

remember that there is an economic fitness which must be produced, otherwise the road is a failure. There is this commercial aspect which the successful engineer always zealously regards, and which must always affect our plans, however correct from a designer's standpoint. For these reasons, one cannot condemn utterly any class of pavement. Cedar block pavement is popularly supposed to be a failure, but it is not difficult to conceive of conditions under which it would be the most suitable that could possibly be employed. An asphalt roadway has its uses, so a vitrified brick pavement, a crushed stone, or gravel, and in very many cases, from an economic standpoint, a dirt driveway is the best adapted to all circumstances.

The problem of paving and roadmaking is largely one of good drainage. I do not mean to say that the quality of the road covering is unimportant, nor the crowning, nor any of the other details, but I do mean that the object is largely drainage. We first make a proper use of underdrains to secure a firm foundation; then we round up the natural earth into such a shape as to shed the water readily to the side gutters; then over this we place a covering such as will prevent water penetrating to the earth sub-soil, and of a quality that the traffic which it must accommodate will not destroy, preventing the water passing to the gutters. The problem is very simple in the abstract. In the actual solution, there occasionally arise differences of opinion. No paving material as now used, whether asphalt, brick or crushed stone, is sufficient to bridge over a wet and yielding sub-soil, and this is more especially the case in Ontario because of the upheaving action of frost. It is important to remember that a dry natural sub-soil supports not only the weight of traffic, but the surface covering as well. It was the neglect of this principle which caused the Romans in the days of the Empire to undertake the clumsy construction of roads with artificial foundations of stone and concrete, two and three feet in thickness, a waste of energy which the nineteenth century cannot afford.

As a general thing you will find the country road already located. Unless it is an old trespass road, that is, one of the early colonization roads, it will probably follow the arbitrary lines of our system of surveys, which, as you are aware, places the road allowance in a certain fixed position, according to the width of the concessions and lots. As the cost of building and maintaining a road depends very largely upon the topography of the country and the nature of the sub-soil upon which it is laid, it will be apparent that before undertaking