AN EXPERIMENTAL APPLICATION OF PERMA-BIND

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Virginia Highway Research Council
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INTRODUCTION

At the request of Mr. R. L. Wyant, Sales Manager for Larutan Products, the producers of Perma-Bind, the Virginia Department of Highways permitted the Burruss Land and Lumber Company, Incorporated of Lynchburg, Virginia, to place an experimental application of this asphaltic material on a shoulder of Interstate 95. Perma-Bind, according to its manufacturer, reduces the maintenance cost on asphaltic pavement by penetrating, binding, sealing, and preserving the asphalt. It is composed almost entirely of Gilsonite, a natural ore, but does contain minute amounts of selected plasticizers, cutter stock, and concentrated resins. Gilsonite is a natural asphalt and is defined in the Glossary of Geology and Related Sciences, published by the American Geological Institute, as:

> "one of the varieties of asphalt having a black color, brilliant luster, brown streak, and conchoidal fracture".

By a letter of May 21, 1970, from Mr. Paul F. Cecchini, Assistant Maintenance Engineer, Mr. Wyant was given authorization to place one distributor load of the material on the shoulder of the southbound lane of Interstate 95 from Route 652, Milepost 6.13, to the Route 207 interchange, Milepost 3.31, in Caroline County. Conditions of the agreement were that the Company would furnish the material and apply it to the shoulder at a cost of $.09 per square yard to the Department.

The Highway Department was interested in the use of Perma-Bind on asphalt pavements as a retarder to oxidation, provided the material did not produce any undesirable conditions.

Subsequent to the placement of the material on Interstate 95, it was learned that a section of street in Danville, Virginia, had been surface treated with it. Since this treatment was in no way the responsibility of the Highway Department, it is discussed separately in a later section of this report.

COMPOSITION AND CONDITION OF SHOULDER

Cores revealed the depth of the pavement on the shoulder selected for the application of Perma-Bind to be three inches. It consisted of a B-3 bituminous concrete base covered by an AE-2 sealer. The aggregate is granite gneiss with abundant pink feldspar and green chlorite and came from the General Crushed Stone Quarry at Doswell, which is mapped geologically as part of the Baltimore gneiss group, a formation of uncertain age.

Prior to application of Perma-Bind, the shoulder was in excellent condition with no cracks, holes, or other deterioration and was free from dirt, debris, grass, and other foreign matter. Figures 1 and 2, which are appended, show the condition of the shoulder. The shoulder was swept with a roller-type broom immediately prior to the application.

PLACING OF MATERIAL ON SHOULDER SURFACE

The Perma-Bind was put in place between 3:00 p.m. and 3:12 p.m. on July 22, 1970, using an Etnyre distributor charged with 1,262 gallons. The distributor applied approximately 100 gallons a minute on a section 10 feet in width and 2.3 miles in length at a rate of ± .11 gallons per square yard. The material was applied in an even coat and appeared to give a 100% coating. While wet the material had an appearance similar to that of glossy black enamel as shown in Figures 3 and 4.

The weather was overcast and humid with an occasional sprinkle in the morning that quickly dried. At the time of application the surface temperature of the pavement was 94° F. and the air temperature was 78° F.

CURING TIME AND PENETRATION

After thirty minutes of curing, tracking was observed but no pickup of the material was noted when an automobile was driven over it. Figure 5 shows the tracking thirty minutes after placement. The automobile was again driven over the material after one hour of elapsed time and no tracking occurred although the surface was still tackey. Two hours appears to be a sufficient amount of time for curing at this temperature and for this surface type before allowing traffic on the material. The surface temperature was 98° F., and the air temperature was 80° F. at 4:00 p.m.

The site was revisited on July 23 after an all night rain, and the Perma-Bind had proven to be impervious to water and was completely cured (see Figure 6). Cores were taken on the shoulder and little or no penetration of the underlying asphalt by the Perma-Bind could be determined. Figures 7 and 8 show the dry, completely cured shoulder with Perma-Bind.

SLIPPERINESS TESTS

Slipperiness tests were performed using the Virginia Highway Research Council skid test trailer. The Virginia Department of Highways has for some years had a policy whereby any surface which falls below a stopping distance number (SDN) of 40 is resurfaced. In addition, the Department has strived to place pavement surfaces which would not fall below an SDN of 50 during their service life. This means that the Department does not consider a surface type which would be expected to drop

below an SDN of 50 to be the most desirable type of surface for highways.

