Memo on Neoprene Rubber Joint Sealer

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Early last fall samples of a new type of joint sealer consisting of Neoprene Rubber and devised by the Lastite Joint Company of Chicago, were submitted to the Research Laboratory for test. These were sent at the suggestion of Mr. Cutler, who later arranged for an experimental installation of these in the concrete pavement under construction on U.S. 27 (Alexandria-Falmouth Road) in Campbell County.

These sealers are prefabricated strips having different types of designs suitable for different types of joints. Their use is not confined to joints produced by the Lastite Company. The three types demonstrated at the project in Campbell County are shown in Fig. 1. Several principals are embodied in the design of these sealers. First, they are prefabricated and are installed at the joint so that there is no need in pavement construction to return for joint sealing sometime after the pavement has been completed; secondly, the shoulders on both types of top sealers are embedded some distance down in the concrete, thus theoretically forming a permanent barrier against seepage of water to the subgrade; thirdly, this shoulder embedment and the semi-hinge construction make possible the expansion and contraction of joints without breaking the bond or seal; and finally, they are made of durable material which is resistant to temperature fluctuations, oil or gasoline, chemicals for ice control, and even to momentary applications of flame (important in airport pavements as protection against jet engines).

As I recall the remarks made during the demonstrations in Campbell County, there were some advantages mentioned by a representative of the Lastite Company. Probably there were others, such as the uniformity of this finished seal as compared with the usual poured material, (see Figs. 4 and 5). On the other hand there are some possible disadvantages, for example, difficulties of keeping the material in place during finishing operations, or difficulties in getting the sealer at exactly the correct elevation with respect to the pavement surface throughout the entire length of the joint.
Those appear to be real problems that should be overcome, because I have observed them not only in the three experimental joints here but also in perhaps 15 or 20 more at several locations in the District of Columbia. I saw their installations during the Highway Research Board Meeting early last December, and the general flaws here appear to be identical with the obvious flaws there. These are not particularly serious, and it may be that they would soon be eliminated in any job where a large number of joints of this type were installed so the contractor's men could become familiar with them.

The assembly of a Lastite joint in the field and most of the general features of an assembled joint are illustrated in Figs. 2 and 3. Obviously, if many joints were going to be assembled in the field, adequate provisions would be made for the work in place of the improvised arrangement shown in Fig. 2. The actual placement of the sealers on any joint is quite simple, the principal concern being in sealing the edges as well as the top, and getting a steel form placed over the sealer in order to keep it in alignment and prevent displacement during the pouring of concrete and rough finishing operations.

At the time that the three experimental joints were placed in the Campbell County project, (November 30, 1948) one of the regular joints adjacent to these was chosen for comparison measurements. After the concrete had cured, two small holes were made in the pavement at each joint for the purpose of setting measuring plugs. These holes were on opposite sides of each joint and about five inches apart. Brass plugs with measuring points were grouted into the holes, and this mortar was allowed to cure about two weeks before the first set of measurements was made on January 25.

Table I shows the location of joints and records the first set of measurements between plugs. Temperatures in the air and in a thermometer well placed in the pavement are included. Fig. 6 illustrates the method used in measuring the distance between joints.

### TABLE I

<table>
<thead>
<tr>
<th>Station</th>
<th>Sealer</th>
<th>Distance Between Points (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>622 + 22</td>
<td>Neoprene</td>
<td>5.036</td>
</tr>
<tr>
<td>622 + 42</td>
<td>Neoprene</td>
<td>4.931</td>
</tr>
<tr>
<td>622 + 62</td>
<td>Neoprene</td>
<td>4.953</td>
</tr>
<tr>
<td>622 + 82</td>
<td>Rubber - Asphalt</td>
<td>5.045</td>
</tr>
</tbody>
</table>

Note: Joints are approximately 9.1 mi. North of Licking River Bridge or 0.9 mi. South of Cross Roads Tavern by speedometer readings.
These measurements will be supplemented from time to time with measurements in the winter and summer in order to determine reactions of the joints to temperature as well as time. Observations of the general performance of the sealers and their effects on the concrete, will, of course, be made along with the length and temperature measurements.

