FINAL REPORT

MINIMIZATION OF REFLECTION CRACKS IN FLEXIBLE PAVEMENTS

by

C. S. Hughes
Assistant Head

Virginia Highway & Transportation Research Council
(A Cooperative Organization Sponsored Jointly by the Vriginia
Department of Highways & Transportation and
the University of Virginia)

Charlottesville, Virginia

July 1977

VHTRC 78-R5

SUMMARY

This report describes the performance of fabrics used under overlays in an effort to minimize longitudinal and alligator cracking in flexible pavements. It is concluded, although the sample size is small, that the treatments will extend the pavement life an average of about two years.

FINAL REPORT

MINIMIZATION OF REFLECTION CRACKS IN FLEXIBLE PAVEMENTS

by

C. S. Hughes
Assistant Head

INTRODUCTION

Virginia has investigated many methods and materials for minimizing reflection cracks over several years. In the first attempts, the objective was to reduce the reflection of portland cement concrete joints through bituminous overlays. These early attempts were, for the most part, unsuccessful.

In 1971, with the increased availability of high tensile strength fabrics and latex additives, efforts to minimize the reflection cracks were renewed and redirected to flexible base pavements. Experimental installations of the newly available materials were begun in 1971 and these were followed by installations in 1972, 1973, and 1976.[1,2,3,4] All sections chosen for installations were badly cracked.

Since the oldest treatments have been under traffic for six years and future installations will be the responsibility of the Maintenance Division, it was thought that a final report summarizing the behavior of the treatments would be worthwhile.

LATEX ADDITIVES

Two latex materials, Pliopave from Goodyear and Petroset from Phillips, were added to bituminous overlays in an effort to reduce reflective cracking. It was found that after a couple of years under traffic neither of these materials was effective in minimizing reflection cracks, and they were dropped from consideration a few years ago.

FABRICS

A review of the test and control sections for the fabric installations was made in June 1977 and brief discriptions of the surfaces are given below.

Route 33 — East of Harrisonburg[1]

After six years the Petromat section is performing very well. The surface is slightly dry, but no longitudinal cracks are apparent. In contrast, the control section has developed longitudinal cracking (Figure 1*) and should require an overlay before one is needed on the Petromat section.

Route 29 — Chatham Bypass[1]

After six years this Petromat section is performing adequately; however, a few longtiudinal cracks are starting to show (Figure 2). The control section exhibits more cracking (Figure 3) than the test section and should be the first to require an overlay.

Route 81 — South of Fancy Hill[1]

After six years neither the Petromat nor control section are showing any signs of distress.

Route 29 — North Charlottesville NBL[2]

This pavement surface is five years old and is badly cracked in both the Petromat (Figure 4) and control (Figure 5) sections. A previous investigation had shown that the infiltration of water beneath the Petromat and overlay had weakened the underlying layers and was responsible for the early failure.

Route 29 — North Charlottesville SBL[3]

This installation is four years old and contains both Petromat and Burlington glass fabric, in addition to the control section. The Petromat is showing a slight amount of longitudinal cracking (Figure 6) and the glass fabric has a large amount of edge cracking (Figure 7). The control section is showing alligator cracking and pumping (Figure 8).

Route 17 — Gloucester County[4]

This pavement was treated last year with sections of Petromat and Mirafi. The original condition included a great deal of transverse (hydrothermal) cracking. After

*Figures attached.

one year both treatments, as well as the control sections, have started to crack.

To obtain a more objective evaluation of the benefit of the fabric treatments, an estimate was made of when the pavements should be overlaid. This estimate was then used to predict the life of the pavements with the treatment as contrasted to the control sections.

It should be realized that this estimate is difficult, particularly in areas where little or no distress is apparent after five or six years. Because the Gloucester County section is only one year old, no attempt was made to predict the number of years until an overlay is required.

Nevertheless, Table 1 represents an attempt to place a service life on the various sections. The estimates shown, although drawn from relatively few test installations, indicate that the treatments will extend the pavement life an average of about two years.

