FILLERS AND CUSHION COURSES FOR BRICK AND BLOCK PAVEMENTS

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Opinion has always been divided as to the merits of the various fillers used for brick and stone block pavements. In the United States the following have been used: sand, tar, asphalt, mixtures of these, and cement grout. None is perfect. Sometimes it has been found that a pavement which has been giving satisfactory service for years suddenly develops faults because the character of the traffic has changed. At the present moment we are faced with one of these changes. For years asphalt filler has been satisfactory in most locations, but with the advent

Figure 1. Bituminous Filler
The surface of the bricks is clean and joints are well filled

of fast moving motor cars it has been observed that the asphalt which adheres to the surface of the pavement causes skidding whenever the pavement is wet.

The filler used should make the pavement waterproof; it should be able to withstand vibration and impact without breaking away from the blocks or bricks; it should conduce to quietness; it should permit the easy removal of the bricks, and yet it should adhere tenaciously to them; it should not interfere with expansion and contraction of the paving material; it should be easy to apply, cheap and lasting; it should withstand temperature changes; it should not produce a slippery surface at any time; it should resist wear and abrasion; it should not track nor be carried off by traffic; it should not spatter passing traffic; it should set up rapidly so that the pavement may be immediately opened to traffic.

Such a filler is yet to be found.

Some asphalts are more adhesive than others; some are more cohesive. Lack of adhesiveness permits water to gain entrance to the cushion or

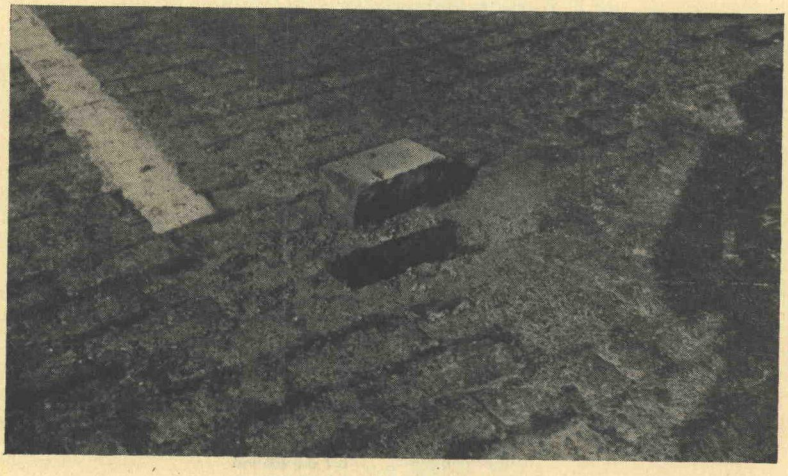

Figure 2

High penetration asphalt filler leaves a sticky surface and the joints are only partially filled. Some of the filler has flowed under the bricks, and much of it has boiled out, in extremely hot weather.

Figure 3

The surface is clean, but joints are not full. Therefore there is serious spalling.

the base. The tar pitches, as a rule, are likely to flow in summer and to chip in winter, but they thoroughly waterproof the joints. Usually

the tars do not remain for so long a time on the surface of the pavement as do the asphalts. Grout filler has been both successful and unsuccessful. Some of the best jobs have been grout filled; and on the other hand, the worst failures of brick pavements have been caused by grout filler.

Mixtures of asphalt and sand, and of pitch and sand have been widely used. These are called mastic fillers. They have been successfully used with lug bricks and granite blocks. An asphalt-pitch-sand mastic