Testing was performed July 23, August 5, and August 11 on the Perma-Bind. On each day of testing eight slipperiness tests were run under wet pavement conditions. For purposes of comparison, a like number of tests were conducted on a similar section of shoulder with the only change in condition being the absence of the Perma-Bind.

The results of the above tests were converted from skid trailer numbers (SN) to stopping distance numbers (SDN)[1/]. The resulting SDN's are shown below:

	Predicted Car Values — with Perma-Bind		
	July 23	August 5	August 11
Average	24	37	34
Range	23-28	34-40	32-38

	Predicted Car Values — without Perma-Bind		
	July 23	August 5	August 11
Average	47	48	45
Range	44-50	44-50	43-47

As can be noted, some improvement in skid resistance has been realized since the first tests were performed. However, at the third testing on August 11, the surface was still extremely slippery. The Highway Department, therefore, covered the Perma-Bind with a chip seal.

THE EXPERIENCE OF THE CITY OF DANVILLE WITH PERMA-BIND

A one-lane section of road on westbound Route 58 in the City of Danville between Mileposts 13.86 and 14.56 was surface treated with Perma-Bind on June 29, 1970. Five hundred and fifty gallons of the material was applied using an Etnyre distributor at an approximate rate of .12 gsy. The Hughes and Dalton Hardware and Building Supply Company of Danville was the supplier.

[1/] Virginia has developed a correlation curve for converting skid trailer numbers (SN) to stopping distance numbers (SDN). This correlation is based on data obtained by both methods on about fifty highway surfaces.

This section was constructed in 1965 and is composed of a B-3 base, an I-2 binder, and an S-5 surface plant mix. [2/] Granite was used as the aggregate and this was supplied by the Vulcan Quarry in Shelton, North Carolina, located just across the Virginia state line.

Since the Perma-Bind was applied and then covered before the author visited the site, the exact condition of the pavement prior to the application is not known to him. The adjacent lane, constructed at the same time, however, appears to be in good condition with no holes, cracks, or other deterioration. The surface was swept prior to application of the Perma-Bind.

Almost immediately after the material was applied, motorists began registering complaints concerning its slickness when wet. Several motorists skidded off the road and two accident reports list the cause of accident as the slickness of the material. Neither of the motorists in the two reported accidents were charged with an offense by the police. The median strip between the westbound and eastbound lanes shows numerous skid marks and a roadway lighting pole in the median strip bears collision marks; but it is not possible to determine if the Perma-Bind caused these skids.

The City of Danville had this section of road resurfaced August 6, 1970, after having the Perma-Bind down a little over a month.

SUMMARY AND RECOMMENDATION

It was found that Perma-Bind can be quickly and easily applied with a bituminous distributor which produces an even coating while distributing about 100 gallons a minute. Approximately .11 gallons per square yard gives a 100% coating to the road surface. The curing time for the material is short; only between one and two hours. An all night rain that followed the application of the material showed it to be impervious to water. It is therefore believed that Perma-Bind can do an excellent job of sealing an old pavement. However, slipperiness tests conducted with the Virginia Highway Research Council skid test trailer showed the Perma-Bind to be extremely slippery, and the Virginia Department of Highways therefore scheduled a resurfacing with a chip seal.

Based on the fact that Perma-Bind is dangerously slippery, it is recommended that it not be used as a highway surface material.

[2/] Refer to Virginia Department of Highways Road and Bridge Specifications for explanation of plant mixes.

Figure 1. Untreated shoulder, southbound direction, Interstate 95.