Table 1

Estimated Life of Test and Control Sections

Location	ADT	Treatment	Life (yrs.) Test	Life (yrs.) Control
Route 33, Harrisonburg	5,500	Petromat	12	9
Route 81, Fancy Hill	6,800	Petromat	14	14
Route 29, Chatham	2,200	Petromat	11	7
Route 29, Charlottesville NBL	8,500	Petromat	5	5
Route 29, Charlottesville SBL	8,500	Petromat	8	5
Route 29, Charlottesville SBL	8,500	Burlington	8	5
Average			9.7	7.5

REFERENCES

1. Hughes, C. S., Petromat Installation Report, Virginia Highway and Transportation Research Council, VHTRC 71-R21, March 1972.

2. _____, Minimization of Reflection Cracks Installation Report — Rt. 29 N. Charlottesville, Virginia Highway and Transportation Research Council, VHTRC 72-R17, December 1972.

3. _____, Minimization of Reflection Cracks Installation Report — 1973, Virginia Highway and Transportation Research Council, VHTRC 73-R16, October 1973.

4. _____, Minimization of Reflection Cracks Route 17 Gloucester County Installation Report 1976, Virginia Highway and Transportation Research Council, VHTRC 77-R30, December 1976.

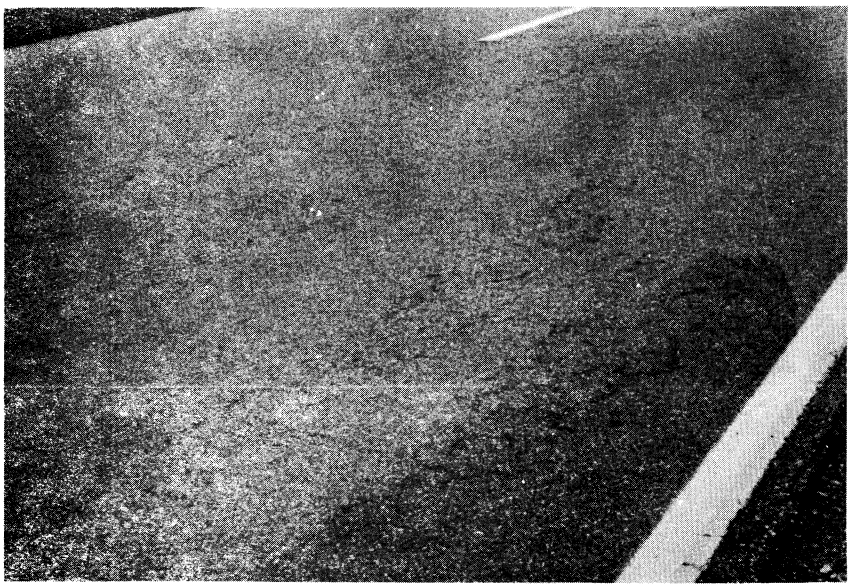

Figure 1. Cracking in the control section on Route 33.

Figure 2. Cracking in Petromat section on Route 29 at Chatham.

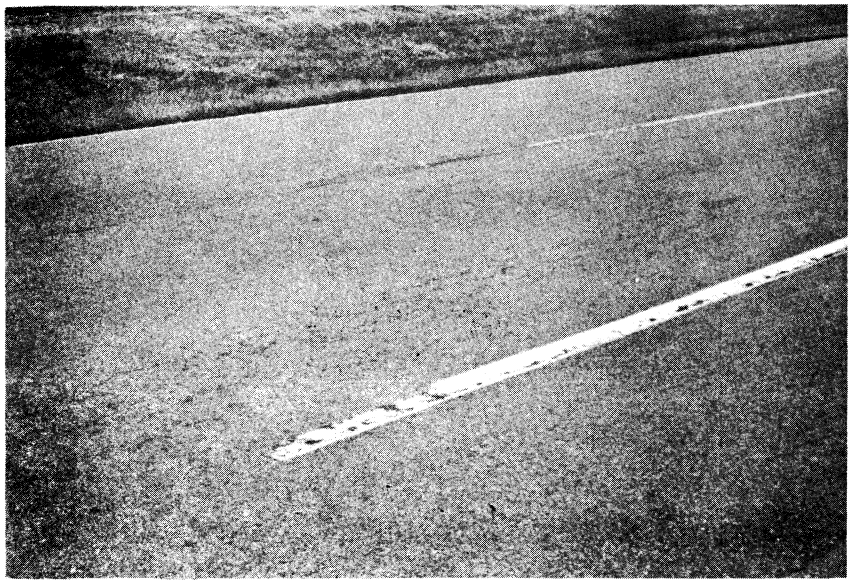

Figure 3. Cracking in control section on Route 29 at Chatham.

