

The speaker explained how dust is created into a nuisance on road surfaces. Hard tires and the grinding together of particles owing to severe strain set up by heavy vehicles, were chief causes. He went on to examine the macadam road and to show how proper construction will do away with a great deal of unnecessary dust. The superficial and internal dust could be partially avoided by proper selection of materials, proper drainage and by the formation of a good physical bond. Fine material should be kept to a minimum and selection of fine aggregate should be based on its ability to refrain from becoming dust. The relation of sand, clay, loam, etc., to the dust problem was outlined.

To allay superficial dust, sprinkling was termed inefficient, requiring periodical repetition which was expensive, and simply turning dust into mud. Sea water was sometimes used, as the salt absorbed moisture from the air and kept the road moist. Chemicals in common use were described. Glutrin, with or without water, had cementing power and made clay harder and more tenacious. Bitumens were successful binders to prevent the internal dust from rising to the surface and protecting the metal, besides absorbing the superficial dust. The good qualities of asphalts were also outlined. Each individual case must have its own consideration, however, in the selection of a material that will be most efficient as a dust layer.

In the discussion which followed, the absence of internal dust in a case of concrete roads was mentioned. Superficial dust could readily be prevented by the application of a preventative. The same applied to brick, there being little or no dust except that which was brought on to the road. Attention was called to the dust-arousing characteristics of the speeding automobile, and the suggestion made for greater penalty for excessive speed.

Mr. A. T. Laing, of the University of Toronto, in discussing the paper, emphasized the direct bearing which self-propelled vehicles and resulting conditions as to road traction and velocity had upon the dust problem. The heavily loaded motor truck not only broke up the crest, but produced internal attrition in the road metal, and the fine material worked to the surface to form dust. The periphery of the wheel produced a shearing or grinding effect on the road surface, and the speed finished the job, producing results disastrous to the roads; a discomfort to travellers and a menace to health.

The two-fold character of the problem was outlined. The application of a palliative or dust layer and the treatment of the surface for the prevention of further dust formation, were touched upon. The wide variety of compounds on the market were subject to one necessary and important characteristic, *viz.*, cohesive property. An oil low in paraffin and also in sulphur was desired. Other qualities which a good preventative should possess were similarly given, and the difficulty of choosing material to best suit the conditions was pointed out.

The close connection between dust prevention and road maintenance was such that the extent to which we eliminate dust formation do we contribute to maintenance. The nature of traffic has a direct bearing.

The discussion concluded by reference to the proper treatment of ordinary macadam roads for dust prevention. It was felt that a light material should be applied, so that a lasting carpet would be formed for light traffic. But, for heavy traffic, it was felt that the road should be thoroughly clean, without molesting the stone, and given a coat of  $\frac{1}{3} : \frac{1}{2}$  gallons per square yard of heavy bituminous application. In case it is the first treatment, two coats, a light and a heavy, should be applied. Crude oil

is not desirable, as it contains objectionable material. An excessively thick carpet on macadam should be guarded against.

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### Maintenance.

By L. Henry, Chief Provincial Engineer, Quebec.  
(Read by J. Duchastel, City Engineer, Outremont.)

Questions to be considered were the ton-mile cost of maintenance; interest of capital; annual payments; and costs of (1) improving, (2) maintaining permanent portions, (3) maintaining non-permanent portions, (4) grading. Cost of maintenance depends on the construction of permanent and non-permanent parts. It was pointed out that when protection in the matter of underdrainage, etc., is omitted when the road is built, maintenance is seriously affected. Properly, the improvement is not maintenance, nor are such items as renewal of old wooden bridges, increasing base, etc. They are permanent improvements.

Emphasis was laid upon the important feature of drainage and the necessity of keeping it constantly in good condition. This included the cleaning of culverts, removal of weeds, etc. Attention had to be paid to slopes and to guard rails where required.

Maintenance of the non-permanent part of the road, *i.e.*, wearing course, was then considered. The author suggested that the upper four inches of the road be regarded as wearing surface and non-permanent. For its maintenance, two methods were in vogue, (1) patrol and (2) general. By the first, defects were eliminated immediately upon appearance,—a patch-work repair. In the second, the defects were left and all repaired together.

The speaker suggested a sinking fund to provide new wearing surface, and also to provide the patrol system. In the discussion which followed Mr. R. H. Fair, county road superintendent, Kingston, emphasized the importance of proper maintenance of side lines and less important road. He stated that there was a decided lack of maintenance with respect to these roads, in the province. Mr. Charles Talbot, county road superintendent, London, called attention to the gravel roads and how they might readily be improved by the log drag, and later constructed into macadam.

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### Road Organization.

By George H. Henry, M.P.P., Todmorden, Ont.

The speaker dwelt upon the relation between the Crown and the farmer in the matter of maintenance of roads. He showed that this task master system had failed. The good road county system had not been successful either, and the government was thinking of stimulating the idea of road commissioners in each municipality. He felt that the county system was small enough, although the township system naturally suggested closer expenditure. A larger system, however, gave uniformity to grades, culverts, bridges, etc., and funds were more readily provided. The paper dealt almost entirely with the county system vs. the town system, and with the policy of the provincial government respecting the establishment of better organization for a more universal improvement of roads throughout the province.

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### Road Location.

By C. R. Wheelock, County Engineer of Peel.

The importance of location, the first thing to be considered in road improvement, and the most permanent