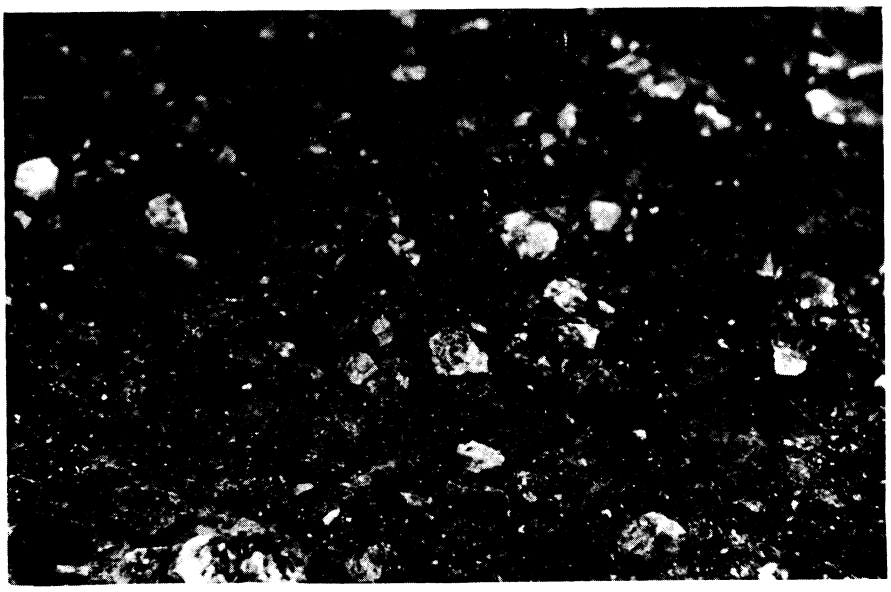

Figure 2. Close-up of untreated shoulder, Interstate 95.

Figure 3. Uncured Perma-Bind (approximately 5 minutes after application).

Figure 4. Close-up of uncured Perma-Bind.

Figure 5. Vehicular tracking of Perma-Bind after 30 minutes of curing.

Figure 6. Perma-Bind 24 hours after application and following an all night rain.

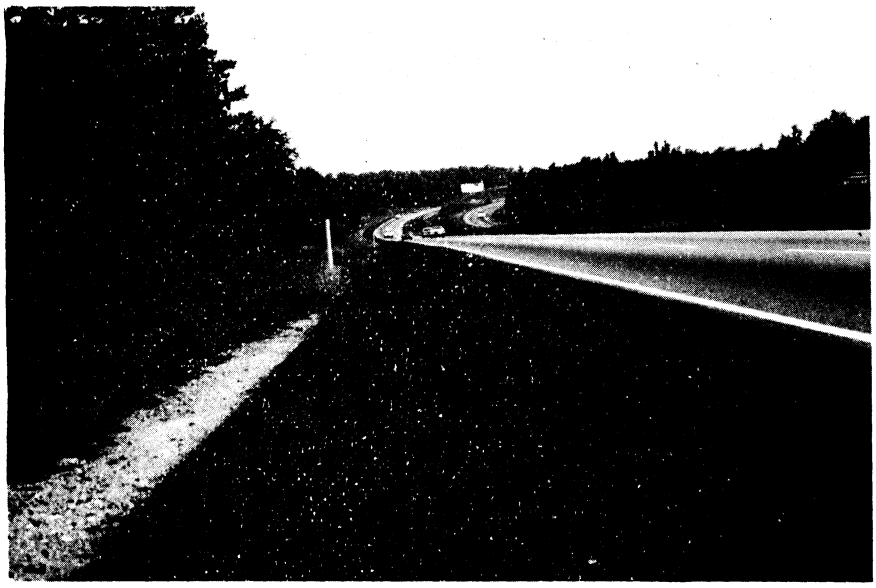

Figure 7. Treated shoulder, southbound direction, Interstate 95.

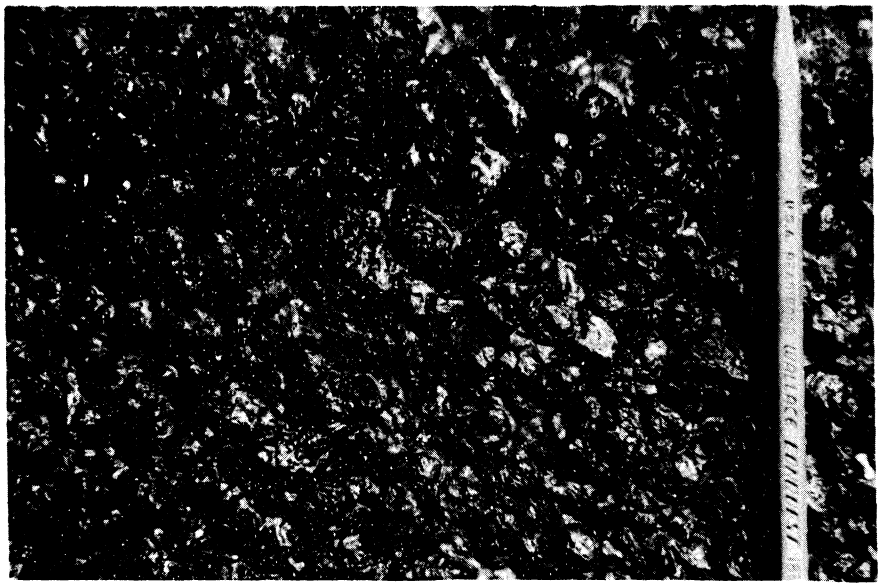

Figure 8. Close-up of completely cured, dry shoulder with Perma-Bind.