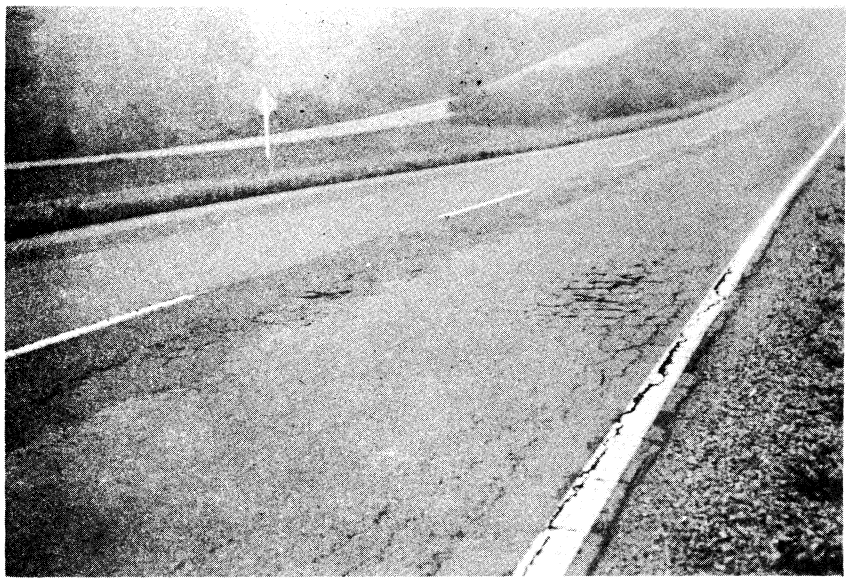

Figure 4. Cracking in Petromat section on Route 29 at Charlottesville (NBL).

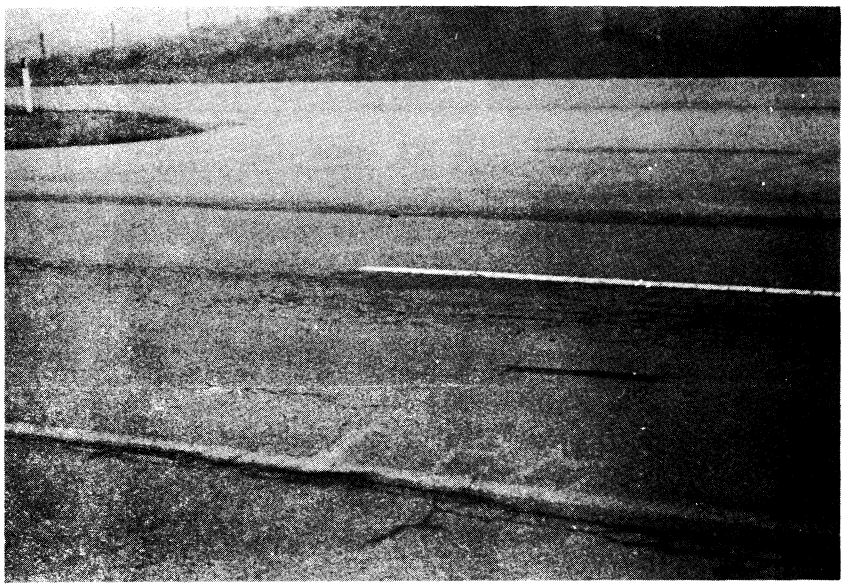

Figure 5. Cracking in control — Petromat interface on Route 29 at Charlottesville (NBL).

