R-289

OFFICE MEMORANDUM

MICHIGAN
STATE HIGHWAY DEPARTMENT
JOHN C. MACKIE, COMMISSIONER

May 8, 1958

To: W. W. McLaughlin
Testing and Research Engineer

From: E. A. Finney

Subject: Rigidity Tests on Universal Form Clamp Co. Dowel Bar Joint Assembly (Type M) Report No. 289 which Supplements Report No. 200, 237, 259, 276 and 287. Research Project 39 F-1(3).

The Universal Form Clamp Company has modified their dowel bar joint assembly by welding the dowels on alternate sides to the assembly. Previously the dowels were held in the assembly by friction. In conjunction with this change they have eliminated some of the supporting wires.

At the request of Mr. Rathfoot, Road Construction Engineer, we have conducted rigidity tests on the subject assembly (Sample No. 58 MR-54), in accordance with the regular procedure described in Report No. 200. The test results indicate that this assembly is 1.55 times as stiff vertically and 1.70 times as stiff laterally as the Bethlehem assembly which has been considered as a standard of acceptibility.

Figure 1 shows a dimensional cross-section, while Figure 2 shows a detailed and an overall view of the subject assembly. Figure 3 illustrates the vertical and horizontal load-deflection relationships for the Universal Form Clamp Company (Type M) joint assembly compared to the Bethlehem (Type C) contraction joint assembly.

On the sample submitted for testing, and illustrated in Figures 1 and 2, two improvements were suggested to the manufacturer. These suggestions were as follows:

1. The end wires should be extended beyond the last dowel a minimum of $4\frac{1}{2}$ inches. The sample had four wires extending only $1\frac{1}{2}$ inches beyond the center of the end dowel, and two wires extending $2\frac{1}{4}$ inches. This $4\frac{1}{2}$ inch extension is necessary in order to provide for more or less automatic lateral positioning of the assembly in the pavement lane.

2. For the expansion joint assembly the center longitudinal wires were satisfactory. However, for the contraction joint assembly submitted the longitudinal wires were close together beneath the transverse joint, making it difficult to place the concrete readily at this point. It was suggested that at the dowel bar these center wires should be a minimum of 3 inches apart, or $1\frac{1}{2}$ inches away from the center of the joint. These wires could slope down coming close together at the bottom of the assembly in order to position the base plate.

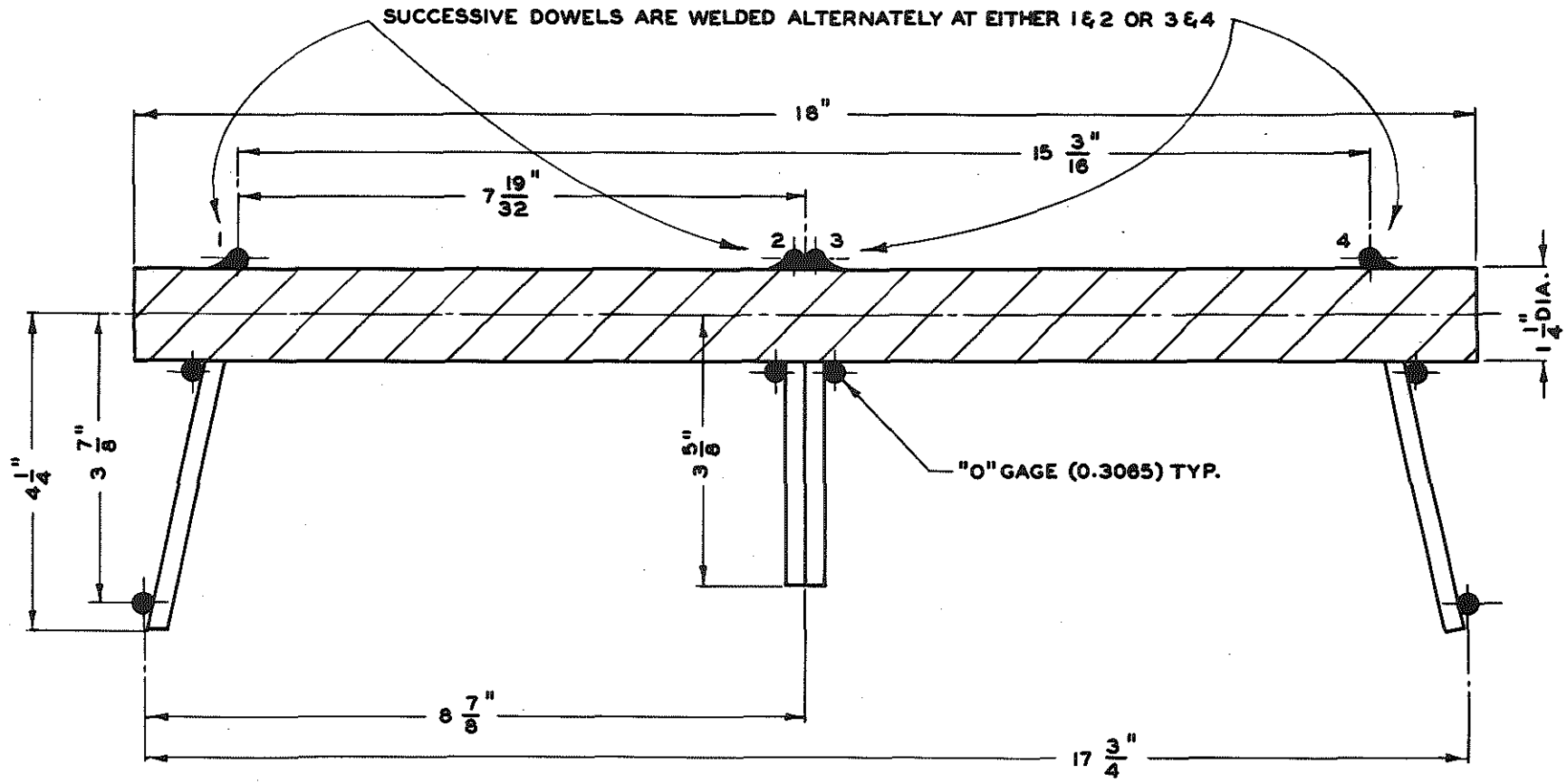
To illustrate the way the Universal Form Clamp Company plans to modify the sample submitted in order to comply with the above suggestions a revised blueprint is attached. This assembly as modified appears satisfactory, for the changes which were made would not affect the rigidity of the assembly.