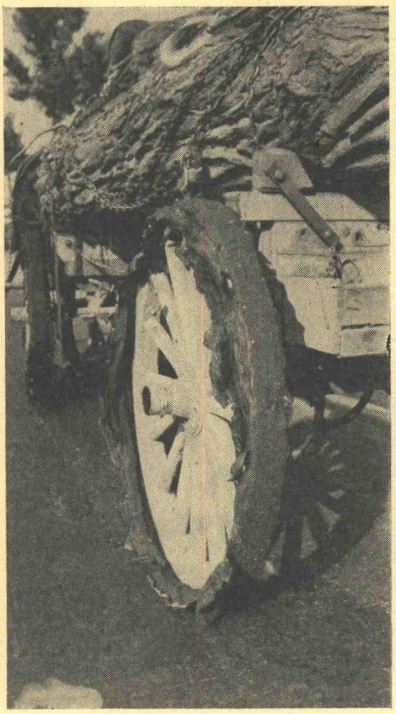

Figure 4

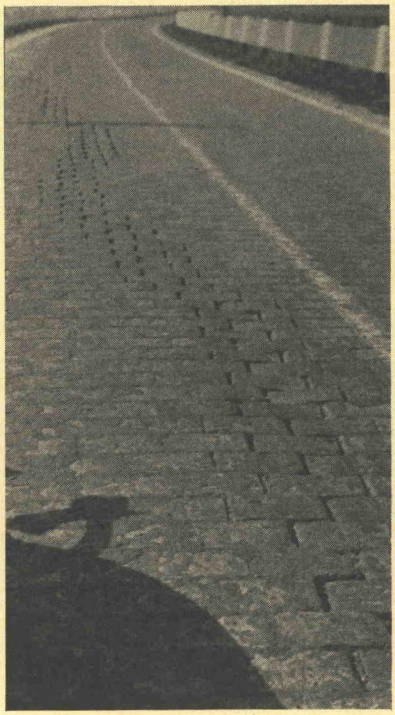

Figure 5

Figure 4

Steel tires pick up filler, pulling it from joints

Figure 5

Longitudinal crack in concrete base permits sand cushion to escape. Hence the filler leaves the joints, flowing under the brick.

which was used in Brooklyn, N. Y. for several years approached the ideal far better than any other. At the present time the Ohio State Highway Department is watching an experiment with various fillers on the Columbus-Lancaster Road. Asphalts and pitches were used. It is too soon after application to report on their behavior, although some of the sections already show signs of failure.

Several methods have been suggested to prevent the adhesion of the filler to the upper surface of the brick and thus remove the film of bitumen which causes cars to skid in wet weather None of these has yet been given a thorough trial

Transverse and longitudinal cracks in concrete foundations often cause failure of the wearing course, or at least a rough spot, because the sand cushion escapes through the cracks and the bricks are left without suitable support Spalling, cracking, and general disintegration follow In order to overcome this, cushion courses other than sand alone have been tried such as a mixture of cement and sand, tar and sand, asphalt and sand, and granulated slag Investigations of all of these are under way

The latest development in brick paving consists of a brick wearing course, asphalt filled, laid on a mastic cushion on a steel base Its behavior during the coming year will be observed and reported

DISCUSSION

ON

FILLER AND CUSHION COURSES FOR BRICK PAVEMENTS

MR A H BLANCHARD, *Consulting Engineer, Toledo, Ohio* It does not appear to be practicable to fill the joints of a plain wire cut brick pavement uniformly with bituminous cement Several years ago investigations were made at the University of Michigan relative to a brick pavement laid with plain brick which were supervised by two engineers of a paving brick manufacturers association It was found when the pavement was taken apart after 24 hours that there was no asphalt filler in some of the joints A report of the details of this investigation was published in the Proceedings of one of the Highway Engineering Conferences at the University of Michigan

MR GEORGE SCHLESINGER, *National Paving Brick Manufacturers Association* In regard to the type of brick which Mr Blanchard mentioned, the National Paving Brick Manufacturers Association at the present time—I am not responsible for what was done in the old days—recommends a lug brick I might also say that the standard specifications for brick paving in Pennsylvania and Ohio require lug brick, but I will not say that you cannot get good results with plain brick However, it is a lot easier to get a satisfactory job of filling with lug brick

MR R B GAGE, *New Jersey, State Highway Department* If this experiment had been performed under the jurisdiction of the New

Jersey State Highway Department, along the lines the views indicate, the Inspector and Engineer would be looking for another job as soon as the experiment was finished If a bituminous filler does not fill the joints and properly adhere to the surface thereof, something is wrong The pictures shown where the asphalt was picked up by the tires of the machines are quite good proof that this bituminous material was never properly applied It was evidently applied at too low a temperature, also in excess of what was needed It certainly would be foolish to try and draw conclusions from any experiment that was not properly performed

A sand asphalt mixture is very difficult to keep uniform in composition and to apply properly To secure the required adhesion and installation, it must be kept hot, which produces a thin liquid mixture out of which the sand settles easily and quickly Consequently, it must be kept constantly agitated and applied very rapidly while hot and thin, or the joints will not be filled and excess material will accummulate on the surface as shown in the pictures To avoid this segregation, we use a bituminous mastic that has the consistency required for a definite use and the composition of which is not affected to any great extent by the temperature needed for its proper application

It is also strange how the surplus material that collected on the surface could be forced to the surface by expansion of the bricks if the joints were not filled If the bricks were of the lug type, then the lugs would have to be crushed by the expansion before any pressure could be applied to the bitumen in the joints It is much easier and more reasonable to assume that the bitumen did not have the required temperature or was not properly applied than to account for these abnormal conditions in any other manner

Mr Blanchard How are you going to fill the joints if it is found that many of them are only a sixty-fourth of an inch wide? If separators or strips of metal or wood are used, uniform widths of joints may be obtained and they may be properly filled The query naturally arises, why increase the cost of laying when the use of wire cut lug brick results in joints of uniform width

REMOVAL OF ICE FROM PAVEMENTS

B C Tiney, *Project Chairman*

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The formation of ice on streets and highways creates a very serious traffic hazard, particularly at such locations as steep hills, sharp curves, and approaches to railroad crossings and traffic signals