In conjunction with the field installations, two laboratory samples consisting of concrete blocks 24 by 25 inches containing a section of a contraction joint both to a depth of 9 inches have been prepared. These have neoprene sealers on top, and one has been buried in the ground alongside the laboratory so that the surface of the block is at ground elevation. It is our intent to treat the surface heavily with salt whenever the block is covered with snow or ice, and thus observe its performance over a long period of time. Of course, there has been little possibility for the salt application this winter.

The other block is being held for load tests as soon as we can provide proper arrangements for applying the loads at a reasonable rate. The idea is to alternate load applications from the concrete on one side of the joint to the concrete on the other side in much the same manner as a moving wheel load. Support below will be firm yet capable of permitting some deflection at the joint under load. A fatigue machine would be ideal for this purpose, but since there is none available we are trying to improvise a method of application using a loading frame. A testing machine would be too cumbersome for this purpose, but there is a possibility of placing an additional block of the right width in the circular track for that type and magnitude of loads in the near future.

In view of the flaws in the installations in Campbell County last Fall, it is my suggestion that some more joints of this type be placed in that road when construction begins again in the Spring if interest continues on the matter.

Respectfully submitted

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Associate Director of Research

cc: Research Board Members
Fig. 1. The three principal forms of Neoprene sealers are illustrated in this view. Top sealer for an expansion joint is shown on the left, top sealer for a contraction joint is in the middle, and on the right is a sealer for the bottom or under side of traction joints. The bottom sealer is intended for use over soft, fine grained subgrades where a slurry might be created after the pavement is in use and work its way upward in the joint. Only the one in the middle was installed with contraction joints on the Alexandria-Falmouth Road.
Fig. 2. The particular contraction joint installed in Campbell County consisted of a divider strip made of pressed wood or something similar to it. All other parts including dowels are fabricated about this preformed divider, therefore the joint can be assembled easily in the field. This view shows a joint partially assembled. Note that the so-called H sections containing the dowels are held in place by clips until the cradle (barely seen at the bottom of the picture) is fastened on for support. Then the clips are removed, and the joints set right-side-up for assembly of remaining parts including the sealers.
Fig. 3. Assembled contraction joint for entire width of pavement. Note center connector plate (upper right of photo) which joins the two half-widths of joint together. A steel form has been placed over the top of the rubber sealer and wired securely. This is a temporary measure to keep the top in alignment and prevent displacement of the rubber during the pouring of concrete and rough finishing operations. This steel form is removed at the time of final finish about the joint. A short section of the sealer has been placed down the edge of the joint, and in addition "cut back" rubber-asphalt sealer has been spread over the openings on the edge to prevent infiltration of water at that point.
Fig. 4. Joint with Neoprene Sealer at Station 622+22 on the Alexandria-Falmouth Road. This photo was taken about two months after the installation and at the time of the first measurements across the joints. Despite its uniform appearance at the surface, this joint was knocked somewhat out of vertical alignment by the finishing machine. As is the case on most experimental installations where only a very few samples of new and unfamiliar materials are involved, there were several flaws in the installation of these joints which probably would have been overcome in a short time if there had been enough joints for the workers to become familiar with them.
Fig. 5. One of the advantages of a prefabricated sealer is its uniformity and the resultant elimination of uneven and unsightly filling of joints which often results with poured fillers. This is a view of the joint at Station 622+62 on the Alexandria-Falmouth Road, which is the joint of usual type (filled with hot-poured material) across which measurements will be made for comparison with measurements from the experimental joints.
Fig. 6. Measuring the distance across a joint with Neoprene Seal on January 26, 1949. Accumulations of soil and fine aggregate particles probably caused by shoulder operations and lengthy periods of rainfall at that time have completely obscured the Neoprene Seal.