E. A. Finney, Director
Research Laboratory

EAF:HFO:la

cc: C. B. Laird
C. A. Weber
C. H. Cash
H. J. Rathfoot

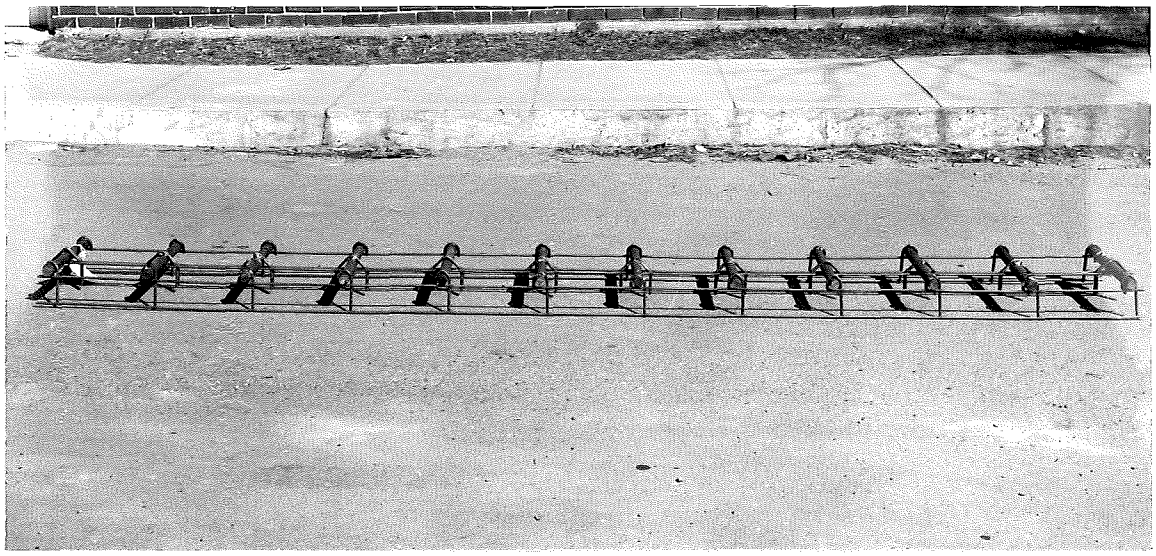
Encl.



