MINIMIZATION OF REFLECTION CRACKS
ROUTE 17 GLOUCESTER COUNTY INSTALLATION REPORT 1976

by

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Senior Research Scientist

(The opinions, findings, and conclusions expressed in this report are those of the author and not necessarily those of the sponsoring agencies.)

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SUMMARY

The installation of two fabrics, Petromat and Mirafi, to reduce reflection cracking on Route 17 in Gloucester County in August 1976 is described. A brief review of the performance of previous installations is included. Finally, it is recommended that additional fabric installations be the responsibility of the Maintenance Division.

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INTRODUCTION

For the past five years the Research Council has been working toward minimizing reflection cracking of both rigid and flexible pavements. The last few years have been devoted primarily to installations on the latter where the potential payoff appears much greater.

The materials used in the experimental work done so far have exhibited widely differing performances. Fabrics such as polypropylene, fiberglass, and nylon have performed adequately for the most part. On the other hand, two latex materials, Goodyear's Pliopave and Phillips' Petroset, have not extended the life of the overlays and are no longer considered effective materials for minimizing reflection cracks.

INSTALLATION

In August of 1976 two materials were installed on a two-lane section of Route 17 in Gloucester County. Figure 1* shows the layout of the test and control sections.

Materials

The two materials were placed on August 5 and consisted of one roll of Celanese Mirafi 140 approximately 325 ft. long and six 300 ft. rolls of Phillips' Petromat in each lane. This was the first Mirafi, a bonded, non-woven fabric consisting of 75% polypropylene and 25% nylon, installed in Virginia. The Petromat had been used on several previous experimental projects. The difference in the Petromat installation this year was that it was placed by a tractor (Figure 2) rather than by hand brakes as had been used previously and as were used to apply the Mirafi on this installation, Figure 3.

*All figures are appended.

The section was badly cracked as shown in Figure 4. In fact, the poor riding quality caused by the numerous transverse cracks was the primary reason for overlaying.

To remove any bias that might result from the locations of the two materials, they were staggered end for end as Figure 1 indicates. In a comparative performance evaluation, control sections of approximately 300 ft. on both ends of the test sections will be observed.

Application

Starting at the north end of the southbound lane, prior to placing the Mirafi, .15 gsy of AC-20 asphalt was applied as a tack coat as recommended by the manufacturer. The single roll of Mirafi was placed, as previously mentioned, using hand brakes. Although the installation of this material went smoothly, placing any fabric by hand is more time-consuming than placing fabric mechanically and does tend to hold up the paving operation.

In placing the Petromat, .25 gsy of AC-20 tack was shot in the southbound lane for the six rolls used. The installation was made quickly and with the exception of wrinkles that occurred near the edge of the pavement (Figure 2) no difficulties were noted. After the sixth roll of Petromat was placed, the process was repeated in the northbound lane.

The overlay consisted of 200 psy of I-2 mix. Other than a problem caused by some truck drivers holding their brakes too tight and causing the fabrics to slip, the overlay installation went smoothly.

The performance of the test and control sections will be watched closely. The presence of transverse cracks and what appears to be faulting at these cracks may create a very severe test for the ability of fabrics to minimize cracks from reflecting through the overlay. If there is appreciable vertical movement at the cracks, it is likely that the fabrics will not be able to minimize the shear stress and influence the formation of reflection cracks.

REVIEW OF PREVIOUS SECTIONS

As mentioned in the Introduction, neither Pliopave nor Petroset have performed sufficiently well to receive further consideration for use. The following paragraphs describe the performance of other sections previously placed as of the spring of 1976.

Route 33 — East of Harrisonburg — 6/71 (Petromat)

No appreciable cracking had taken place in the Petromat test section. A few longitudinal cracks were appearing in the wheel path of the adjacent passing lane and in the traffic lane just west of the test section. Both sections which are showing initial signs of cracking can be considered control sections.

Route 29 — Chatham Bypass — 6/71 (Petromat)

Two transverse cracks have appeared in the test section, one of which has spalled appreciably. Several transverse and a few longitudinal cracks have developed in the control section to the south of the test area, just adjacent to the exit ramp to Rte. 832.

Route I-81 — S. Fancy Hill — 10/71 (Petromat)

No cracking has developed in either the test section or the adjacent pavement.

