

established and while the curriculum is designed to give instruction in other branches of engineering, the object for which it was designed and the outstanding feature, as name would imply, is the technical training of men for positions on staff of highway engineers.

The young men desiring to qualify for service in the department are required to take a short technical course where mathematics and science make up the major part of the work. From this they pass on to the School of Roads and Bridges and receive a three-year course of instruction in civil engineering. The vacation periods are for the greater part spent in the field under the department. It will be seen, therefore, that a very thorough course of theoretical and practical training is established.

As to the justification of the establishment of this institution one need only point to the splendid system of highways which extend throughout the republic. This influence of France in this respect has been felt in the other countries on the continent, Germany, Switzerland, Italy and others have profited by her experience, and while organization in these countries has not reached the same degree of perfection, great stress is laid on both the practical experience and the technical training of men seeking appointment as highway engineers.

In Great Britain a very different system is followed. There are many instances in which surveyors are appointed who have not had technical training, but this practice is not working out satisfactorily and the tendency now is to lay greater stress upon thorough technical training. The apprenticeship system is in vogue and the long and tedious training through which the pupil has to pass is surrounded by numerous limitations. A young lad with ordinary schooling articles to a county or municipal engineer for a period of three or four years. By hard work and study during this time he may pass the preliminary of the professional examinations and at the close of his pupilage he is qualified for appointment as an assistant and so he works his way up by stages to a chief appointment. It will be seen that by this method no standard of excellence is set, although his membership in the various professional associations will help in this respect. Furthermore, the duties of his chief may have been such that the pupil gained very little insight into road construction and management, and in the nature of the case the knowledge of the subject gained must be limited to the field within which his experience lay.

The consensus of opinion, however, is in favor of a thorough technical training and a recognition of its importance is given in the fact that a student with an engineering training may reduce the period of pupilage to one year.

Coming to this continent, what do we find? Alas in the past there has been little disposition to recognize the office of a highway engineer. An assumption far too common has been that anybody can build roads, and what is the result? Either that illusive personage has given up the job or he has been bluffing, for we are still, in a large measure, without roads.

In both Canada and the United States many municipalities have paid heavily to prove that the township clerk, or the assessor or some other official could not build a culvert, a concrete bridge abutment or a road that would last, and many a lamentation has gone up that enough money has been spent to have paved the road in gold and still the road is bad. It is true that engineers, even the best of them, at times may make mistakes, but it is safe to say that their achievements in other lines is sufficient to warrant the recognition of their services in the solution of the problems in highway work.

With the changes that have been brought about in recent years through the introduction of the motor-driven vehicle the problems have become more complex and our treatment of the question has not kept pace with the demand, due largely to a disinclination to abandon old methods.

That the universities of this continent are not lax in dealing with this question may be seen by a brief review of what is being done. In the United States remarkable advancement has been made. In nearly every technical institution where a course of civil engineering is taught the subject of highway engineering is given a prominent place, and in many cases is made a major subject of the final year. Five years ago less than half of these institutions touched the subject. The Department of Public Roads at Washington, through the efficient directorship of Logan Waller Page, has also given a great impetus to the training of young men. By giving a special course of instruction in the department and then placing these men in charge of work on the field a practical demonstration has been given of the value of such training.

In Canada, we are glad to see that a like recognition of the subject is being given. It is not possible, at this time, to go into details but we are pleased to note that highway engineering is given a prominent place in the curricula of nearly all the universities and technical colleges throughout the Dominion. In this, Laval University has been the leader, having begun such a course over twenty years ago. In the University of Toronto the subject is combined with sanitary engineering in the fourth year of the civil engineering course. The time is devoted to a lecture and reading course dealing with the design, drainage, foundation and the construction of all types of roads from the ordinary clay road up to high-class city pavements. A lecture course on the geology of road metals, a lecture course on municipal structures, including highway bridges, culverts, retaining walls, etc., a laboratory course for the examination of the properties of sands, gravels and the various kinds of rock employed in road construction and also for the physical properties of bituminous materials, all of which have a direct bearing upon the efficiency of the young engineer.

One feature of this work is worthy of special mention. Laboratory investigations will continue to form an important adjunct to our highway work and it is of utmost importance that the engineer in charge of work should know how to interpret such reports and there is no way in which he can do this more intelligently than by having conducted a series of experiments himself.

In view of the facts cited with respect to practice followed in Europe, what should be our attitude in Canada? Can we afford to disregard the features in training to which they in Europe give such prominence? Certainly in many respects our problems are beset with conditions more difficult and such as tax to the resources of our best engineering skill and ability, and this congress will have conferred a lasting benefit on our community if it does nothing more than to educate public opinion to a fuller recognition of the importance of utilizing the services of our technically trained young men in the improvement of our highways.

This is mentioned as one feature of our pressing needs, not unmindful of the fact that there are others. As much more might be said regarding a systematized national policy, but even this must be organized and put into execution by engineers who can fully grasp the problem. His status must be recognized and the rewards for his services commensurate with the high office he is called on to fill.