

before laying the wearing courses. The modern top courses are generally expensive, and it is neither recommended, nor even justifiable, to risk them when the substructure is not sufficiently dry or firm, even though there is a good foundation.

The progressive method of improving roads gives all the time necessary for a proper preparation of the substructures, and traffic hardens them. When the time comes for laying the foundations and top courses, the firmness of the soil on which they are to be laid is accurately known. It must always be borne in mind that undulations in the wearing courses which appear after a few years, are nearly always due to lack of firmness in the substructure, whatever the resistance of the foundations and the quality of the materials may be. Undulating surfaces with many depressions will be found even in wooden pavements resting on concrete foundations, due to the above cause.

#### Foundation Problems

The foundation is one of the most important things in road-making. Its object, as everybody knows, is to distribute wheel pressure over a sufficient surface of the structure so that the latter, and consequently the wearing course, will not be sunk or perforated by the wheels. It constitutes a resistant protective cushion between the wearing course and the soil. Foundations are classed among the permanent works because they have all the above-mentioned characteristics of such works.

In laying foundations it must always be borne in mind that a permanent work is being done, and care should be taken to make it a durable one. Vehicle wheels must never reach them, and they must be thick and solid enough to prevent their being broken or crushed out of shape by the heaviest vehicles. This, unfortunately, has not always been understood, and there have been many disappointments, especially since heavy trucks have come into use. At present this is better known and is receiving more attention.

Foundations are made of concrete, stone, boulders or gravel, and even of sand when the soil is clayey. Without entering into the details of their construction, it is nevertheless useful to call attention to the following points of importance: Homogeneity and hygroscopicity. When stones of different sizes are used in making the foundations, the different sizes must be laid one upon the other in uniform layers, and they must not be made throughout their whole thickness of stones of the same size in one place and of another size in an adjacent place. Too much gravel, dust or sand must not be used at one place to fill voids and a smaller quantity in another location.

#### Materials of Uniform Size

The best foundations are those made of uniform size throughout all their thickness and laid in a uniform manner. When stones from four to six inches in size are used, they must be of good quality, pressed solidly against one another by hard rolling so as to break the excessively thin corners and edges and to interlock them firmly. If the stones are unstable, too soft or alterable, the vibration caused by passing vehicles will wear them out at the points of contact, and, in the long run, the foundation will sink irregularly.

The stones must touch each other, and filling the voids with too much dust, sand or even gravel is another drawback, as the stones then will not touch; and in such a case the firmer particles have a tendency to drop and the larger pieces of stones to rise, at least in this climate, causing, in the long run, harmful movements and some kind of segregation in the foundation.

Foundations of coarse sand, not hygroscopic, where laid on clay soil, give good results under water-bound macadam, and are economical in places where stone is dear. Well-made Telford foundations are excellent, but very expensive.

The concrete foundations are the best, but their cost is generally considered too high in the case of rural roads. They are subject to cracks in soil not dry or firm enough,

especially on account of frost, and it frequently happens that the cracks rise to the top course.

In calculating the thickness of foundations, it is absolutely necessary to take the heavy weight of modern motor trucks into account.

#### Temporary Gravel Roads

When the regular wearing course is laid, their solidity and lowed, foundations may be laid long before the regular wearing courses, and may, if covered with a layer of gravel, be used as gravel roads until a regular top course becomes necessary owing to increased traffic. During the interval, the roads are kept as gravel roads, and arrangements are made so that, when the regular wearing course is laid, it will not be necessary to scarify them or do any other work over again. Following the same method, the foundation may also be made wholly of gravel covered with an additional layer of gravel, and used as a gravel road till a regular top course becomes indispensable.

The temporary use of foundations covered with gravel as a wearing course allows of regular compacting by the traffic and of correcting their defects whenever they appear. When the regular wearing course is laid, their solidity and resistance are exactly known. The soft places have become hardened, and there is less likelihood of the defects which occur in wearing courses laid on an insufficiently firm foundation.

I may add also that, in this province, the rural roads are covered with snow during a portion of the year, and, consequently, the wearing of the top courses of the rural roads by traffic is much less than in countries where there is traffic throughout the year, and this may have much influence on their choice.

It would be advisable also to consider substituting one kind of top course for another, taking existing conditions in this province into account; also to consider what precautions should be adopted when laying cheap temporary top courses for avoiding certain expenses which otherwise would be incurred when it becomes necessary, owing to increase of traffic, to use them later on as foundations and to cover them by improved top courses.

Senator G. D. Robertson, Minister of Labor, has notified D. K. Trotter, secretary of the Association of Montreal Building and Construction Industries, that the association will be invited to select its own delegates to the National Industrial Conference to be held Thursday, September 11th, in Ottawa.

The annual convention of the Associated Boards of Trade of Vancouver Island was held July 10th in Courtenay, B.C. The principal proposals endorsed were the extension of the Esquimalt & Nanaimo Railway to the northern end of the island, the construction of about twenty-two miles of road to open the Sayward district for settlement, and the continuation of the Strathcona Park road.

"Town planning in Great Britain," says "Conservation," "has so far advanced beyond the experimental stage that it has now been decided to make it compulsory for every town, having 20,000 inhabitants or more, to submit a town planning scheme for its own area to the Local Government Board, not later than 1926. The British people realize that haphazard growth of towns leads to serious evils and they are determined to control it. In future, land will have to be developed so as best to serve the interests of the community, which, in the long run, is usually in the interests of the landholders themselves. Only the land speculator is adversely affected. If the public wish to put that individual out of business, they cannot do it more effectively than by actively promoting proper schemes of town planning. In Canada, the province of Nova Scotia took the lead in making town planning compulsory in 1915. The only other province which has a compulsory Act is Saskatchewan. These are therefore the only two provinces abreast of the Old Country in town-planning progress, though most of our provinces have enabling Acts in force."