

on stilts and the concrete allowed to pass through and around it. In other methods of placing reinforcement, the concrete is struck off at a certain elevation and the reinforcement placed thereon. Where the bottom layer of concrete is put down and struck off, the subgrade will absorb most of the excess water. When the second layer of concrete is deposited upon the reinforcement, you do not get the same capillary action on this concrete as that to which the original layer was subjected. If an initial crack forms in the first layer of concrete before it has developed any strength, this crack will be stopped by the reinforcement, while otherwise it might be carried through to the surface. I think there is little doubt that many embryo cracks thus formed on sandy subgrades eventually come to the surface, particularly so where no reinforcing metal is used.

I believe that, in classifying transverse cracks in concrete pavements, we should not include the contraction cracks that we know will form at distances of 28 to 35 feet, depending upon the strength of the concrete and the reinforcement metal used, for such cracks are not structural defects, such as those that develop six to eight or ten feet from each other.

EFFECT OF REINFORCEMENT IN WASHINGTON STATE HIGHWAYS

SUMMARY OF REPORT

By E R HOFFMAN

Washington State Highway Department Olympia Washington

Relative percentages of plain and reinforced slabs (6-7½-6 section, 20 feet wide and 30 feet long) which contained cracks are shown in Figure 95.

Older pavements were reinforced with mesh, and in the others ½" square corrugated bars, with spacing varied to suit conditions were used. Lower cost of placement and convenience of distribution warranted a change to the latter type.

Reinforcement has not been used as part of the primary design. Reinforced slabs shown in Figure 95 were used only as follows:

- (A) Across trenches excavated for the purpose of placing culverts
- (B) At bridge approaches wherein one end of the slab rests on solid concrete abutment and the other end is supported by the adjacent embankment
- (C) On overhanging pavement laid on narrow embankments which were widened just prior to pavement construction
- (D) In some cases on high fills
- (E) Over soft subgrades

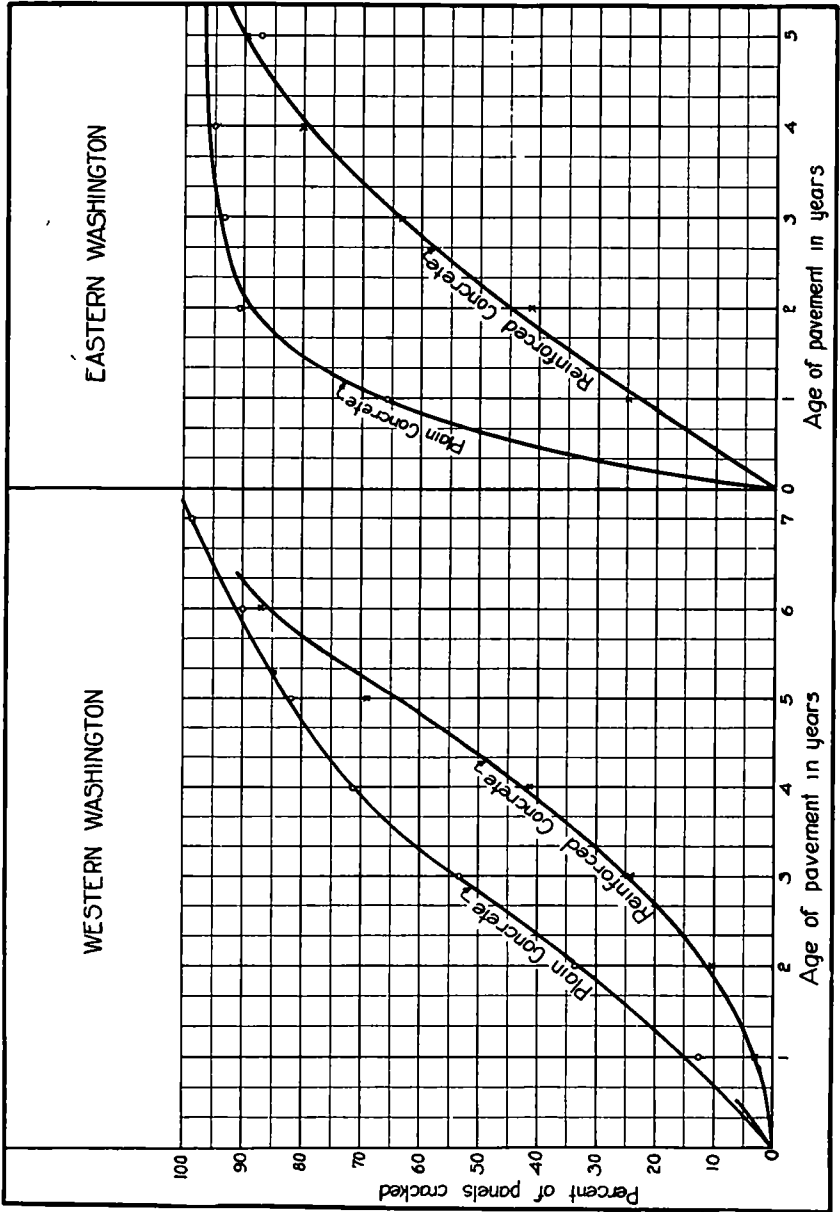


Figure 95—Influence of age and climate on slab condition—Washington State Highways

The curves which represent about 165 miles of road show

- (1) Cracking increased consistently with age
- (2) Notwithstanding the adverse condition to which they were subjected, reinforced slabs showed less cracking than the plain concrete sections

EFFECT OF REINFORCEMENT IN CALIFORNIA

SUMMARY OF REPORT

By R M MORTON

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Observations were made on short sections of reinforced pavement and adjacent plain concrete slabs in Santa Barbara County roads between Los Alamos and Elwood. There were 63 sections of roads V-SB-2-C-F and G, varying in length from 10 to 2,346 feet. The pavement was 4 inches thick, 15 feet wide and was laid with 1 2 4 mix, about 1918. Forty sections contained "triangular mesh" steel fabric, style No 068, with primary members laid transversely and twenty-two sections were reinforced transversely only with $\frac{3}{8}$ " square steel bars on 18 inch spacing.

Usually subsoil was much the same under both types of pavement. The sections chosen for reinforcement, however, were undoubtedly the ones believed most likely to fail because of doubtful subgrade conditions.

In 1922 L H Gibson, Division Engineer, submitted a report on the conditions of the 63 sections.

In 1924 C L McKesson, Materials and Research Engineer, reported on 18 of the original sections which had not been resurfaced.

The following conclusions offered by Mr Gibson were substantially agreed to by Mr. McKesson.

1 On well-drained, porous subgrades no difference in condition was found between plain and reinforced slabs.

2 On heavy black adobe or yellow clay subgrades, in cut or fill, less cracking was found in the reinforced than in the adjoining plain slabs. While the latter contained generally 2 to 6 open longitudinal cracks the former showed but 1 or 2 and these were tightly closed and appeared two or three feet from pavement edges, being caused probably by repeated expansion and contraction of subgrade.

3 In side hill excavation more cracks occurred along the line of zero cut and fill in the plain sections than in the reinforced. Such cracks as did occur in the latter were tightly closed.

4 Wire mesh and steel bar reinforcement did not always prevent cracks caused by subgrade settlement, but materially lessened the number of breaks and prevented cracks from opening and raveling.