UNIVERSAL FORM CLAMP COMPANY
JOINT ASSEMBLY

SAMPLE 58 MR - 54

FIGURE 1



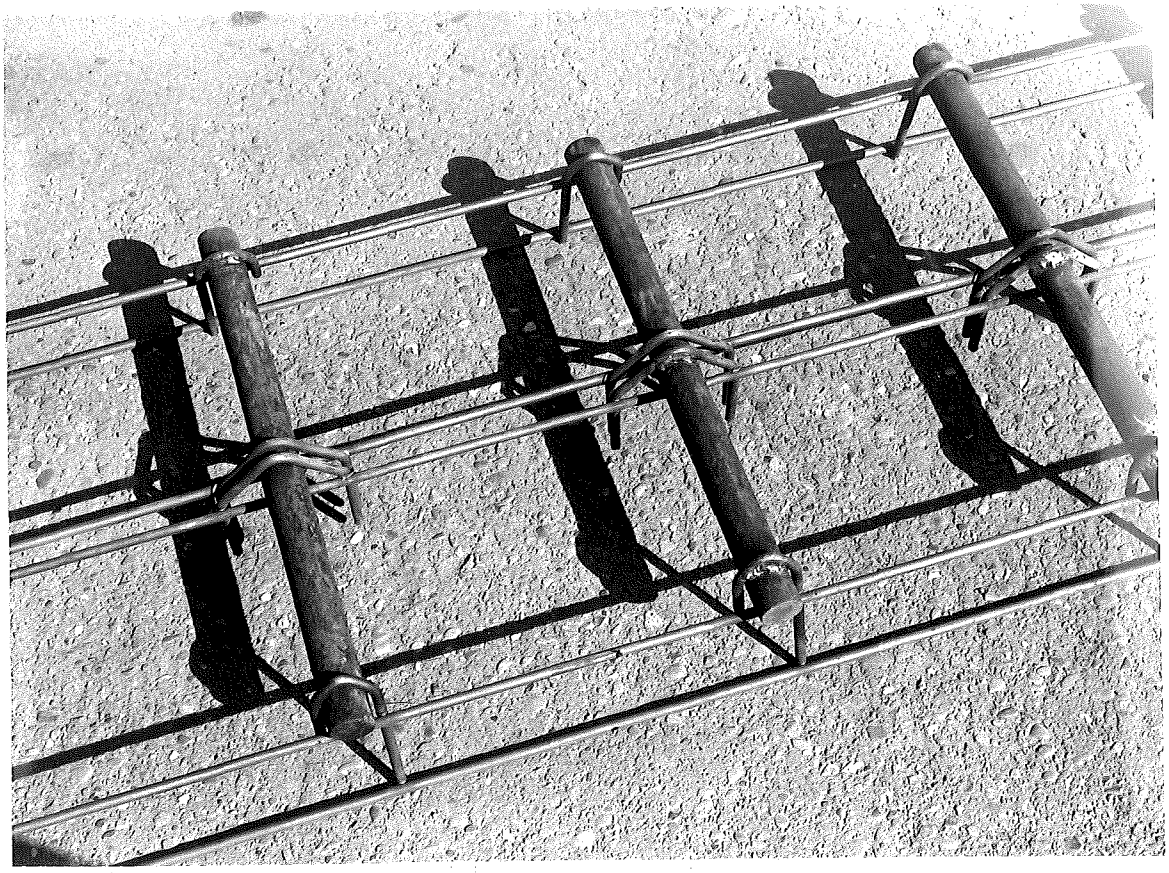
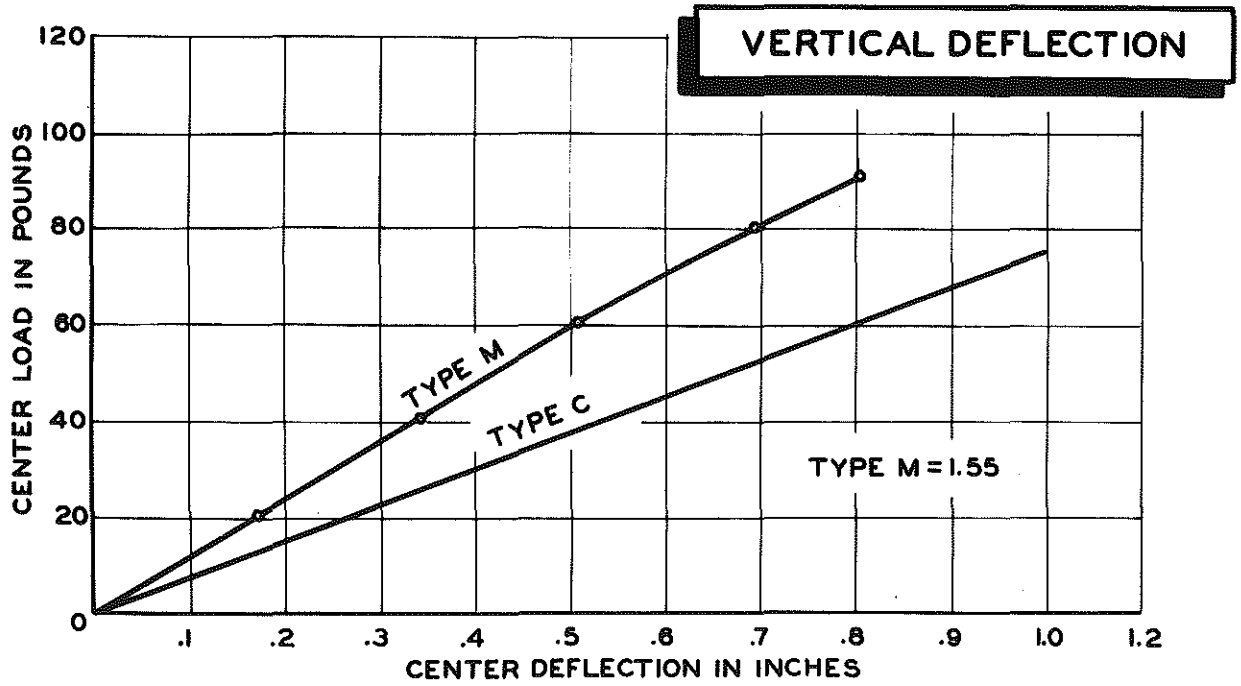


