

is convenient that we should ascertain specifically what the varying estimates of the engineers have been, and what the differences have been in the character of the work in respect of which they have estimated. Now, up to a comparatively recent period, with one exception, to which I shall allude in a moment, the work which we understood we were preparing to construct, was a high-class railway. As to the character of its structures, it was to be the same as the Intercolonial. As to its grades and alignment it was to be very superior to the average of all the railways on this continent throughout; and, as to that portion which extended from Lake Superior to Jasper House, it was to be very, very far in advance—with reference to east-bound traffic—of, I suppose, any road of the same length on the continent; I am satisfied I am right in saying very far in advance of any railway on the continent of that length, say 1,500 miles. That is the general style of the road. As to the character of the structures, the standard of the Intercolonial was adopted, and as to grades, alignment and curvature we were promised, even through the mountainous and wooded sections, the very highest class of railway, as also through the prairie region, and through that section, where the work must be done at more expense, from Red River to Lake Superior, where you reach our interior sea-board. Now, I purpose, in giving the reasons for this motion, to show to the House, partly by a reference to authentic documents, that I am justified in my course on this occasion. The most convenient mode of dealing with the earlier estimates and standards used in treating this subject is, perhaps, to take the report of the Chief Engineer for 1877, which summarizes the previous results, and then applies itself to the work of the year. I propose, first of all, to deal with what is called the British Columbia section which, in this report, begins at the Yellow Head Pass, and continues down to Fort Moody. The first practicable route found, as appears from the Chief Engineer's report, so long ago as 1871, was that which has been ultimately adopted; and it is a remarkable proof of the great difficulties present to the minds of the engineers, and of the successive Governments which dealt with this matter that, having so early as 1871, found the most practicable route, which has been ultimately adopted, we should have been, almost ever since, trying to find some other route which would afford an access from the Rocky Mountains to the Pacific coast easier than that to which we have, at last, been obliged to resort. I am not, in the least degree, now proposing to question the wisdom of that choice, which may have been a good one; I am merely saying that we found the first practicable route in 1871, and that we have been trying to escape from it ever since, on account of difficulties of construction, but that we have ultimately been compelled to adopt it. Speaking of the operations of 1871, the Chief Engineer, Mr. Sandford Fleming, thus reported:

"It was further found that it was possible to reach the coast from Kamloops by the course and outlet of the Rivers Thompson and Fraser, the line terminating at an excellent harbor on Burrard Inlet. Thus, it was ascertained that a line was available for the railway, through the entire Rocky Mountain region, although portions would be enormously expensive. The report which I had the honor to submit, dated 10th April, 1872, pointed out generally the advantages of this line as compared with the railway extending eastward from San Francisco to New York. Those engineering features, which govern the cost of operating a railway and transporting goods, gave promise of being much more favorable on the Canadian route. The United States Pacific Railway attains an altitude above the sea, at four different points, fully double the height of the great continental summit on the Canadian line, and for 1,300 consecutive miles there is no altitude so low on the railway between San Francisco and New York, as the highest summit of the line through the Yellow Head Pass. With respect to distances it was estimated that, from Burrard Inlet to Montreal would be 633 miles less than from San Francisco to New York. It was, at the same time, estimated that the Canadian route would bring New York, Boston and Portland, from 300 to 500 miles nearer to the Pacific Coast at Burrard Inlet than these cities now are, with San Francisco as the terminal point of their line through the United States. The distance from England to China would be more than 1,000 miles less

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by the Canadian line than by the line passing through New York and San Francisco.

"The remarkable advantages of which the first year's survey (1872) gave promise, are not attainable without encountering obstacles which call for formidable works of construction. A line, in itself practicable, had indeed been discovered, but the information gained by the rapid and necessarily imperfect exploration also indicated that to carry a railway through some of the gorges of the Rivers Thompson and Fraser would require an enormous outlay. The difficulties, in fact, appeared so great that a recommendation to adopt the route discovered, could not be justified until every effort had been exhausted to obtain a line sufficiently favorable at less cost. Accordingly, in 1872, the engineering staff was reorganized, and the work of survey and exploration was extended to embrace a wider area of operations."

The engineer then proceeds to detail the other operations that went on in that and subsequent years, with a view to find some easier route. Then I turn to the work of 1874, in which instrumental surveys were made of the section from the Fort Hope to Burrard Inlet. The report thus states on the subject:

"The instrumental survey made this year from Fort Hope to Burrard Inlet was so far satisfactory as to establish the fact that the line was perfectly feasible and the gradients favorable, although the bridging of the wide and deep river channels would be expensive. Three tunnels appear to be necessary, having a total length of 3,400 feet, but only at a few other points would the work of excavation be heavy. It was considered important to obtain exact data in order to form a reliable estimate of the difficulties to be encountered along the canyons of the lower rivers Fraser and Thompson. The engineering force available was insufficient to make a minute survey of all the very serious difficulties encountered, extending as they do successively, for seventy miles. It was deemed advisable, under the circumstances, to select an average section of the canyons for examination; accordingly, a trial location survey was made for a distance of fourteen miles up the Fraser from Yale. On this fourteen mile section the survey showed that tunnels of an aggregate length of 6,385 feet, together with formidable rock cuttings, would be required. Favorable undulating gradients could, however, be obtained."

So that with the view at the time to establish the average character of the work, an average canyon was taken, and it alone was explored. That I need hardly say was a very rough, although, perhaps, the best available mode of obtaining an estimate of what the real difficulties of the work were. But things got better by 1877, when a more detailed report was made. The engineer gives us then ten different possible lines, speaking of the probable cost of which, he says:

"It would be undoubtedly desirable for the purpose of comparison to have reasonably correct estimates of the probable cost of each route, but this result is unattainable without regular location surveys."

He then proceeds to state the difficulties which exist:

"It is an exceedingly difficult matter, even with data sufficient to deduce the actual quantities of work, to form an estimate of cost at all reliable, owing in part to the uncertainty of the price of labor. It is impossible to say what wages it may be necessary to pay. The price of labor on the Pacific coast has, of late years, been much higher than on the Atlantic coast; and it is not possible to foretell what its range may be in future years. The value of labor enters so largely into the cost of a railway that any estimates of probable expense are conjectural, unless the price of that labor be established. It is, nevertheless, possible to form a comparative estimate by taking, as a standard, the prices which have been obtained on other public works recently completed. The Intercolonial Railway will, in this respect, be taken as the standard, and the estimates will be based on the cost of labor during the construction of that work. A percentage may be added, as individual judgment may dictate, equivalent to any supposed advance of price which may affect the western section of the Pacific line."

The engineer goes on to say that basing his estimate on these figures, that is to say on the assumption that the cost of labor, etc., would be the same as on the Intercolonial, which, of course, taking that as a common measure, would afford a remarkably unsatisfactory mode of getting at the comparative cost, he estimates the route we were then adopting at \$35,000,000. But he proceeds to say:

"These estimates are founded on the theory that the works are to be constructed equal in character to those on the Intercolonial Railway. The amount of expenditure, however, may, in the first place, be reduced by the introduction of timber trestle-work in the place of solid earth or rock embankments, and by the use of temporary structures in place of permanent and more costly ones. Various expedients could be resorted to to limit the first expenditure, generally, by the adoption of perishable works, to be replaced as they require restoration by more permanent works. By this means the first cost could be reduced, but with the prospect of ultimate increased expense. It is found difficult to determine