

The chief points which should determine the selection of a type of surface are: (1) The volume and nature of the probable traffic over the road; (2) Conditions incident to the location of the road, including the character of the adjacent land and improvements, the character of the foundation, the existing grades, the climatic conditions, and the cost and availability of materials.

The volume and nature of probable future traffic is the most essential point. This must necessarily be approximated, and due allowance should be made for increase during the life of the road. The nature of the future traffic is difficult to foresee, owing to rapid changes in the weight and speed of motor-driven vehicles.

It has often been asked, "What type of road is best for country roads, especially those that are subjected to a mixed motor and horse-drawn traffic?" The answer to the question embraces several factors. These may be summarized under three general heads—utility, durability and cost.

One answer to this question is, to construct a surface adapted to each class of traffic; in other words, making a double roadway. This is done to the great advantage of the users of the road where the travel is sufficiently dense to require it, as adjacent to many of our cities.

Many miles of roads in New Jersey have been constructed as a double roadway in the following manner: The centre of the road is paved with bituminous concrete 2 inches thick for a width of 12 feet on a macadam foundation, and on each side of this a waterbound macadam road is constructed 6 inches thick and 4 feet wide, making a total width of 20 feet. The horses can travel on macadam surface when the bituminous surface is slippery, allowing one wheel of the wagon to run on bituminous surface, and leaving sufficient room for motor cars to run on centre of road. By following this method three ends are attained: First, the horses are able to travel over the road without slipping; second, a more satisfactory and wider road is obtained for less money; and third, there is less obstruction to traffic.

A bituminous concrete road 16 feet wide would cost more than a double road 20 feet wide. Another advantage of the latter is that the traffic would be distributed over the entire road. A road laid according to the above method would be free from the unsightly drop at edges often seen on sides of bituminous roads. This sharp drop at edges of road is very injurious, owing to the breaking off of the edges by the wheels when vehicles are driven off and on. This is most destructive to the life of the road; water is allowed into the body of the road, and as a consequence disintegration begins. The durability of the road is thus greatly lessened, as the breaking of the bond permits a movement of the stone particles. This increases the wear, thereby augmenting the cost of maintenance, with the result that the annual expenditure is increased.

It is, therefore, seen that this double roadway is the cheapest, whether measured on the basis of first or maintenance cost.

**Traffic Census.**—Traffic enumeration is now becoming an important element in the design of road crusts, or, at any rate, in the studies which have an influence in the choice of methods and materials. A traffic census should be considered one of the most important points in the decision of that important problem, the selection of that type of construction best suited to local conditions considered from the standpoints of both economy and efficiency.

At one time it was considered sufficient in taking a traffic census to count the vehicles passing a point in a given time, but it has now been recognized that such a method of enumeration is useless for comparing a mixed

mass of traffic on one road with a mixed and possibly very dissimilar traffic on another road.

The standard system in Britain is to reduce traffic to tons per yard width of road per day. While this is a great advance on the previous method, it does not take sufficient note of the character of the traffic, each class of vehicle being given an assumed weight.

It is readily seen that tonnage alone is not the proper unit to which a reduction of the traffic census should be made. A load of four tons drawn by horses and proceeding on hard-tired wheels at three miles an hour produces quite a different effect on the road than the same load proceeding at twelve miles an hour on rubber-tired wheels on a self-propelled vehicle. A heavy touring car travelling 25 miles an hour requires quite a different consideration from those in the case of a light motor express wagon, averaging 12 miles an hour.

**Conclusion.**—Relation between the traffic and maintenance costs is difficult to express in any particular case. (1) Many factors other than traffic are involved, such as climatic conditions, grades and drainage; (2) the present condition of traffic records and of the records of relation of traffic conditions to wear has not reached the point where such conclusions can be drawn.

In view of the present impracticability of making roads sufficiently strong to withstand any kind of traffic, it is important that a concise record be kept of the expenditure, character, and effects of traffic, weather conditions and other details including the condition of the surface and sub-crust in respect of all roads. By this means it may be proved conclusively that the difference in cost of maintenance of the roads before and after the traffic in question comes upon them is a material amount, and that the extent of repairs is reasonable. The method of collecting evidence and of keeping accounts is a matter of extreme importance, and it would be well if some standard form were adopted.

In order to proceed with system in the matter of choice of a road, the engineer should have the necessary data as to traffic; as to cost of construction and maintenance of similar type of road under like conditions; as to the life of road; as to climatic conditions, and, in fact, all available information on the subject.

The Eugene Dietzgen Co., Limited, dealers in engineering and scientific instruments and supplies, have moved their head Canadian office from 116 Adelaide Street West, Toronto, to 31 Richmond Street West, Toronto. They now occupy the old Methodist Book Room quarters, which provide more floor space.

It is announced that the American Coal Products Company, well known in connection with the sale of sulphate of ammonia, and parent organization of the even more widely known Barrett Manufacturing Company, has decided to unite both concerns under the name of "The Barrett Company." The fact that all the roofing, waterproofing and building materials, as well as coal tar, oils, chemicals, and similar products are made and widely advertised in the name of the Barrett Manufacturing Company, has added immensely to the good-will attached to the name, which increase has not been connected in the mind of the general public with the securities of the American Coal Products Company, although this concern owns the stock of the Barrett Manufacturing Company. The commercial dealings of the American Coal Products Company included the disposal of ammonia, more especially sulphate of ammonia, which enters largely into the composition of commercial fertilizers. These transactions will be carried on by the same personnel in the name of "The Barrett Company, Ammonia Sales Agency Department." The Agricultural Department, which has carried on propaganda for the use of sulphate of ammonia as a fertilizer, will continue as a department of The Barrett Company. The Barrett products are made and sold in Canada by The Paterson Manufacturing Company, Limited, and by The Carritte-Paterson Manufacturing Company, Limited.