Figure 2
Overall and close up view


VERTICAL DEFLECTION
CENTER LOAD IN POUNDS
120
100
80
60
40
20
0
TYPE M
TYPE C
TYPE M = 1.55
.1
.2
.3
.4
.5
.6
.7
.8
.9
1.0
1.2
CENTER DEFLECTION IN INCHES

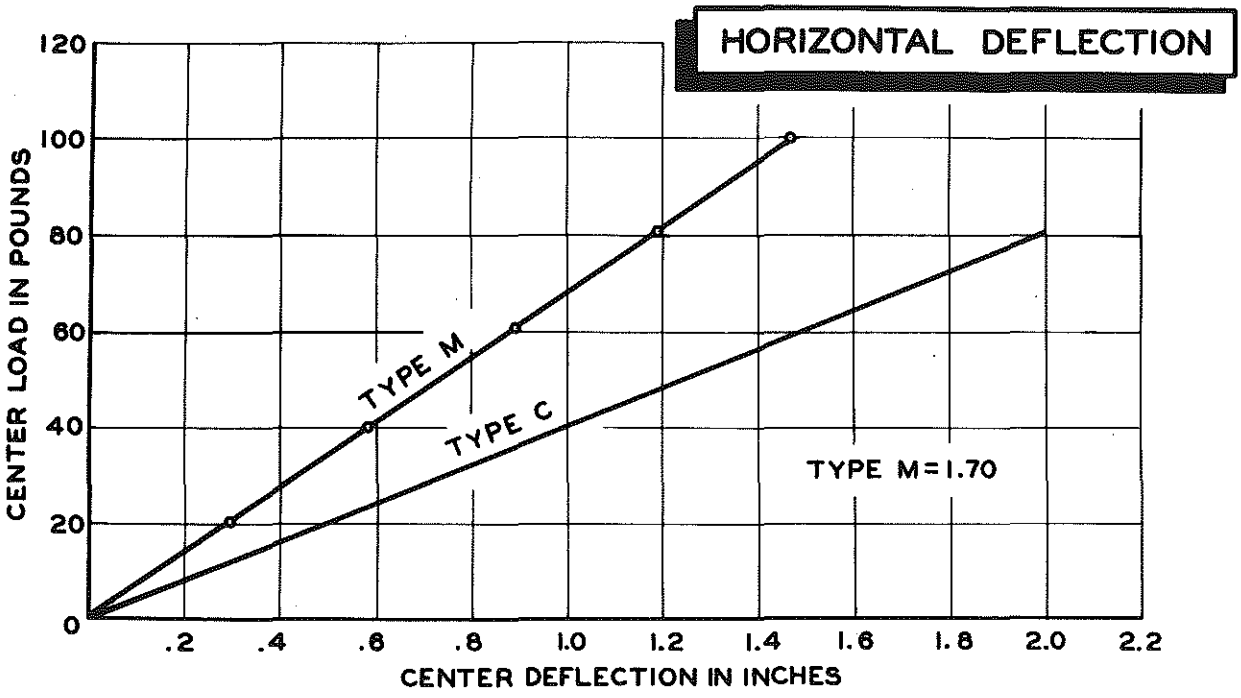
