

more by this process, in the busiest streets of the city, and car traffic interfered with to such a limited extent that you hear no complaint whatever from the travelling public during the course of the work. Included in the 10 miles of single track will be found all classes of paving within the railway area—sheet asphalt, wood block granite block, vitrified block and scoria block.

**Type of Pavement.**—It has been suggested that this subject could properly include a discussion as to the type of pavement between and adjacent to the rails which has been found most satisfactory. The most satisfactory type of pavement in the railway tracks on heavy traffic streets is granite block, with a cement filler. Excellent results have been obtained in Baltimore with the recut granite. The old blocks are from 8 to 14 inches in length. The 8-inch blocks are re-headed, while the 14-inch ones are split, making altogether, blocks smaller and much more uniform in size than the standard new block. The result is a very uniform, even surface, an excellent pavement for track areas.

On streets which may be half business and half residential, or in the retail districts, vitrified blocks should be used.

All block pavements should be laid on a cement-sand cushion.

On strictly residential streets of very light traffic sheet asphalt has been used, but the writer rather deplores the use of this material within the track areas.

The block pavements are usually laid between the extreme outer rails, including the dummy, with two rows of liners on the outside of each outer rail. Selected granite block, on a mortar bed, is most desirable as liners on heavy traffic streets. On streets of lighter traffic and residential streets, wood block,  $4\frac{1}{2}$  inches deep, thoroughly embedded in the concrete and on a mortar bed, give most excellent results as liners and an excellent finish to the street, particularly where sheet asphalt is laid from the rails to the gutters.

In order to cheapen the cost of track paving our policy the latter part of last year was to install sheet asphalt in the dummy strip, where there is very little traffic, and which will give good results if the track work is stable. We will follow this policy almost exclusively this year, as a modification of our former standard, where asphalt is used between the rails and curb.

**Track Details.**—The rails are usually of the Trilby type, 105 lbs. to the yard, 7 inches deep, with a slight bevel on the outer paving edge. With this rail, and the use of steel tie plates and screw spikes, tierods may be eliminated, and by the elimination of the rods better results from a paving point of view are obtained. Tierods are a nuisance in track paving, causing a great amount of cutting if a block pavement is used, and usually have to be placed below the centre of the rail in case sheet asphalt is used in order to have them in the concrete instead of in the binder.

**Comparison of Mixing and Penetration Methods.**—Good construction could unquestionably be obtained by the re-routing of the cars, either by means of a third track and cross-overs or by diverting the cars to other streets, thereby allowing the concrete to be placed by the ordinary mixing method and at the same time allowing time for the concrete slab to set before car traffic is again restored. While this method is a safer way, it is much more expensive than the penetration method. Unquestionably excellent results have been obtained by the latter method such as have been described, its attractiveness being that it is cheaper as to first cost, owing, principally, to the economical manner in which the materials can be handled,

and it overcomes the principal objection of traction officials, namely, interruption to car traffic, which is, of course, a serious objection.

In order to obtain good results with the penetration method, every detail must be carefully looked after by the inspectors, such as the quality and size of the stone composing the ballast, the tamping, and the mixing and placing of the grout. Frequent test holes should be cut in order to see that thorough penetration is secured, and wherever possible the penetration should be started at the down-grade end of a block and proceeded with up-grade.

**Conclusions.**—Under the old system of earth foundation or ballast, failures and troubles were numerous. Under the new system of concrete under the ties, installed as has been described, the percentage of trouble is infinitesimal, the principal defects being at crossings and around special work. It proves conclusively that for strictly up-to-date permanent construction, both for the street railway system and the pavement, the ties should be laid on a concrete base, from 6 to 8 inches in thickness, and completely enveloped in the same.

## PULVERIZED COAL FOR LOCOMOTIVES.

The committee of the International Railway Fuel Association in charge of the subject summarizes the advantages of pulverized coal in locomotive practice as follows: (1) Smokeless, sparkless, and cinderless operation; (2) maintenance of maximum boiler pressure within a uniform average variation of three pounds without popping; (3) an increase of from 7.5 to 15 per cent. in boiler efficiency as compared with burning lump coal on grates; (4) saving of from 15 to 30 per cent. in fuel of equivalent heat value fired; (5) enlarged exhaust nozzle area, resulting in greater drawbar pull and smoother working of locomotive; (6) elimination of ashpit delays, facilities and expense and reduction of time required for and ease in firing up; (7) maintenance of a relatively high degree of superheated steam; (8) no accumulation of cinders, soot or ashes in superheater of boiler flues, smokebox or on superheater elements; (9) no punishment or overheating of firebox, new or old sheets, rivets, patch bolts, stay or flue beads; (10) elimination of arduous manual labor for building, cleaning, and dumping fires; (11) avoids expense and annoyance of providing various sizes and kinds of fuel; (12) eliminates the necessity of front end and ash pan inspection, and for special fuels, firing tools and appliances for building fires and for stoking and cleaning fires; (13) equal provision with engineer for fireman to observe signals and track, thus reducing liability of accident. "Your committee," concludes a recent report on the subject, "is of the opinion that the effectiveness and utility of the use of fuel in pulverized form has been demonstrated from the past year's development, and that progress in the use of this method of stoking and burning bituminous and anthracite coals and lignites for generating power, heat, and light on railways will be marked from now on." It is stated that railways in many countries are now seriously considering the use of pulverized coal, and that some in the United States are already installing pulverizing plants.

The Railways Department has ordered from the Algoma Steel Corporation, Sault Ste. Marie, Ont., 15,000 tons steel rails, A.S.C.E. standard sections, 80-lbs., for the Hudson Bay Railway, for 1917 delivery.