surface in bearing = 158" x 6" x 8 bars = 76 sq. inches

Experimental Aluminum Joint
Horizontal surface 1-inch wide 10 feet long
Approximate amount of bearing 1" x 120" = 120 sq.in.

PROJECT DATA

Two joints were poured at Paducah, Kentucky, on Project U-586, the Paducah Belt Line. The first of these joints was set on September 9, 1949, at Station 70+00 on the West side of the pavement, South from the intersection of Joe Cooper Drive and Broadway, see Figures 3 and 5. Measuring plugs
and thermometer wells were provided for placement. The thermometer plug was inserted at the center of the slab after the concrete had set sufficiently. The measuring plugs were placed after the concrete had hardened. All of the plugs were set according to Public Roads Administration procedure, first used in Kentucky in 1940 on the experimental joint spacing project on the Owensboro-Hartford Road.

The joint at Station 60+98.5 was set at a later date than was the one at Station 70+00 using a chair with an extended heel which facilitated the placement of the joint. The original chair had a base 5-inches long with the vertical member set at the end. The new chair was extended 2-inches beyond the vertical to form a better seat.

Results of Widths Measurements Across Joints, January 31, 1950

<table>
<thead>
<tr>
<th>Type of Joint</th>
<th>Station</th>
<th>Temp. °F</th>
<th>Width (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>70+50</td>
<td>63.5</td>
<td>4.998</td>
</tr>
<tr>
<td>Experimental</td>
<td>70+00</td>
<td>63.5</td>
<td>4.994</td>
</tr>
<tr>
<td>Experimental</td>
<td>60+98.5</td>
<td>67.5</td>
<td>5.024</td>
</tr>
</tbody>
</table>

Measurements will be made in the future to indicate the movement taking place. When the measurements were made on the 31st of January 1950 the observer stated that there was no deterioration, disintegration or other unusual condition evident at either of the joints.
There are perhaps many features of this apparatus that may not be as practicable as it appears on the surface. It was possible that one weakness of the device lay in the fact that a considerable amount of shear stress would be applied at the joint and that the concrete itself might not be able to withstand such stress.

A strip of concrete along A-A about one (1)-inch wide and 4-inches deep supports the remainder of the slab.

Investigation might be carried on to prove or disapprove this possibility. Another possibility was that the joint could be treated as a straight weakened plane joint, therefore, no finishing would be required and when and if the pavement cracked at the joint remedial measures could be applied if necessary.

Since the original placement of these joints, the section has been changed so that the extruded vertical portion is shorter measuring only 2-inches whereas the original was approximately 2-inches taller, this was accomplished by cutting the portion above the horizontal which changes it to the shape of an equal arm cross. There is undoubtedly some material saved by the change.
Fig. 1. Oblique view of Experimental Aluminum Joint Placed at Sta. 70+00 on Project U-586, Paducah Belt Line, Paducah, Kentucky. A standard type transverse joint appears in the background.

Fig. 2. View of Chair Used For Seating Experimental Aluminum Joint.
Fig. 3. Experimental Aluminum Joint in Place with Heel and Vertical Portion of Chair Pointing in the Direction of Pour. A Cap has been placed on the Joint to Facilitate the Finishing Process.

Fig. 4. A Standard Joint Being Placed on Proj. U-586, Paducah Belt Line, Paducah, Kentucky.
Fig. 5. Completed Pour Over Joint at 70+00 Before Cap Was Removed and Joint Finished.