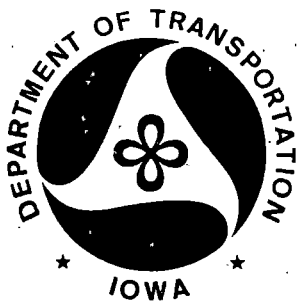
IMPROVEMENT OF LONGITUDINAL JOINTS IN ASPHALT PAVEMENT

Construction Report
Iowa Highway Research Board
Project HR-215



Highway Division
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By

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Disclaimer

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Introduction

One significant benefit of asphalt concrete pavement construction is that it may be opened to traffic within one hour after being laid. Therefore, road closure and detour are not necessary, but only temporary lane closure and control of traffic.

This one lane construction, even though desirable in regard to maintaining traffic flow, does pose an additional problem. The longitudinal joint at centerline often becomes a maintenance problem.

The objective of this research project is to identify construction procedures that will provide an improved centerline joint.

Location

The research was incorporated by extra work order into Project FR-44-4(26)--2G-39. This was a widening and asphaltic concrete resurfacing project in Guthrie and Dallas counties, Figure 1. The research sections are between stations 156+14 in Guthrie County and 451+00 in Dallas County.

Construction

The experimental sections were constructed between July 23 and August 12, 1980.

The paver was a Blaw-Knox PF-500, the breakdown roller was a Ray-Go Vibratory, the pneumatic tired roller was a Michigan Model RW 181 with a tire pressure of 120 psi, and the finish roller was a Huber Model T-1014H.

Section 1A, stations 156+14 to 183+14 and section 1B, stations 206+40 to 232+40 were laid with a one inch overlap at the centerline joint as presently described in the construction manual.

Section 2A, stations 183+14 to 7+95 and section 2B, stations 232+40 to 258+40 required a double tack coat on the vertical face of the previously laid pass. The first shot of tack was at the end of the day the first pass was laid and the second shot was the morning that the joint was closed.

Section 3A, stations 7+95 to 32+95 and section 3B, stations 258+40 to 284+40 were laid without a horizontal offset between layers; the centerline joint for the two layers being vertical.

Section 4A, stations 76+40 to 102+40 and section 4B, stations 317+00 to 344+00 were laid with the 1:1 edge slope shoe removed from the paver. This was done only on the surface course.

Section 5A, stations 102+40 to 128+40 and section 5B, stations 344+00 to 372+00 were laid and compacted using a revised rolling procedure. The revised procedure used on the second lane laid was to roll within four inches of the longitudinal joint on the breakdown pass and to overlap on the second pass rather than overlapping on the first pass as is currently done.

Section 6A, stations 128+40 to 154+40 and section 6B, stations 372+00 to 398+00 called for trimming 1½± inches from the centerline edge of the first laid pass just before

the edge was tacked for the second pass. The method of trimming was not specified but it was assumed it would be by sawing or using a rolling Colter. Neither method was used.

An attempt was made to do the trimming with a motor patrol blade but a straight edge could not be obtained. The edge of the bucket on a skid-type loader was sharpened and used to trim the edge. Immediately following the trimming, the mat was rolled to assure bond with the underlying layer. The edge was tack coated the same day and again prior to closing the longitudinal joint.

Section 7A, stations 154+40 to 180+40 and section 7B, stations 398+00 to 424+00 again had the centerline edge trimmed as in sections 6A and 6B but with the revised rolling pattern used in sections 5A and 5B, that is lapping over the longitudinal joint on the second roller pass instead of the first.

Section 8A, stations 180+40 to 206+40 and 8B, stations 424+00 to 451+00 had the longitudinal joint sealed by the pneumatic tired roller on the final pass.

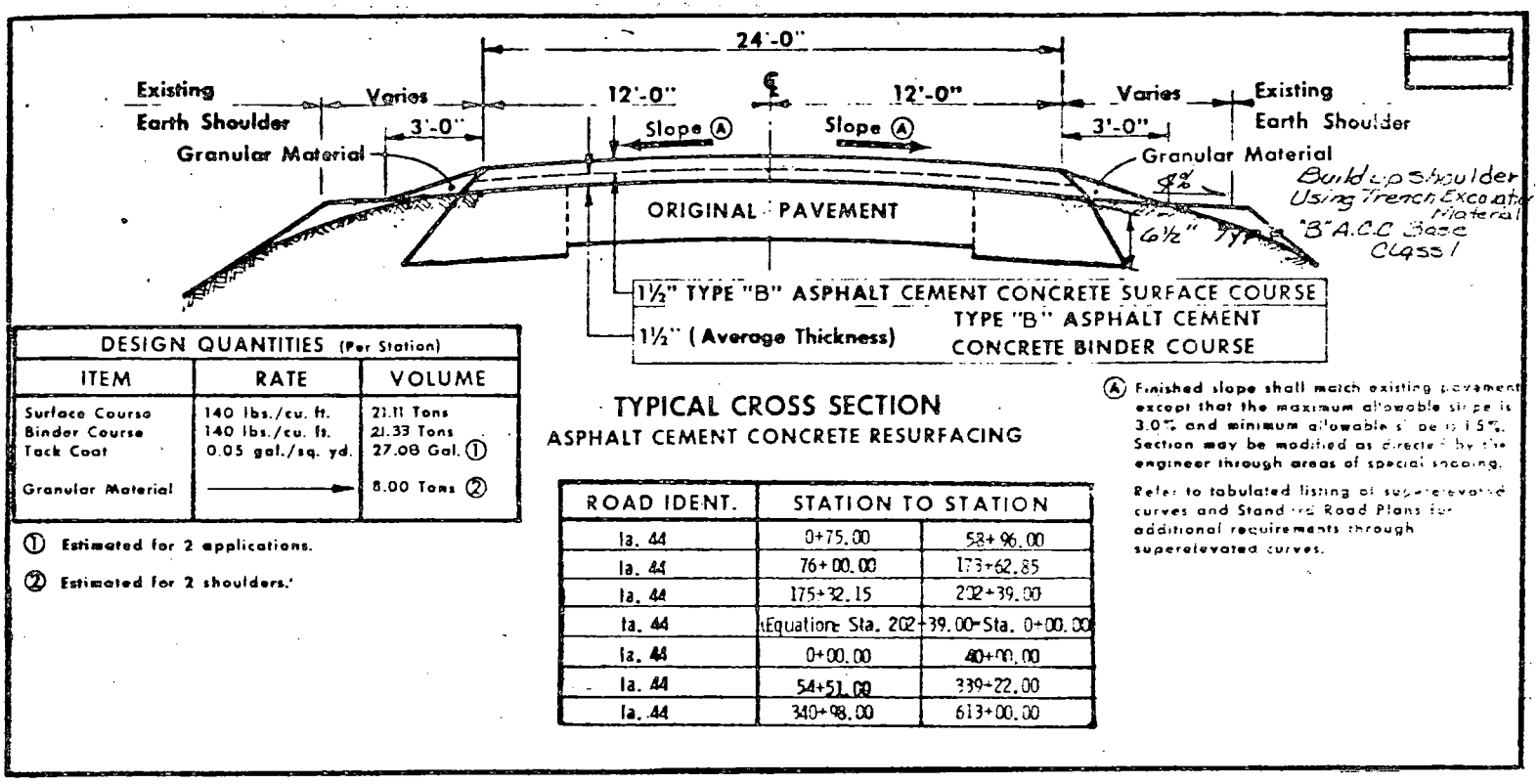
The project was paved from east to west and the joint was normally closed from the south side.