Route 29 — N. of Charlottesville (NBL) — 7/72 (Petromat)

The test section as well as the adjacent pavement started cracking early in 1975. Skin patching was applied in November 1975, and the cracking has now extended through it. Slabs were sawed from cracked and uncracked areas in the spring of 1976. Moisture and stripping were observed in the pavement beneath the cracked area, although the overlying Petromat was still completely intact. From the results on this limited section it appears that Petromat can not, and should not, be used to solve problems such as intrusive water in the pavement system.

Route 29 — N. of Charlottesville (SBL) — 6/73 (Petromat)

Initial signs of cracking were observed in both the test section and the control sections. It is envisoned that the same performance as was found in the previously mentioned section will take place in this site for the same reason.

Route 29 — N. of Charlottesville (SBL) — 6/73 (Burlington Fiberglass)

Extensive edge cracking was taking place in the control section just north of and extending into the fiberglass section. This area is in a sag and the cracking is very likely caused by an undesirable moisture condition.

RECOMMENDATIONS

Because the Research Council has been involved in investigating the installation of fabrics to minimize reflection cracks for the last five years, and because the methods of installation are now well established, it is recommended that future installations be decided on by the Maintenance Division.

It is further recommended that future fabric installations be accomplished by mechanical means as opposed to hand methods to speed up the work and reduce the amount of labor required.

The Research Council will be happy to serve in an advisory capacity in future installations, if requested.

ACKNOWLEDGEMENTS

The very able and cooperative assistance of John McEwen and his field forces is acknowledged and appreciated. The enthusiasm demonstrated by Mr. McEwen on this installation was contagious and provided the impetus for a successful installation.

