

# The Canadian Engineer

*A weekly paper for civil engineers and contractors*

## Economics of the C.N.R. Tunnel at Montreal

Some Problems in Location That Arose When Seeking An Entrance Into That City—  
Observations and Anecdotes Regarding Construction Difficulties—May Extend Electrified Zone to Ottawa—Paper Read Before Engineering Institute's Toronto Branch

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**B**OTH by temperament and training, it is the economic side of things which has always appealed to me most. Railways are commercial concerns, and the tunnel is an essential part of a great railway. If it cannot be justified in a commercial sense, if it cannot pay interest on its cost, it has no right to exist. This economic aspect of engineering works has come into great prominence of late years, and notably since the introduction of railways. Nearly all our great tunnels have been built to carry railways past, or under, obstructions of one kind or another, so that the history of tunnelling is almost altogether confined to the last seventy or eighty years, and most of the great tunnels are much younger than that.

Railway construction started on a large scale first in England, where population was already dense, and traffic was waiting to be carried in large volume. A railway once built, even on what we should now consider very crude lines, was practically sure of paying its way from the very start, and the cost was a minor consideration as soon as the potentialities of the steam railway came to be understood.

It was when the building of railways extended to this continent of great distances, and at the same time sparse population, that it was found that not only were fixed charges a very heavy drain on railway earnings, but that capital was very hard to get in any case, and had to be brought in from outside, hence the difference in cost between the early American roads and the English ones, and the expedients of sharp curvature, heavy grades and cheap construction, which were used to reduce the capital cost; and hence the fact that so much English capital went into American roads.

As time went on, and the traffic became heavier, and as, too, other lines were built between the same termini and competition became keen, there came the era when the balancing of cost against more perfect location and construction began to be a regular study, and while I think a good many of the earlier engineers (Latrobe, for instance) had thought a good deal about these matters (their works showed that they did), it was Wellington who first committed his ideas to paper, and his writings are still useful as well as monumental.

The element of location which conduces more than any other to reduce the cost of haul, is, of course, that of gradients, and in reducing gradients in rough country there is very often a strong temptation, less often an absolute necessity, to resort to tunnelling. Hence nearly all our tunnels are in the two great mountain ranges of the continent, one east and the other west of the Mississippi River. There are a few, however, on this continent, for the construction of which there are other or contributing causes; and a great many on the other side of the Atlantic,—cases where property damage was to be avoided at almost any cost, or where navigation in-

terests were paramount and a tunnel was more practicable than a high level bridge. The Detroit-Sarnia and Hudson River tunnels are instances of the latter class, and the Baltimore and Washington tunnels are instances of the former, and to this class our own Montreal tunnel also properly belongs.

Towards the close of 1906, more than twelve years ago, I was instructed to commence surveys and location for the Canadian Northern Ry. from Montreal westward, primarily to the Georgian Bay, and eventually, as it turned out, to



THE MONTREAL PORTAL OF THE C.N.R. TUNNEL