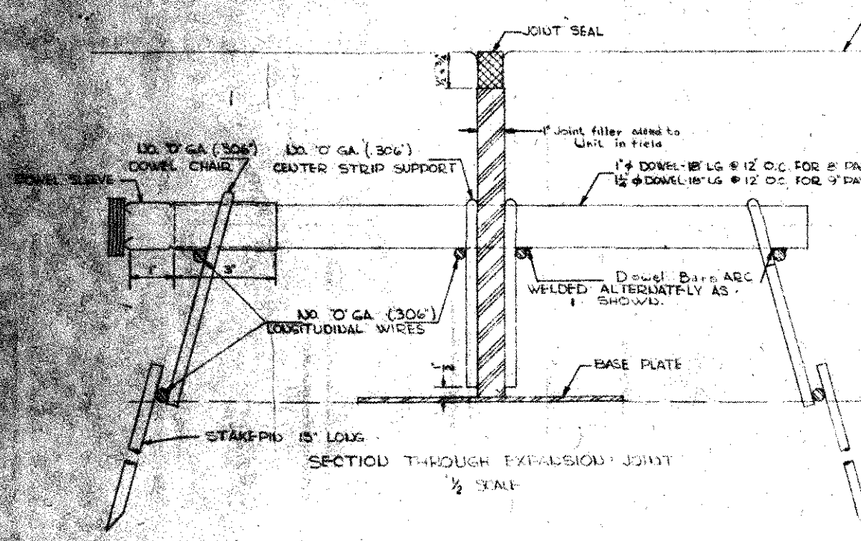
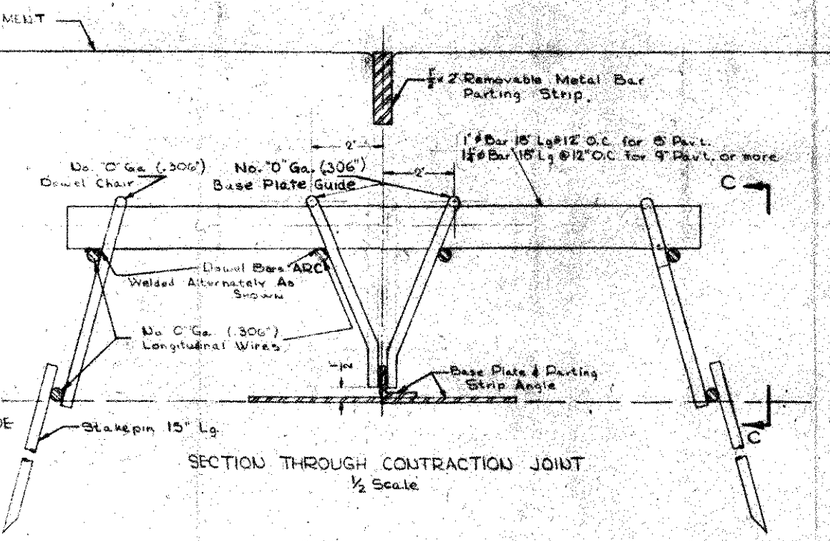

HORIZONTAL DEFLECTION
CENTER LOAD IN POUNDS
120
100
80
60
40
20
0
TYPE M
TYPE C
TYPE M = 1.70
.2
.4
.6
.8
1.0
1.2
1.4
1.6
1.8
2.0
2.2
CENTER DEFLECTION IN INCHES

