
SUPPLEMENTARY REPORT
OF THE
QUEBEC CORPORATION ENGINEER
OF THE
NORTH SHORE RAILWAY.

PRESENTED 12TH FEBRUARY 1875.



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The EDITH *and* LORNE PIERCE
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CITY HALL,

QUEBEC, 12th February, 1875.

*The Mayor, Aldermen, and Councillors
of the City of Quebec.*



GENTLEMEN,

The time has arrived when it behoves me to present this additional or supplemental report on the works on the North Shore Railway between Quebec and Montreal.

If I have been complimentary so far, I was actuated in so doing by the same spirit which causes the Government Engineer, Mr. Light, to say in the concluding paragraph of his second report. "The remarks herein contained would have been made in my first official report, but that it was preferred not to raise so many objections on a first inspection of the work."

Mr. Light I think, was perfectly justified in following my example in this particular, as it would not have been good policy to throw cold water on an undertaking which has been so long before the country and now bids fair to be carried out to a speedy realization.

The objections, after all, are but secondary, in as much as they mostly apply to works which are hardly

4 SUPPLEMENTARY REPORT OF THE ENGINEER

yet commenced and which there is now ample time to rectify, without, to any great extent, increasing the cost of the road,

The suggestions I am about to make do not require that any portion of the works as executed should be condemned, removed or done over again; but merely that they be added to, as in the proposed increased height and breadth of the roadway, the additional thickness and bond of the bridge piers, the additional thickness and strength of the proposed crib-work around the substructure of the bridge piers, and so on.

When I say that the time has arrived for me to supply this additional information: it is that since the publication of Mr. Light's supplemental report, I have heard the remark made that it is totally different from my first official report and entirely contradictory thereof. The "Courrier du Canada" has lately reiterated the assertion which as I shall presently show is altogether unwarranted.

Mr. Light, in his first report expresses himself satisfied with the progress made and with the general character of the work, with the exception, he says, of the road-bed which he considers too low and too narrow.

Mr. Light says, page 8 of his written report. "The works generally are well done and in accordance with the specifications, and are progressing in a satisfactory manner."

Is this in opposition to what I have written on the same subject?

Again, at foot of page 8 of Light's report, he says: "The question whether the works are substantial and permanent in character may be answered in the affirmative."

Does this paragraph belie me ?

At page 9 of same report, Mr. Light says : " The alinement is good and will generally admit of a high rate of speed.

" The inclination of the gradients is generally all that can be desired "

What disagreement is there here between us, and so far, on all these important points we both do full justice to the Chief Engineer, Genl. Seymour.

The only point so far as I can see, where Mr. Light and myself appear to disagree, is one of minor importance ; that is, inasmuch as, if Mr. Light's views be correct, the defect can be rectified. He says in regard to the culverts, that they are built upon imperfect plans, whereas I report such of them as I have seen to be built in a substantial manner ; nor is there any contradiction even here, since it is evident a structure may be solidly built, though on an imperfect plan. But supposing Mr. Light to be right on this point, which I do not admit, there are as yet very few of the culverts built as compared with the whole number required, and those which remain to be made can be easily and cheaply rectified by the Engineer in Chief and officers under his charge, and no doubt without any opposition on the part of the Contractor who cannot but be interested in so constructing the culverts as to not in any way run the risk of their giving way under the effects of frost or other elements of destruction.

The foundations of culverts, says Mr. Light, are but two (2) feet deep. Mr. Lindsay, on the contrary, certifies that such is not the case, he says : " The foundation pits were dug 3 ft. deep below bed of stream under the main body of culvert and four feet under the end walls."

See page 6 of Review by the Chief Engineer of the reports made by the Govt. Engineer respecting the character of the road.

~~Mr. Light states that the pier at the Jacques Cartier Bridge is but 5 ft. thick, and that it should be 7 ft. Now, Seymour shows at page 8 of the "Review" herein above alluded to, and I know from actual measurement that this pier is 6 ft. thick, instead of 5 which the plan shows and which, says Seymour, it had been intended to make it, but was increased to 6 ft. upon the representation of a member of the Government that the Engineer had so advised, and the Engineer of the Company expresses himself as naturally sorry that the Govt. Engineer did not give him an opportunity of setting him right on this point.~~

of the Red Bridge
 The pier as constructed I consider of sufficient dimensions provided it be properly bonded with thorough headers, and in all cases a thinner wall thoroughly bonded is superior in strength and durability to one of which the thickness is so great as to preclude the possibility of thorough headers, that is, of stones reaching through and through from face to face of pier.

As to the piers which are not yet built, though, if thoroughly bonded from face to face in every course I would consider them sufficiently strong and stable; nevertheless it would, I think, be advisable for the Engineer in Chief to increase their thickness where possible by about 20 per cent as he did in the case of the pier at the Red Bridge, and where the foundations are in, as at Portneuf, the piers might be strengthened by giving them less batter so as to bring them out thicker at the head under the coping. The piers must of necessity inspire confidence even in the casual

observer and unprofessional man; that is: not only should they be strong enough, but they should appear so.

