

on which the traffic is not confined to definite lines or very heavy.

10. Stone paving, carried out either with ordinary hand-dressed setts or with small setts (Durax; Kleinpflaster), laid on concrete and bound with cement or pitch, makes excellent and economical surfacings for bridges with heavy traffic. However, it is only suitable in cases where questions of the weight of the surfacing or of noise are of no importance. The thickness of the layer of sand interposed between the setts and the foundation will be decided in the same way as with an ordinary carriage-way, in town or country, as the case may be.

11. For movable bridges, and for non-rigid suspension bridges, the surfacing should be light and easy to attach to the bridge platform. The trials made in France and Belgium with old mine cables, or other fibrous substances of even less cost, and with such materials impregnated with tarry, bituminous or asphaltic materials should be encouraged.

Third Question. — Construction of Macadamized Roads Bound with Tarry, Bituminous or Asphaltic Materials.—Sub-section A dealt with this question and arrived at these resolutions:—

General Conclusions.—By the use of bituminous, including tarry or asphaltic binders, we may obtain a number of different forms of road crust, which may be employed with advantage, according to the various conditions of the road as regards traffic, locality, and climate.

The exact value and duration of life of these various road crusts, taking into account traffic, climatic conditions, and the methods of construction, remain to be determined.

For this purpose it is advisable to draw up a uniform system of tests, measurements and records, under the following headings:—

1. Physical and local conditions. (Plans, cross-section, slopes, camber foundations, subsoil.)
2. Materials employed, petrological analysis, dimensions, composition of the binding agent.
- 2a. Method of construction, date of construction.
3. Census of traffic on the section under review.
4. Climatic conditions affecting the road.
5. Periodical measurement of wear.
6. Periodical examination of the state of the road crust.

7. Actual cost of the road crust: (a) As regards cost of construction. (b) As regards maintenance cost.

The standard form in which the information is to be furnished will be drawn up by the Permanent Commission.

Particular Conclusions. — I. Foundation and drainage.

Confirming the conclusions adopted in 1910 by the second Congress (Brussels, 2 Question), which called attention to the advantages of a dry foundation and a sound subsoil, the Congress especially insists upon the great importance of efficient foundations in the case of road crusts bound with bituminous (including tarry or asphaltic binders) for the following reasons:—

(1) The road crust being expensive, it is important to give it a base which will increase its life.

(2) As the weight, speed and intensity of the traffic continually tend to increase on roads con-

sidered worthy of such a crust, it is best to provide a foundation which has been so constructed as to secure for the crust the best possible conditions of resistance to wear.

II. Dimensions and shape of metalling.

(1) When an ordinary macadamized road crust is constructed with a view to being tar-sprayed, it should be constructed of hard metal, with sharp edges, and broken as nearly as possible to a cube of the dimensions of from 4 to 6 c/m.

(2) In the case of bituminous including tarry or asphaltic macadam, carried out by the mixing process, the dimensions of the metal may be so selected and graded as to form a compact road crust with the fewest possible voids. The dimensions of the largest metal may vary according to the nature of the stone and of the traffic. When the process of construction employed requires more than one layer of material, the upper layer or wearing crust may be formed of smaller metal.

(3) In respect of bituminous including tarry or asphaltic road crusts constructed by the penetration process, the trials and tests now being carried out in various countries should be continued, taking care only to employ metal of as cubical a shape as possible, and with sharp edges, at any rate, for the portion of the road crust nearest the surface.

(4) It is understood that further experiments will also be carried out in the use of the other methods, and especially 1 and 2.

III. Employment of partially used metal.

By carefully eliminating all particles of mud and organic matter, it is possible to successfully make use of partially worn materials, on condition that they are not employed for the surface of the road crust.

IV. Relative importance of patching.

It is agreed that it is absolutely necessary to carry out repairs, in the case of all bituminous including tarry and asphaltic road crusts, immediately the necessity for them arises.

V. Permissible wear.

The complete renewal rendered necessary by wear must be carried out immediately the depth of the road crust is below a given limit of safety, or when its waterproofing qualities have become so poor that the road will unduly suffer from climatic conditions.

VI. Various means of employing tarry, bituminous and asphaltic materials.

In using these materials, both in the penetration method and the mixing method:—

(a) It is preferable to use dry stone in order that it may adhere well to the binder. In the mixing method the stone must always be dry, and if necessary it must be heated.

(b) One must never lay a top crust upon a soft or damp foundation. One should preferably carry out the work in fine weather.

(c) One must never employ too much binder, but only a sufficient quantity to bind the portion of the road which is being rolled.

(d) One must never employ road rollers which are too heavy.

VII. Tests and chemical analysis.

The advantages of analyses and methodical laboratory tests, and their necessity in the case of bituminous binders, are unanimously recognized.