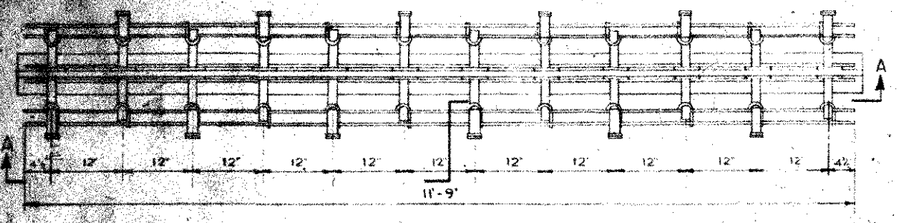
FIGURE 3



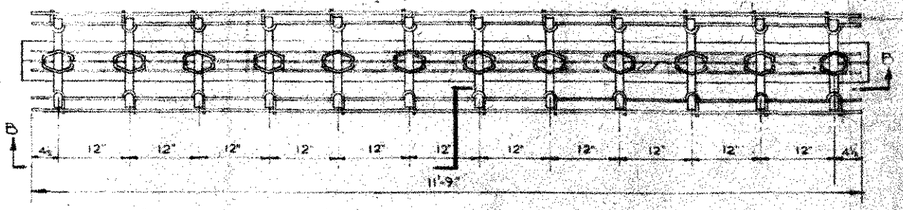
SECTION THROUGH EXPANSION JOINT
½ SCALE



SECTION THROUGH CONTRACTION JOINT
½ Scale



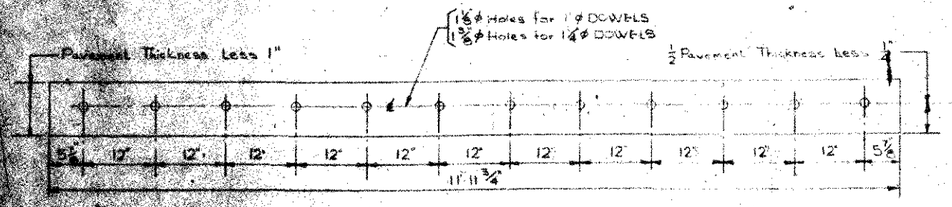
PLAN VIEW



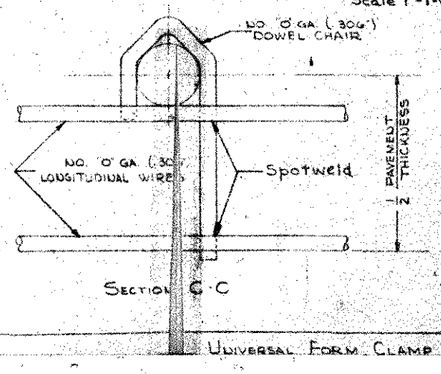
PLAN VIEW

SECTION A-A SIDE ELEVATION
EXPANSION JOINT UNIT
Scale 1"=1'-0"

SECTION B-B SIDE ELEVATION
CONTRACTION JOINT UNIT
Scale 1"=1'-0"



EXPANSION JOINT FILLER



General Notes:

Each basket unit shall be staked to subgrade with a minimum of 4 (⅝"x15") metal stakes.

Where lane widths other than indicated occur the dowel bar spacing shall be 12" as shown and excess space equalized at each side of pavement slab.

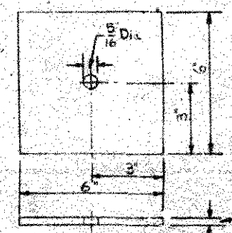
There shall be a 3" clearance between edges of pavement reinforcement and joints.

All materials and workmanship shall be in accordance with the current Michigan State Highway Department Standard Specifications.

This Standard shows the minimum requirements for dowel bar assembly. Other devices for holding the dowel bars in position will be permitted if approved by the engineer.

On incoherent sand subgrades, sand plates shall be used to support the basket as directed by the engineer.

When used, the sand plates shall be according to details shown hereon and one plate shall be placed under each corner of each basket unit.



SAND PLATE DETAIL
(4 each unit

MICHIGAN STATE HIGHWAY DEPARTMENT
STANDARD PLAN FOR
DOWEL BAR INSTALLATION
FOR LOAD TRANSFER
AT TRANSVERSE JOINTS

ROAD DIVISION APPROVAL

CHECKED _____ CHIEF ROAD DRAFTSMAN _____ ASST. ENGINEER OF ROAD DESIGN

RECOMMENDED FOR APPROVAL _____ ENGINEER OF ROAD DESIGN _____ DATE

RECOMMENDED FOR APPROVAL _____ CONSTRUCTION ENGINEER _____ DATE

APPROVED _____ ROAD ENGINEER _____ DATE

STATE HIGHWAY DEPARTMENT APPROVAL

APPROVED _____ STATE HIGHWAY COMMISSIONER

BY _____ DEPUTY COMMISSIONER - CHIEF ENGINEER _____ DATE

DRAWN BY _____ CHECKED BY _____ TRACED BY _____ APPROVED _____

Universal Form Clamp Co. Drawing No. EX-212