

# The Canadian Engineer

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## RAILWAY ECONOMICS

IMPORTANT FACTORS OF THE SUBJECT AS APPLIED MORE PARTICULARLY TO THE RAILWAYS OF CANADA—QUESTIONS AFFECTING LOCATION AND CONSTRUCTION, REVENUE ESTIMATES AND OPERATING COSTS

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**R**AILWAY economics is a subject to which much attention has been given by railway engineers in recent years. There has been so much construction undertaken by the different railways latterly, that a great amount of data has had to be compiled on the subject of economics. The following table is illustrative of the amount of work that was undertaken and completed by the larger railways in Canada during the year 1912:

Canadian Northern Ontario Railway	195	miles
Canadian Northern Railway	304	"
Canadian Pacific Railway	360	"
Grand Trunk Pacific Railway	608	"
Intercolonial Railway	17	"
Timiskaming and Northern Ontario Railway	30	"
National Transcontinental Railway	358	"

making a total of 1,872 miles of railway in one year.

The problem of transportation in this Dominion is one peculiar to itself, and is made more difficult to deal with on account of the lack of precedent. The conditions cannot well be compared with those in the United States, either as they are now, or as they were when the large transcontinental railways were first developed on the south side of the border, consequently the subject has to be dealt with largely from first principles.

**Economics of Location and Construction.**—This branch of the subject deals with the relations between the cost of operation and the cost of construction, of any particular section of railway and finding the best location, of that section of railway, which will give the most economical combination of cost and operating expenses and at the same time give the maximum revenue.

There are two classes of location, one being the location of a new line of railway between two points hitherto unconnected, the other being the relocation of an existing piece of railway in order to give more economical and better financial returns.

In the case of an entirely new project it is usual to make a preliminary examination of several different routes and then make a comparison of the following estimated features:—

- Probable revenue from each line.
  - Cost of construction.
  - Annual traffic—gross tonnage.
  - Cost of handling such traffic,
- and, in addition to these specific items, the effect of future changes in traffic or operating conditions must be considered. This latter is one of the most important items in this country as the railways, more particularly in the

Western Provinces, have built and are building lines through practically unsettled districts basing their estimates of the volume of traffic and sources of revenue on the future settlement of the districts adjacent to the railway, the general effect of railway development being to increase the population of that part of the country served by the new line, due to better transportation facilities.

In the case, however, of the relocation of an existing line, besides taking into account the increased efficiency obtainable by the new route or line (which can be computed more accurately than in the case of an entirely new line) allowance has to be made for the possible injury to existing facilities and also for the value of the facilities on the old route which have to be abandoned. In this instance the net income has to be increased to such an extent that a proper return will be obtained on the capital outlay necessary to make the entire change.

**Probable Revenue.**—There are several methods of estimating the probable revenue or the volume of traffic of a section of proposed railway. The first method is to make a comparison between the whole population of the country and the gross earnings from the operation of all the railways, and then to assume a similar amount per capita for the projected railway. This method is quick and easy, but is very approximate and is really more suitable for a country more developed than Canada, such as the United States, but it is of interest to note that the gross earnings of Canadian railways average about \$29 per capita per annum of the whole population of Canada.

A second method is to estimate the probable earnings per mile of railway by a comparison of the earnings per mile of some existing railway or railways similarly situated. The gross earnings per mile is a very variable quantity on different railways and only a very approximate idea can be obtained by this method, but the following table illustrates this more clearly:

TABLE I.

Name of railway.	Gross earnings	Mileage.	Gross earnings per mile.
Intercolonial	\$ 11,003,410	1,462.89	\$ 7,520
Canadian Northern	20,860,093	4,272.92	4,811
Canadian Northern Ont.	881,953	492.35	1,792
Canadian Northern Que.	1,327,534	369.27	3,597
Canadian Pacific	116,233,812	10,813.70	10,748
Grand Trunk	35,801,975	3,105.82	11,526
Canada Atlantic	2,173,363	459.26	4,766
Halifax & South Western	478,031	378.32	1,264
Timiskaming & Northern Ontario	1,935,421	302.28	6,408