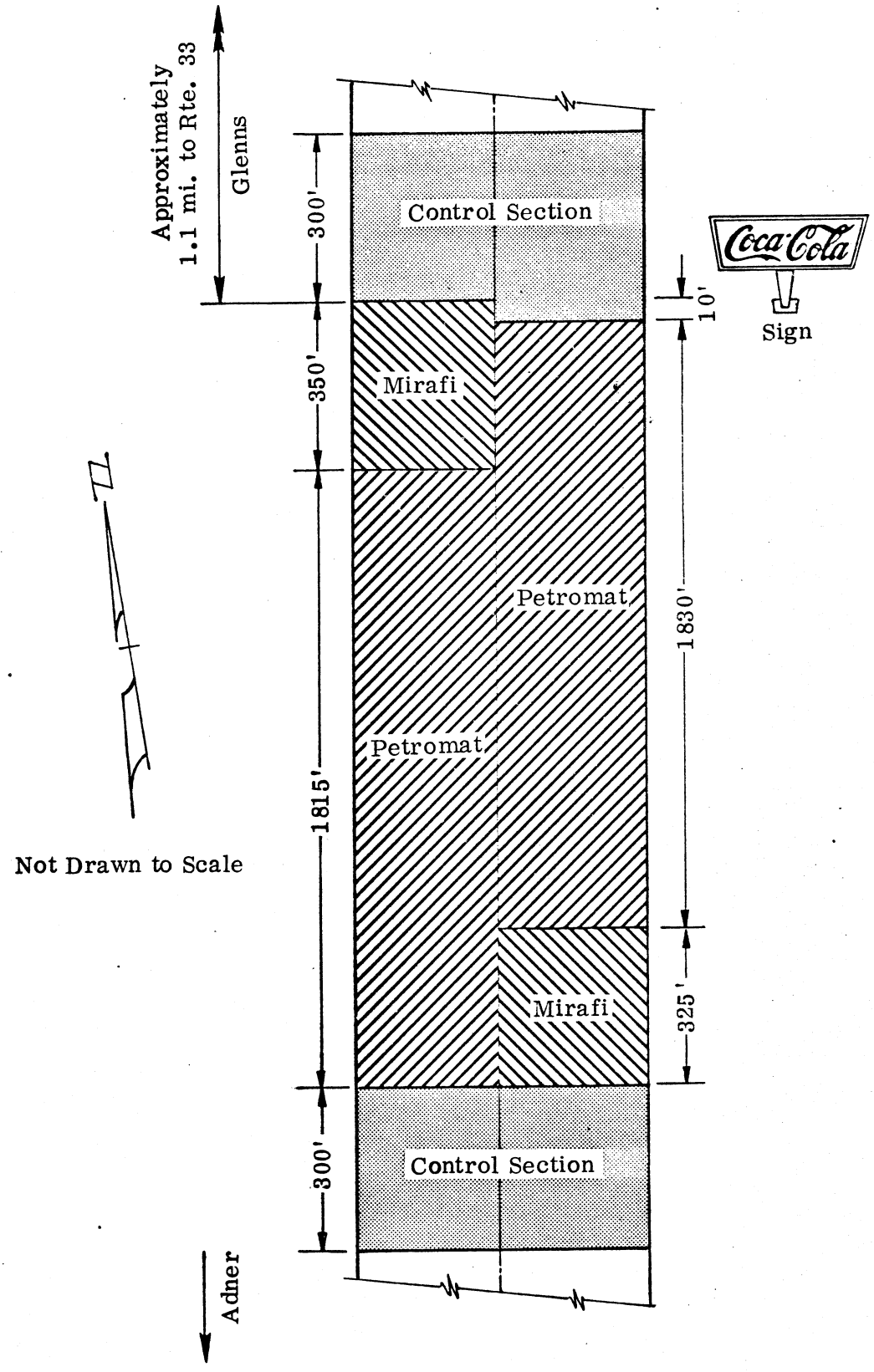

Figure 1. Location of test sections.

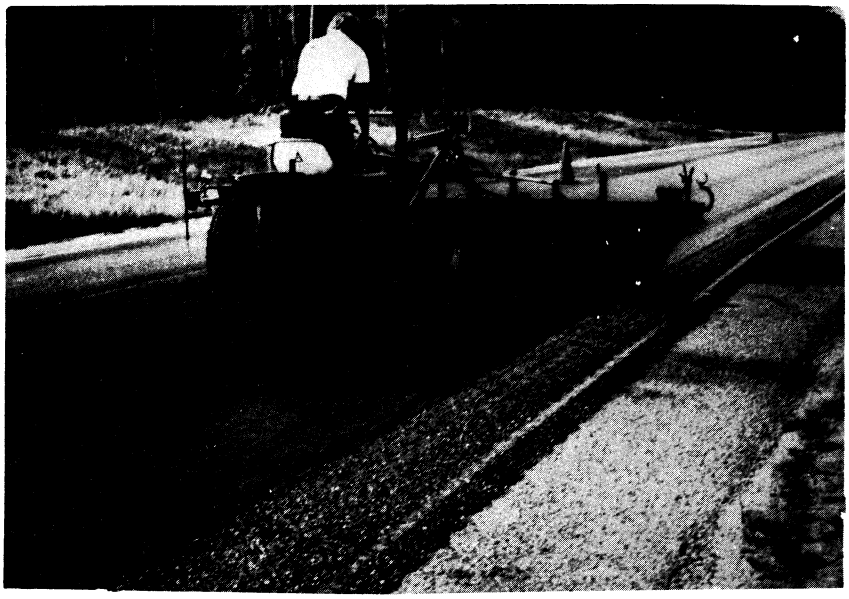

Figure 2. Tractor placing Petromat and resulting wrinkles in fabric.

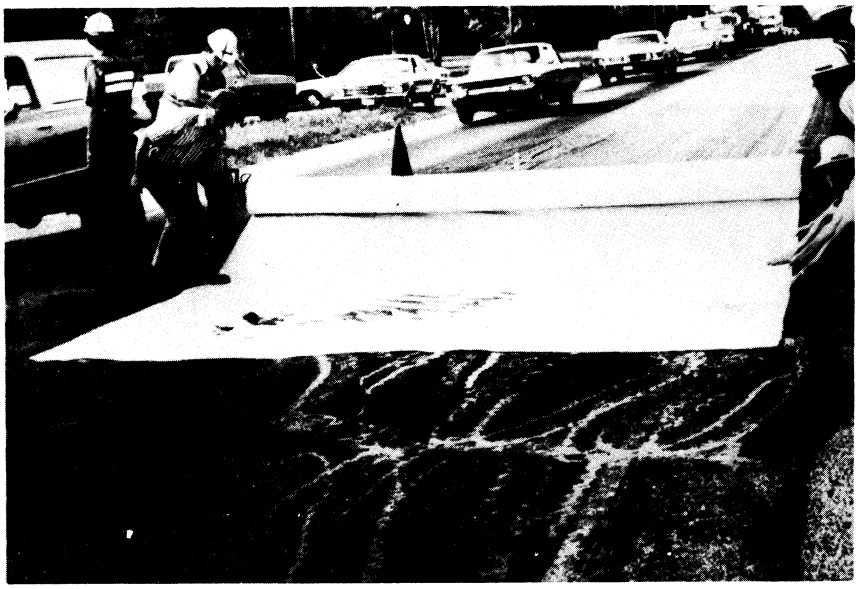

Figure 3. Mirafi being placed with the aid of hand brakes.

Figure 4. Typical transverse cracking in foreground.