Evaluation

Cores were drilled from the various sections August 15, 1980 about three inches left and right of the longitudinal joint and from the quarter-point of each lane. The densities of each core and the average for each location per longitudinal joint procedure are included in Table 1.

The core densities show that densities at centerline are less than those at the quarter points. This difference in density could be eliminated by using a full width paver which would require closing the road.

A visual inspection was made February 4, 1981 and no deterioration of the longitudinal joint was observed in the experimental sections.



DESIGN QUANTITIES (Per Station)		
ITEM	RATE	VOLUME
Surface Course	140 lbs./cu. ft.	21.11 Tons
Binder Course	140 lbs./cu. ft.	21.33 Tons
Tack Coat	0.05 gal./sq. yd.	27.08 Gal. ①
Granular Material	——→	8.00 Tons ②

① Estimated for 2 applications.

② Estimated for 2 shoulders.

TYPICAL CROSS SECTION
ASPHALT CEMENT CONCRETE RESURFACING

ROAD IDENT.	STATION TO STATION	
Ia. 44	0+75.00	58+96.00
Ia. 44	76+00.00	173+62.85
Ia. 44	175+32.15	202+39.00
Ia. 44	Equations Sta. 202+39.00=Sta. 0+00.00	
Ia. 44	0+00.00	40+00.00
Ia. 44	54+51.00	339+22.00
Ia. 44	340+98.00	613+00.00

Ⓐ Finished slope shall match existing pavement except that the maximum allowable slope is 3.0% and minimum allowable slope is 1.5%. Section may be modified as directed by the engineer through areas of special shaping.

Refer to tabulated listing of superelevated curves and Standard Road Plans for additional requirements through superelevated curves.

Figure 1: Project FR-44-4(26)--2G-39 Guthrie County

TABLE I

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IMPROVEMENT OF LONGITUDINAL JOINTS IN ASPHALT PAVEMENT

Section No.	Sta.	Density 8-15-80 ¼ pt. Rt.	CL Rt.	CL Lt.	¼ pt. Lt.	Procedure
1A	170	2.24	2.25	2.23	2.30	Present
1B	220	2.35	2.24	2.35	2.35	construction
1	AV	2.30	2.25	2.29	2.33	procedure
2A	195	2.29	2.24	2.12	2.28	Tack coat
2B	245	2.34	2.21	2.20	2.29	vertical face
2	AV	2.32	2.23	2.16	2.29	between passes
3A	20	2.30	2.14	2.21	2.31	Delete
3B	270	2.27	2.25	2.17	2.32	transverse
3	AV	2.29	2.20	2.19	2.32	offsets
4A	90	2.36	2.27	2.31	2.29	Delete 1:1
4B	330	2.33	2.33	2.30	2.32	slope shoe
4	AV	2.35	2.30	2.31	2.31	on edge
5A	115	2.34	2.23	2.18	2.37	Roll within 4" of CL
5B	360	2.33	2.25	2.19	2.31	on breakdown, overlap
5	AV	2.34	2.24	2.19	2.34	CL on 2nd pass
6A	140	2.36	2.26	2.27	2.33	Trim 1st pass ±1½"
6B	385	2.32	2.24	2.26	2.33	before 2nd pass tack.
6	AV	2.34	2.25	2.27	2.33	Standard roll pattern. Surface course only.
7A	165	2.38	2.29	2.28	2.31	
7B	410	2.32	2.23	2.26	2.33	Same trim as 6, rolling
7	AV	2.35	2.26	2.27	2.32	procedure as 5.
8A	195	2.32	2.25	2.25	2.29	Use pneumatic roller
8B	440	2.35	2.26	2.29	2.35	on joint on final pass.
8	AV	2.34	2.26	2.27	2.32	

ACKNOWLEDGEMENT

The cooperation of the contractor, Henningsen Construction Company, is appreciated, also the help of personnel from the Creston Construction Office, especially Larry Delaney, Project Supervisor for his help in supplying construction information included in this report.