Again I say, however, and repeat that the piers as designed would meet with my approval provided they were united face to face in such a manner as to form, so to say, a single solid block of stone in each course, which can be efficiently done by using the best and strongest cementing matter with stones running through and through their entire thickness at distances of about 6 ft. in every course.

I come now to the question of the breadth and height of the road bed along the line of Railway and to show that my views in this respect have not been forestalled by those of the Government Engineer, but rather the contrary, since my report is of the 24th of November last and Mr. Light's report of the 12th of January of the present year, I shall now give the concluding paragraph of my first report, when it will be seen, as already stated, that Mr. Light's views are not at all contradictory of mine but, on the contrary, quite in keeping therewith.

The paragraph reads as follows:—" This report
" Mr. Mayor and Gentlemen, is of course founded on
" and relates to the works as contracted for between the
" company and the Contractor; but I shall take occasion
" shortly, in another report to the Council to state my
" views as to how far the road, as contracted for, can be
" considered a first class road, in relation to its perish-
" able wooden bridge superstructure, its breadth and
" depth of cutting and its height and breadth of embank-
" ment, taking then into consideration the important
" question as to how far the additional cost of adding

“ a foot or two to the height of the formation level
“ throughout (\$1000 to \$2000 per mile) will be counter-
“ balanced by a corresponding saving in cost of running
“ the road during the heavy snows of winter, the clear-
“ ing of which from a low level track cannot but be a
“ formidable item in the yearly cost of maintenance ; and
“ this, I believe, can be done without adding to the
“ \$4,000,000 cash cost of the road, by revising the
“ general schedule in a manner to increase the cost of
“ the, permanent way, graduation, bridging, &c., and
“ setting down a less amount for stations, cars, engines
“ and general equipment ; as, while the roadway, when
“ once completed, cannot but at greatly increased outlay
“ and much loss of time be altered to a higher and
“ broader guage, it will be easy on the contrary if the
“ traffic warrants it, which I hope and believe will soon
“ be found to be the case, to add to the station accomo-
“ dation and purchase additional rolling stock.”

I am therefore of opinion that the road-bed at formation level should be broader than it is. Mr Light. recommends 17 ft., but I think that 15 ft., the same breadth as Mr. Legge has given to the Northern Colonization Road, would answer all useful purposes, and I am happy to state that in this we do not after all differ widely from the chief Engineer himself, since as will be seen by referring to page 9 of his “ Review ” of Mr. Light’s report, he says :

“ In as much as Mr. Light did not see a mile or
“ even a rod of earth-work that had been completed
“ either according to the specifications or to the instruc-
“ tions of the Engineer, I do not consider it worth while
“ at the present time to enter upon a defence of their
“ sufficiency further than to state generally, that when

“ fully completed according to contract, they will be found quite up to their requirements as exemplified by the best railway experiences in Canada and in the United States.”

The Company's Engineer goes on to say : “ I also desire to state that when fully completed according to specifications, the excavations and embankments will be the same width at formation level as are required by the specifications of the Montreal Northern Colonization Railway and that the top of the road-bed, when ballasted, will be wider at the base of the cross tie than upon that road, and wider in proportion to the guage than upon either the Grand Trunk or the Intercolonial.”

Again, quoting from Light's report, Genl. Seymour says : “ He speaks of the widths as measured at intervals between the race course and half the distance to Three Rivers, being 11, 12 and 13 feet, and from that point westward, as being generally 15 ft.,” and then adds.

“ There will be no difference in the width of formation level when the grading is completed, and the reason for the present irregularity is that the work in many places has not been carried out to the side stakes.”

The Chief Engineer, therefore, fully and unreservedly admits that the breadth of road-way at formation level should be 15 ft. instead of 12 to 13 ft. which it now is, and not only that it should be, but that it shall be made so; and if it be said that had not this discussion taken place, it is likely the roadway would have remained as it is, the Company will, now that public

opinion is alive to this matter, insist on the specifications being carried out by the Contractor.

Now, as to the height of embankment at formation level, I am clearly of opinion that so much should be added to this height as will cause the surface of the rails to be fully three feet above the average level of the country instead of two feet as contemplated by the specifications and sections, and that the breadth of formation level should be increased where necessary to allow of this additional height.

We are building a road to unite two important cities and which will hereafter form part of the great road to the Pacific. Let us then make the road such that it may be considered first class or as near an approach to a first class road as circumstances will admit of.

