THE ADDRESS OF THE RETIRING PRESIDENT, MR. W. F. TYE.

GENTLEMEN :---

In rising to comply with the time honored custom of reading the President's address, I beg to thank you for the high honor you have conferred on me in electing me to the Presidency of our National Society.

Owing to my residence in Toronto, and to my absence in Europe during the first part of the year, I was unable to attend many of the Council meetings. The affairs of the Society were, however, so well looked after by the Council and our efficient Secretary, that I am sure the absence of the President was not felt.

I have great pleasure in congratulating the Society on its continued growth. Our Membership now amounts in all to over 3,000, and includes almost every engineer in the country. The expansion of the Society is a thing of which we must all feel justly proud. We have grown so rapidly that our old home has become too small for us, and we were very fortunate in being able to dispose of it on such advantageous terms at the very moment when a change had become necessary.

Our thanks are due to the Building Committee for the efficient and expeditious manner in which they have prepared a new residence for us; and I must congratulate the Society on the result of their efforts.

During the year the Council suffered a severe loss in the death of their friend and colleague, Mr. James N. Shanly. Mr. Shanly was a capable, conscientious engineer, and a favorite with all with whom he came in contac. He took a keen and intelligent interest in the Society's affairs. He was Chairman of the Finance and Building Committees, and much of the success of our new home is due to his untiring efforts.

When looking around for a subject on which to address you, my thoughts turn naturally to Railway Location, on which a great part of my professional career has been spent.

Transportation is one of Canada's greatest problems: our country is of vast area, the distances are great, the population sparse, and the traffic light; making the mileage and cost of railways high per head of population. On the other hand the growth of the country is and will continue to be rapid. A great problem is thus presented: how to build our railways that they may not be too expensive for our present requirements, and yet be capable of improvement to fit our future needs. Economics of Railway Location is, therefore, of even more than usual importance to Canada. The subject is so vast that it is only possible in such an address to touch its outer fringe; but it is so important to us all that even a few rudimentary remarks may be interesting.

While railways are built to serve the traffic requirements of the country, the immediate object of the promoters and builders is to make a profit, either on the construction or operation. This is undoubtedly true when built by private parties. When built by a Government, it is with the end in view that the people may make money either directly through the operation of the railway, or indirectly by the reduction of rates. It is, therefore, of prime importance that the engineer, whether he be working for private parties or for a Government, locate and construct the most economic road. The most economic road is not necessarily either the cheapest or most expensive, neither is it necessarily the one which may be operated at the least cost—it is in reality the one which is the most effective commercially or the one which will enable its owners to transport the largest amount of traffic at the lowest cost.

In order to ascertain that a railroad is most effective commercially, the features which underlie its commercial effectiveness should be understood. These are:—Gross Earnings. Operating Expenses, and Fixed Charges; and are of importance in the order named. Gross Earnings, which depend on the amount of trailic handled, is undoubtedly first. It is never advisable to build a railway unless there is or will be sufficient traffic to pay the Operating Eapenses and the Fixed Charges, no matter how cheaply or how well it can be built.

In new countries, such as most Canadian railways are built through, there is rarely sufficient traffic in sight to justify the construction of a road, so the promoters—whether they be a Government or private parties must have faith in the project and must be able to justify to themselves, and to the investing public, the possibilities of paying dividends.

Engineers are sometimes, though rarely, consulted in the early stages

of the project to report on the traffic possibilities of the route. The usual way is for the promoters to decide for themselves that a road between certain terminals is commercially desirable, and that there is or will be sufficient traffic on such a route to justify its construction. Engineers are then employed to survey and construct the road. The question should at once arise with the engineer—how the railway can be so located as to make it the most effective commercially, or how to get for the promoters the most profitable traffic. No matter how this problem is stated, it finally resolves itself into this:—if the promoters be private parties, how can the money invested—or if a government, to transport the most traffic at the least cost? The answer in either case would be the same, for, if it is so located that it may handle the most traffic at the least cost, it will, if properly managed, make the most interest on the money invested.

The first problem the engineer has thus to face is how he can so locate the road between the given terminals as to get the most profitable traffic. The route which takes in the greatest number of towns, or which goes through the best land, if the country be unsettled, should be the first examined. A mistake frequently made is to locate the road within a mile or two of an important town in order to decrease distance or avoid expense. The cost of handling traffic is the total cost from the door of the consignor to the door of the consignee, and rates on that basis must be equal. The added charge for cartage is at times so large as to wholly destroy the business of the badly placed line and give it to a competitor more favor ably situated, or if it be not wholly destroyed, the additional cartage and delivery charges eat up the profits.

Where traffic is light, and train loads less than the rated capacity of the locomotive, the cost of handling additional traffic is much less than is the ordinary train mile cost. It should be figured in equating the value of a change in location which increases traffic at 50% of the usual train mile cost. In this respect it should be remembered that deviations from the direct route do not always materially add to the length of the line.

In order to locate a railway so that it may be commercially effective it is first necessary to know what the volume of traffic is likely to be, whether it is immediately available, and at what rate it is likely to grow. The best way to ascertain this is by comparison with roads through the same or a similar country. A road through a country most nearly approximating that to be traversed should be selected for examination, and its traffic for previous years studied. If, for any reason business is likely to be materially greater or less than on the road under examination, due allowance should be made.

All railways are now required to make yearly reports to the government, and such statistics should be examined as well as those published in the Railway Companies' Annual Reports. The average train load and the railing grade should be studied, and finally the average number trains per day should be ascertained. It must be remembered that thoush the traffic is rarely balanced, that is, that there is seldom as much tonnase moving one way as the other, the number of trains each way must within narrow limits be the same. It is not always easy for an outsider to ascertain the number of trains over any given railway, as railway statistics are not published in this form, but every effort should be made to arrive at it as closely as possible.

Having obtained this information, and having determined how the traffic on the proposed road will compare with that on the road under examination, some approximation of the ruling grades on the road in view should be arrived at. If different from those on the route with which comparison is being made, the number of trains per day each way on the proposed road should be increased or diminished accordingly.

While this method of ascertaining the number of trains per day is only approximate, it is certainly much more accurate than to attempt to make an independent estimate of the gross tonnage on the new road. The rate of growth of traffic should be similarly ascertained, as a railroad should be built not only to take care of the present traffic but also that of the road in the reasonably near future.

Cost per train mile is the basis of all economic comparison, as the effectof the number of trains on the cost of operation is much more direct than as by of

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