

Primitive and Wasteful Manner of Laying Out and Constructing Transportation Lines.

Col. H. N. Ruttan, President Canadian Society of Civil Engineers, read the following address at the annual meeting in Winnipeg recently:

Engineering was some 80 years ago defined by Thomas Tredgold as "the art of directing the great sources of power in nature for the use and convenience of man." At the beginning of the twentieth century it has become apparent not only to engineers, but to all those who have the interests of posterity at heart, that the great sources of power in nature should not only be directed, but that they should be economically managed and conserved, so that Tredgold's definition may now properly read, "The art of directing and conserving the great sources of power in nature for the use and convenience of man."

Anything approaching an exhaustive discussion on the subject, one on which volumes might be written, is not now intended. It may be pointed out that among the wastes which have been permitted throughout the past are:

1. The impoverishment of the lands. The gradual conversion of what were productive areas into barren wastes, examples of which may be seen in older parts of Asia and Europe, and, unfortunately, to an appreciable extent, in North America.

2. Following the exhaustion of the soil, and keeping pace with it, has been the destruction of the forests; and

3. The unbalancing and perhaps the lessening, of precipitation, so that rains come when they are not wanted and fail when they are indispensable for successful agriculture.

4. The primitive and wasteful manner in which transportation lines are laid out and constructed.

It is the last paragraph only with which it is proposed to deal in the present address. The requirements of modern civilization demand not only that people be carried at express speed from one quarter of the globe to another, but that every food and fabric grown and produced be distributed broadcast for the use and convenience of man. The rush to meet these requirements has led to the abnormal development of transportation routes, which, though good in themselves and generally advantageous, have often, with a total disregard of economic arrangement, been improperly located or needlessly multiplied in one section to the inconvenience of another.

The necessary requirements in the initiation and construction of transportation lines may be stated as follows: A thorough knowledge of the country to be served, both in its physical features and its capabilities for production. That this knowledge be utilized in the location of lines of transportation, so that the greatest service be provided at a minimum ultimate cost against the traffic using the lines.

Before going further it may be well to consider to what extent these requirements are at present met. A study of the railway systems of any country must lead to the conclusion that no effective system of supervision has been exercised in the locations of the systems to meet the economic requirements above stated. Much comparatively useless road has been constructed for the purpose of enabling one set of capitalists to take tolls on traffic which could have been easily handled by an existing line. Instances appear where productive districts, separated by unproductive or partially unproductive country, are connected by lines running full length through the unproductive land, whereas a single line would have served the traffic of several converging railways. All this

largely increases the capital, interest, maintenance, and management charges, which must be borne by the traffic. Some of the causes contributing to the defective economy referred to are:

Want of knowledge of the country in the construction of the first lines.

The desire of capitalists to share in profits being earned by favorably situated lines.

The ease with which charters for so-called competing lines may be obtained.

The relatively slight interest taken by the public in the location of transportation lines, and the mistaken idea that the construction of any line is advantageous.

This deplorable state of affairs may be remedied in a most simple and inexpensive manner. Before any companies are given franchises by Parliament, both the public and Parliament should insist upon having before them sufficient information to enable them to judge of the effect upon both public and private property of the proposed works. This information may be best given by large scale and accurate plans of the proposed works, such as are required by the standing orders of the House of Commons in England, extracts from which are given in an appendix to this address. In this connection attention is called to the fact that in Canada something should at once be done to arrange for surveys of the country and the preparation of plans similar to the ordnance maps of Great Britain.

A further step forward would be the giving of compulsory running rights over existing lines to companies which may properly participate in the traffic of certain districts, and which cannot do so without heavy expenditure in the construction of parallel lines, which would in themselves be unproductive or which would unnecessarily cut into business which can be readily handled by existing lines.

The remarks on granting charters to railway companies and proposed improvements in procedure apply with equal force to canals, river improvements, and hydro-electric plants. Though Canada is noted for its magnificent canal system and for the progressive and patriotic policies of its governments in this respect, the opening up of the country will necessitate in the immediate future a development far beyond any that has yet taken place. It is therefore most necessary that a broad and intelligent view of the whole situation be taken so that duplication of facilities be avoided and expenditure be made in the interest of and ultimate economy in, capital and operation charges.

Numerous instances might be given illustrating great expenditures which have been made in an ill-considered and extravagant manner in the construction of railways, and of applications to Parliament for charters to construct works, which were both physically and economically impossible to carry out. These have often masked the acquisition by private parties of important assets of the public domain. Such instances are well known to most engineers. It is therefore not necessary to refer directly to them.

It is not intended in any way to discourage development work in the country, but to point out the haphazard and expensive manner in which undertakings for the public service are often carried out, and to suggest what is considered a business-like and common-sense means of conserving, in this respect, the interest of the people at large. It must be remembered that eventually the burden falls upon, and must be borne by, the people. If the construction of an unnecessary mile of railway is prevented, or a mile already constructed is made to do the work of two, the country as a whole will be greatly benefitted.

At first it may appear that the suggested changes in initiating and carrying out public works would, if carried into effect, discourage the construction of works needed for the development of the country and its resources. This, however, would not be the case; on the contrary, the care displayed in scrutinizing projects before they were authorized would give confidence to investors by the assurance that, in the opinion of Parliament, the works were such as were reasonable and proper, and would go far, by the confidence inspired, to facilitate the flow of capital into the country. A charter granted by Parliament under the regulations proposed would be in itself a guarantee that the project was sound and practicable. The criticism called for by these regulations should greatly assist in determining the merits of such projects.

It is, of course, apparent that, in addition to the enormous saving which could be made by the economic location and construction of works for the use and convenience of the public, there are other conditions not less important. For example, the power now possessed by companies to increase capital beyond reasonable limits, and the crude management in operation, now being so much discussed in connection with the claim of the American railways, that rates must be increased to enable them to earn revenue to meet their capital and operation expenses.

In the following conditions the last two are not purely engineering, and need not be further considered at the present time: The economic location and construction of lines of transportation; the limiting of capitalization within reasonable bounds, and the scientific and economical operation of all transportation services, will all three have the effect of reducing rates to a minimum. It is in the first of these that engineers are vitally interested, and their advice to clients will go a long way towards conserving immense sums of capital now wasted in crude and uneconomical locations and constructions. The word economy has no reference to detail, and is used in its broader meaning only. As to economy of designs in detail, there is no fault to be found; on the contrary, all are proud of the bridges, tunnels, and other noted structures which are being constantly turned out by the profession.

In carrying out the proposed system no cumbersome legislative machinery would be required—an amendment to the Railway Act giving the Board of Railway Commissioners power to make regulations for the necessary surveys and plans, and finally to deal with the matters in question, is all that would be necessary.

EXTRACTS FROM STANDING ORDERS OF THE
BRITISH HOUSE OF COMMONS.

4. Plans, Books of Reference, Sections and Cross-sections.

40. Every plan required to be deposited shall be drawn to a scale of not less than 4 ins. to a mile, and shall describe the lands which may be taken or used compulsorily, or on which an improvement charge may be imposed, or which are rendered liable to the imposition of an improvement charge, and in the case of bills of the second class, shall also describe the line or situation of the whole of the work (no alternative line or work being in any case permitted), and the lands in or through which it is to be made, maintained, varied, extended, or enlarged, or through which any communication is to or from the work may be made; and where it is the intention of the promoters to apply for powers to make any lateral deviation from the line of the proposed work, the limits of such deviation shall be defined upon the plan, and all lands included within such limits shall be marked thereon; and unless