We can not, of course, expect a really first class road to be built for \$26,000 a mile which is the contract price of the one now under consideration, when, as is well known, the average cost of railroads in America is not less than \$50,000 a mile and in England £50,000 ; nor can it ever, in my opinion warrant the appellation of a first class road until its proposed wooden bridges and iron rails give way to bridges of iron and rails of steel as is to be the case in the Northern Colonization Railway ; but let us at least have it of such a width and height as will cause it to withstand the elements and allow of its being economically worked in winter, when at a three feet elevation above the ordinary level of the country, the snow plough may keep it in working order. I said nothing in my report in chief of the material which in some places along the line has been taken from the ditches and thrown on the side of the road as I was

led to believe that it would be removed by the Contractor ; otherwise, it would, of course, have the effect anticipated by Mr. Light, of causing the snow to accumulate, fill the space and impede the working of the line

The Chief Engineer says in relation to this at page 10 of his "Review :"

"The spoil banks or snow traps of which Mr. Light speaks are all to be removed before the work is accepted."

This is sufficient, if the Company insists on it being done, which I consider indispensable.

That the earthwork is not considered finished on any part of the line may again be inferred from the following paragraph at page 18 of Seymour's "Review," and that it is intended to be made good is equally apparent in the same extract.

"In considering this whole subject" says Seymour, "as far as any decision is to be influenced by the rough and unfinished condition of the work, at the time of its inspection by the Government Engineer, it should be borne in mind that the contract being for a "lump sum" as it is called, the Contractor cannot consistently be required to perform any particular portion of his work at any specified time ; provided the *entire work* is completed in the manner and within the time specified in the contract and therefore the Engineer can only endeavor to see that when the work is done, "it is properly done."

Now, as to the important question of the proposed foundations or substructure of the bridge piers. In my first report I show that foundations of wood are not uncommon and that some of the greatest structures extant rest on timber foundations. It remains for me to

consider in how far the plans prepared by the Chief Engineer of the Company will, if carried out, ensure permanency and durability in the proposed structures over the many broad and important rivers which intersect the line of railway between Quebec and Montreal.

In my opinion the piles should be cut off, not at a uniform depth of so many feet under the surface of the respective rivers at the lowest water; but rather that they should be curtailed in length so as not to project more than a very few feet above the bed or bottom of such rivers; as otherwise, with the proposed crib-work around them, composed, as it is intended to be, of a single wall or casing of round logs notched into each other and bolted and the intervening space between it and the piles filled in with stones, if the crib-work should fail, and I am afraid it would be very likely to do so in course of time, the piles would, from the falling away of the surrounding stone, remain unsupported, and where projecting several feet above bed of stream, would be liable, I think, to bend or sway from their vertical position and endanger the superstructure.

But if the plan be persisted in, of cutting the piles off short beneath the surface at low water, and it should be at extreme low water so that no portion of the wood-work could at any time be exposed to wind and weather, which would cause its rapid decay; I say that if this plan be followed out, then in my opinion the pile foundations should be surrounded with strong crib-work of double walls of solid timber well braced by cross ties at every few feet apart, the whole solidly braced and bolted, and the space within the walls as well as between the crib-work and piles solidly filled in with stones, and this crib-work should not be less

than 8 to 10 ft. in breadth or thickness at its upper or narrowest part.

Alluding to his plan of sub-structure for the piers of the several bridges, General Seymour says that "the failure to drive one single pile to the required depth or to place one single bolt in the right position might endanger the safety of the entire structure." Such an admission as this, I think should not be made, as it does not argue well for the solidity of the proposed mode of setting the foundations of these bridges.

The question of the length of bridge super-structure, as compared with the breadth of stream, I do not consider of paramount importance, as there are always more than one way of doing a thing, and doing it well, and as to the length of trestle work the Engineer himself states that "The entire question of trestle work is still in abeyance."

I believe, Mr. Mayor and Gentlemen, I have now put this matter of the North Shore Rail Road impartially and independently before the public and that it will have the effect of nullifying such monstrous assertions as those contained in "Le Courrier du Canada" of Tuesday where it is brazenly asserted "Les travaux sont mal faits,.....les ponts et leurs tabliers, tout défectueux" which would lead one to believe that the bridges are actually built and defectively constructed, and no doubt have the good effect of floating our bonds in Europe or elsewhere.

Will there never be an end to this jealousy which actuates us the one towards the other. Can no man in Quebec take hold of an enterprise either as Contractor, Engineer or otherwise without some one trying to strangle him immediately or to step in to his shoes.

We are constantly crying ourselves down and then we are surprised that having no confidence in ourselves, no one else has any in us. It is certainly not by calling out before we are hurt and finding fault with everythig we do, that we will engage our neighbors to help us through. On the contrary, let us put the case in its true light as I think I have now done, in this report and we will find Montreal willing to help us, as we have already been given to understand by Mayor Barnard and Aldermen David and Rivard, to the extent of a quarter of a million of dollars ; Government will, also, no doubt, again come to our rescue in a like amount, and then with a broad and high guage, imperishable bridges and steel rails we may look forward to a lucrative and uninterrupted traffic and the Company to the disposal of its bonds in any foreign market.

Humbly submitted

CHS. BAILLAIRGÉ,

N. S. R. R. Engineer on behalf of the
Corporation of Quebec.