Longitudinal cracks

6 Were eliminated by ½" transverse bars (60 lb to 85 lb. total).

Corner cracks

7. Were caused by ¾" edge bars in bond when slab length exceeded 200 feet

Relative cracking in plain and reinforced sections is shown in Table 10, while corner cracks occurring in various slab lengths with single and double ¾" edge bars are shown in Table 11.

W W. Mack: On account of the size of Delaware, the conditions encountered there may be comparable to those that may be found in some of the counties of the larger States. As Mr Hogentagler has said, there are favorable subgrade conditions there which apparently seem to throw other conditions out of line. There being practically no local materials whatever in the State of Delaware, no attempt has been made to use inferior local aggregates Materials have been of a very high grade. We have used a 1½-minute mix, and have secured a uniform grade of concrete. This has reduced the number of cracks in a marked degree

EFFECT OF REINFORCEMENT IN CONCRETE ROADS IN DELAWARE

SUMMARY OF REPORT

By W. W. Mack

Delaware State Highway Department, Dover, Delaware

Because of favorable soil, traffic or climatic conditions, certain Delaware highways have developed exceptionally few defects This condition is illustrated by a plain concrete road in Delaware County, 2½ miles long, with an average slab length of 595 feet, which, after one year of use, has but four transverse and no longitudinal cracks

Sections reinforced with mesh (15 to 25 lbs per 100 sq. ft) and bars (81 to 185 lbs. per 100 sq ft) in some cases contained more cracks than adjoining plain concrete slabs. With 185-pound bar reinforcement cracking was more than double that in the adjacent plain slabs.

Maintenance costs per mile, pavement slab only, for the year 1924 on several roads were as follows

A. Coleman du Pont road, Sussex County, 5-7-5 section, 14 feet wide, 15 miles long, and reinforced with mesh 15 to 25 lbs per 100 sq. ft —$19 73.

B Plain concrete pavement, 5 miles long, of same age and design and adjoining *A*—$20 60

TABLE 11 STUDY OF PAVING REINFORCEMENT MICHIGAN STATE HIGHWAY DEPARTMENT—TRANSVERSE CRACKING

Influence of Reinforcement on Transverse Cracks

Job No	Reinforcement Station to Station	# of Longitudinal Steel per 100 Sq Ft	# of Transverse Steel per 100 Sq Ft	Size & Number of Longitudinal Steel Bars	Size Transverse Steel	Cross Section of Pavement	Age, Years	Average Slab Length Reinforced Section	Average Slab Length, No. 1 Adjacent Section.	Average Slab Length No 2 Adjacent Section	Spacing of Transverse Cracks Reinforced Sec	Spacing of Transverse Cracks Adjacent Sec No 1	Spacing of Transverse Cracks Adjacent Sec No 2	Adjacent No 1% Increase or Decrease of Transverse Cracking on Reinforced Section	Adjacent Section No 2% Decrease or Increase of Transverse Cracking on Reinforced Section
FA 45 A1	83+13–86+06	25#	60#	3–¾″	½″	Uniform 8″ single slab	4	297′	317′	391′	27 0	26 4	21 7	− 2 0%	−19 5%
FA 68 DEF	541+50–546+47	50#	80#	6–¾″	½″	Uniform 8″ center joint	2½	127′ 380′	560′	211′	32 3 25 3	23 4	21 1	− 7 5%	−34 5%
FA 68 C	153+94–220+14	30#	31#	8–½″	½″	Uniform 8″ center joint	2	210′ 166′	124′	136 5′	46 6 55 5	19 1	28 7	−65 8%	−38 5%
FA 70 A	62+50–65+75	27#	50#	8–½″	½″	Uniform 8″ center joint	2	117′ 208′	352′	282′	117 104	88 0	70 5	−15 5%	−39 8%
(1) FA 70 A	77+55–86+00	27#	50#	8–½″	½″	Uniform 8″ center joint	2	275′	252 5′	250	34	48	26 3	41 2%	−23 7%
(2) FA 115	486+29–490+35	27#	35#	8–½″	½″	9-7-9 Mich	1								
FA 115	513+19–520+54	27#	35#	8–½″	½″	9-7-9 Mich	1	101	100	100	75	62 5	41 7	−17 5%	−44 5%
TL 46–22	174+98–179+21	30#	31#	8–½″	½″	9-7-9 Mich	1	96 106	101 95	100 100	84 84 7	56 1 42	91 59	−33 1% 50 4%	8 2% −30 3%

(1) One 64′ slab omitted in figuring avg length of slabs both plain to west and reinforced

(2) Slabs under 55′ length omitted in considering results.

TABLE 12 STUDY OF PAVING REINFORCEMENT MICHIGAN STATE HIGHWAY DEPARTMENT—F A 68 DEF

Table Showing Relation of Slab Length to Number of Corner Breaks per Station Breaks Due to Edge Bar Uniform 8-inch with Center Joint

Single ¾" Edge Bar

Slab Lengths	0–40	40–100	100–150	150–200	200–250	250–300	300–350	350–400	400–450	450–500	Over 500
Average Slab Length	33	84	128	200	228	277	320	380	423	482	586
No Slabs	1	4	2	1	10	8	7	4	6	12	24
No Breaks	0	0	0	0	2	7	6	4	2	17	38
Breaks per Slab	0	0	0	0	0 2	0 9	0 9	1 0	1 5	1 4	1 6

Double ¾" Edge Bar

Average Slab Length	18	61	128	169	224	277	0	0	402	475	609
No Slabs	6	7	5	6	9	8	0	0	1	3	1
No Breaks	0	0	1	0	2	2	0	0	0	12	7
Breaks per Slab	0	0	0 2	0	0 2	0 25	0	0	0	4 0	7 0

C Plain concrete pavement, 6-8-6 section, 16 feet wide, 32 miles long, similar subgrade and age, but with 50 per cent more traffic than *A* and *B*—$24 30

D Plain concrete pavement, 6-8-6 section, 18 to 20 feet wide and 15 miles long, with less favorable subgrade and 3 to 5 times the traffic of roads *A* and *B*—$78 50

Since at $1,000 per mile cost for reinforcement a saving of $70 95 would be required to warrant its use it would seem that unless it afforded a reduction in first cost of road, reinforcement would not be economically justified for average soil, traffic and climatic conditions existing in Delaware

EFFECT OF REINFORCEMENT AS SHOWN BY COLUMBIA PIKE EXPERIMENTAL ROAD

SUMMARY OF REPORT

BY J T PAULS

U S Bureau of Public Roads, Washington D C

Based on comparative sections, gravel aggregate, with and without center joint, 200 feet long and 4 years old, the following conclusions are offered

1 Combined longitudinal and transverse crack in full width sections was reduced more consistently with slab thickness than was either one separately

2 Plain half width sections contained no more transverse cracks than did full width sections

3 Mesh reinforced sections contained considerably less crack than plain sections Six-inch section with mesh reinforcement contained about the same crack length as an 8-inch plain slab Six-inch sec-