134

MICHIGAN
STATE HIGHWAY DEPARTMENT
Charles M. Ziegler
State Highway Commissioner

COLD-POURED ASPHALT-RUBBER JOINT SEAL EXPERIMENT ON M-43

Bryant Pocock
and
William Martin

Highway Research Project 36 G-4 (3G)
Progress Report No. 1

Research Laboratory
Testing and Research Division
Report No. 134
August 24, 1949

COLD-POURED ASPHALT-RUBBER
JOINT SEALING EXPERIMENT

At the request of the Construction Division, and by permission of the Public Roads Administration, an experimental joint seal study was established on Construction Project SS-23-6, C5 on M-43 under the direction of the Research Laboratory. The objects of the experiment were (1) to observe, under normal field conditions, the preparation and installation of a cold-poured type of asphalt-rubber joint sealing compound, and (2) to compare its performance under service with that of the hot-poured type of asphalt-rubber compounds now in common use.

The location of the experimental section on Project SS-23-6, C5 is shown in Figure 1, as well as the exact installation limits of the two types of joint sealing materials.

Cold-poured Asphalt-rubber Section:

The cold-poured asphalt-rubber material used in this experiment is known commercially as Enamelite No. 332.88, a product of the Presstite Engineering Company of 3900 Chouteau Avenue, St. Louis, Missouri. The Presstite Company furnished, gratis, their own equipment, personnel, and sufficient material to seal 44 contraction joints and 8 expansion joints between stations 69+52 and 114+97. The work was done under their direct supervision and specifications in the presence of Research Laboratory personnel. To substantiate their claims that their material could be applied when the concrete was wet, all joints between stations 87+81 and 114+97 were wetted with water just prior to pouring joint. The water had no apparent adverse effect on adhesion. The work was done on June 2, and 3, 1949 under ideal weather conditions which were clear and bright with air temperatures varying between 80 and 90° F. The pavement temperature averaged 95° F.

Enamelite is a two-package material consisting of a dry powder (asphalt and filler), and a liquid (liquid bitumen carrier with rubber). The two materials are combined in the proportions as packaged in a specially designed portable mixer. The mixed compound is extruded from the mixer directly into the joint through a nozzle so constructed as to pass freely in the joint opening. Immediately after pouring, the material is covered with a strip of paper to prevent pick-up during its initial curing and hardening period which takes about 24 hours.

Prior to sealing, the joints were thoroughly cleaned by first raking them with a sharp tool to remove fixed stones and concrete obstructions, after which a power wire brush was used to remove all traces of dust, laitance, and membrane-curing compound. Compressed air was not available for additional cleaning of joints. The air from the rotating wire brush was sufficient to remove loose particles of sand and dirt. Photographs showing various stages of the sealing operations will be found in Figures 2 to 8, inclusive.

Hot-poured Asphalt-rubber Section

The experimental section of hot-poured asphalt-rubber joint sealing material extended from Station 115+97 to 176+60, the location of which is also shown in Figure 1. The material used in sealing this section was a hot-poured type of asphalt-rubber joint sealing compound known as Careylastic, manufactured by the Philip Carey Co. of Cincinnati, Ohio. All work on this section was done by the contractor's men and equipment in conformance with the Department's specifications for joint sealing and in the presence of Research Laboratory personnel.

Attention is called to the fact that joints between 115+97 and 148+70 contained a mixture of two different compounds, Careylastic and Zero-lastic. The latter is a product of Servicised Products Company of

Chicago. It so happened that an unknown quantity of Zero-lastic became mixed with Careylastic stock between the above stations. This was corrected east of 148+70.

Prior to sealing, the joints were cleaned by blowing with air and raking, followed by a mechanical wire brush constructed by the Research Laboratory. The joints were sealed from June 27-29, 1949 under ideal weather conditions. It was clear and hot with air temperatures ranging around 85° F. Various stages of pouring operations are shown in Figures 9 - 12 inclusive. Temperature of sealing material was maintained between 380-400° F. Pavement temperature averaged 94° F. throughout the pouring.

Relative Cost of Sealing Operation

In accordance with current market prices, the two joint sealing materials are comparable in cost. With regard to labor, the hot-poured sealing operation will require at least one more man to do the work.

From past experience with hot-poured compounds, it requires from 1 to 2 gallons of material for a 22-foot contraction joint which includes normal operational losses and shrinkage. The results of this work with the cold-poured material indicate that approximately the same amount of material will be required to satisfactorily seal normal contraction joints. Nine hundred pounds of cold-poured material were used for the 1144 linear feet of combined contraction and expansion joints contained in the test section. This is equivalent to 17.3 pounds per 22-foot joint, or approximately 2 gals. of material per joint.

Pavement Details

Pavement - 22 feet wide - 8 inches thick, uniform construction

Crown 1-1/4 inches

Longitudinal plane of weakness joint with 1/2" tie bars

Air-Entraining Concrete

Pouring date of pavement in test area, May 9 through May 25, 1949

No expansion joints except at Bridge at Sta. 87+50

Contraction joints at 99-foot intervals

Load Transfer 1" x 15" dowels at 12-inch spacing at one half depth of pavement. Joints formed by groove at surface 1/2" wide, 2" deep, filled with joint seal.

Subbase 15 inches of granular material from local pits meeting Michigan State Highway Department specifications for subbase material.

General Comments

The initial appearance of the two joint seals were comparable in that they both wetted the concrete to give a satisfactory bond. Subsequent to pouring, shrinkage took place in both materials. Normal temperature shrinkage was apparent in case of the hot-poured material shortly after pouring, whereas the cold-poured material showed no immediate shrinkage. However, some shrinkage did occur within a few days after pouring.

The operation of applying cold-poured joint seal has been worked out satisfactorily as to method of mixing and application. From experience however, it is indicated that joint cleaning operations must be more thorough in the case of cold-poured materials in general.