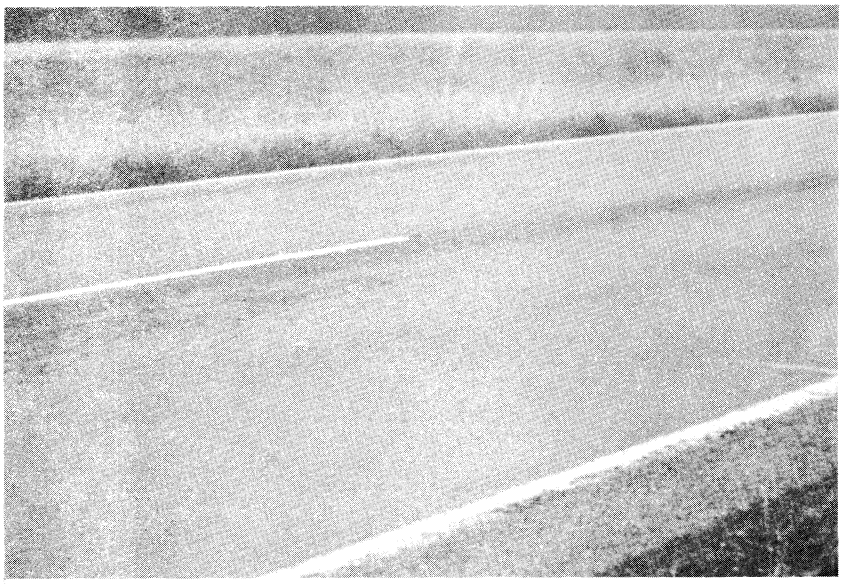

Figure 6. Cracking essentially stops at Petromat on Route 29 at Charlottesville (SBL).

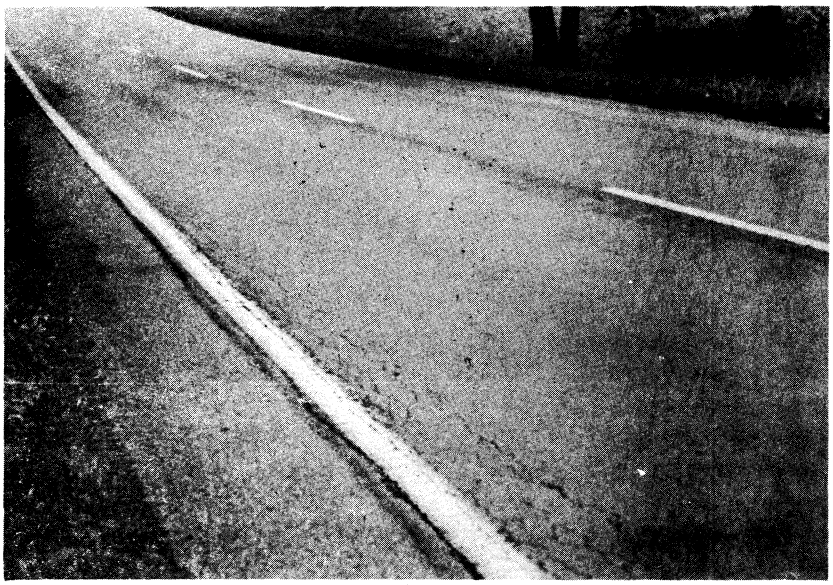

Figure 7. Edge cracking in Burlington glass fabric section of Route 29 at Charlottesville (SBL).

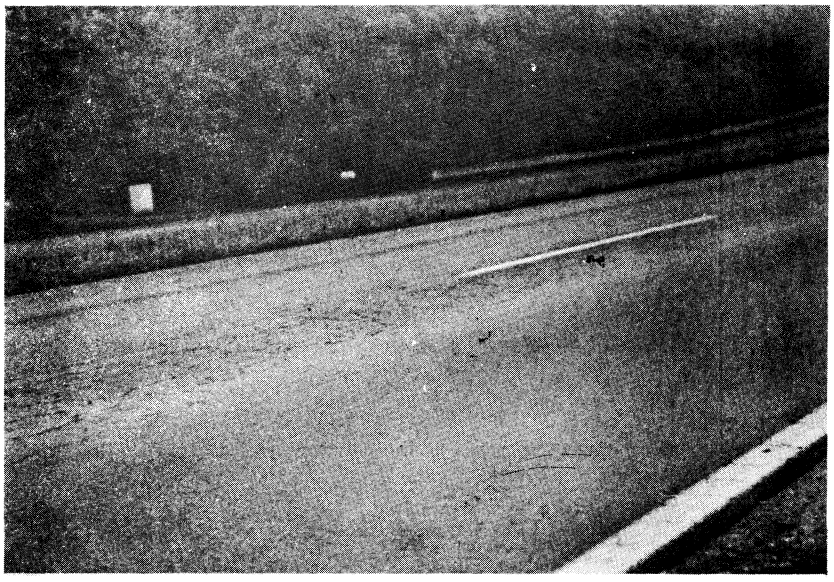

Figure 8. Cracking and pumping in control section on Route 29 at Charlottesville (SBL).