FIELD FOR HIGHWAY ENGINEERS

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ESIGNING and constructing street pavements and highways has become a specialized branch of engineering. Road improvement as an adjunct to agricultural and commercial development is now so far recognized as a necessity that modern road building is limited only by ability to finance the movement. No settled section is now deaf to the appeals of reason and self-interest. Yet great as has been the mileage of road improvement during the past decade, the surface of possibility has been no more than scratched.

There are in the United States, for instance, approximately 2,200,000 miles of established highways, of which only 240,000 miles have been improved, and of these many are in need of reconstruction.

As knowledge of the fundamental principles of construction extends, a vast field for highway engineering opens. Indeed, the demand for really competent, up-todate highway engineers already exceeds the supply.

Our colleges and universities are seeking to fulfil their obligations to the public and to the students by offering courses in Highway Engineering. This is a laudable undertaking, and it is laying the ground work for a future usefulness that will be of immense value. Some of these schools of highway engineering are in an experimental stage-tentative ventures, the success of which is yet to be demonstrated. Other schools have taken up the problem seriously and with evident determination to succeed.

There is a difference of opinion regarding the practical value of the training given in some of these schools, but that is a matter which will work itself out in time. The gratifying fact is that our higher institutions of learning realize the need for trained highway engineers and are trying to fill the gap in educational opportunities.

It is, perhaps, inevitable that theoretical highway engineering, taught by theoretical highway engineers, is preponderant in some of the schools. It is un-questionably true in many instances that graduates leave these schools with little practical knowledge of highway construction, although they are well grounded in the theory. The average new graduate can hardly be regarded as an expert, qualified to take entire charge of important work. Experience is needed. The same is true in any profession. Nor is it extensive work alone which is important. Every highway or street is important to the public, and anything less than the best engineering is a wrong committed at the cost of the community paying

Young highway engineers need experience under for the service. capable chiefs. Young engineers acquire in the schools a knowledge of fundamental principles, and they are taught the technique of designing; but the construction of a pavement involves matters of detail which the schools do not teach and which, in many instances, the schools can not teach. In a vital sense, each pavement is a distinct problem. Local conditions of soil, topography and traffic modify general specifications, and require the adaptation of methods to suit peculiar exigencies.

The highway engineer learns by experience that the success of his work often depends largely upon strict and correct attention to what appear to be minor details. It is only through the medium of experience that the highway engineer learns why apparently trivial details are of the highest importance.

That highway construction is rapidly becoming a test of engineering ability is a truth which ought to be emphasized. The public is becoming so far sophisticated in such matters as to be able to make a fairly just apportionment of blame. The engineer in charge is blamed for the shortcomings of the contractor if the latter follows the former's designs, specifications and orders.

In other words, where the engineer is responsible for the design and has absolute jurisdiction over the manner in which the contract is executed, he is held to accountability for results. Exception to this rule is noted in case higher authorities, either public officials or property owners, select a type of pavement unsuited to the particular location for which it is chosen.

A fundamental, and enormously expensive, weakness in our system of road improvement is in allowing incompetent persons to determine the kind of roadway to be constructed. Only a competent engineer can estimate the volume, kind and weight of traffic that a highway may be called upon to bear in future years. Only a trained and well-informed engineer knows what kind of road surfacing and constructional methods ought to be adopted in order to ensure a roadway which, with proper maintenance, will endure until after the construction bonds have been retired.

The engineer should stand between the taxpayers and their ignorance, prejudices, errors of judgment and politics. Unfortunately the engineer sometimes can do no more than proffer advice. When he cannot select the type of pavement to be constructed, even the best engineer cannot be held responsible for results.

Nevertheless, the engineer who is loyal to his convictions and to the public is gradually coming into his The people are beginning to heed the advice of own. engineers who are known to be honest, fearless and capable.

In Europe, the engineer decides all highway questions. If a road is to be improved, the authorized engineer determines the kind and width of improvement, the grades and where the road shall go. That is one reason why Europe has an intelligently designed system of good roads. Another reason is found in the fact that contracting usually is an hereditary business descending from father to son, generation succeeding generation. Contractors, therefore, have pride in their work and they are loyal to the traditions of their families. The third reason is that government supervision supervises.

The best highway engineers know that the final word in highway construction has not been spoken. There remains something to be learned. This fact gives an incentive to ambitious men to engage in highway engineering. The field for development is unlimited.

EXTENSIVE ROAD SYSTEM PROJECTED FOR NORTH YORK COUNTY, ONT.

In order to link up the good roads system of the Ontario counties of Simcoe and South York, it is proposed to proceed with road improvement in North York to the extent of about \$500,000. This will involve the construction of about 100 miles of unimproved road in addition to an appropriation of \$68,000 for bridges and culverts. According to Mr. E. A. James, engineer to the York County Highway Commission, the system will provide for four through roads between Lake Ontario and Lake Simcoe, in addition to the improvement of the existing cross-roads. It will link up the six market towns of Schomberg, Aurora, New Market, Sutton, Mount Albert and Stouffville.