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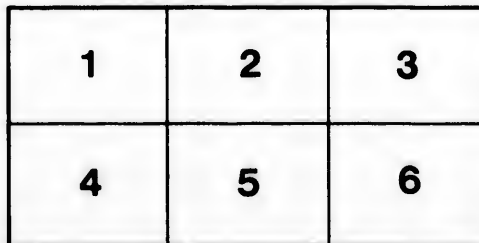
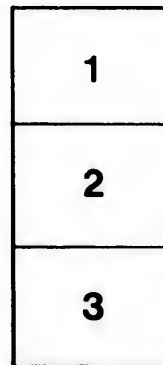
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SEYMOUR ON LIGHT.

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NORTH SHORE RAILWAY.

SEYMOUR ON LIGHT,

BEING A RE-PUBLICATION OF THREE LETTERS WHICH APPEARED IN
THE NEWS-PAPERS OF QUEBEC, IN 1876.

WITH EXPLANATORY REMARKS.

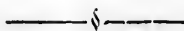
BY SILAS SEYMOUR,

GENERAL CONSULTING ENGINEER.

QUEBEC, September 25, 1877.

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EXPLANATORY.



In order that those who may not be entirely familiar with my own connection with the past history of what was formerly known as the North Shore Railway, may appreciate the motives which have impelled, and will continue to impel me to resist, and publicly expose the insidious efforts which are constantly being made by Mr. A. L. Light, the present Government Engineer in charge of that Railway, to bolster up his own professional reputation, at the expense of my own, I deem it proper to submit for their information, the following explanatory remarks :

During the summer of 1871, I was induced, by the representatives of the North Shore Railway Company, to abandon a large and lucrative practice in the United States, (which practice had been secured to me as the result of a somewhat extended and practical experience in the construction and management of Railways, during which I had also established a reputation for a certain degree of probity, skill, and foresight in such matters), and to accept the position of Consulting and Acting Chief Engineer of the North Shore Railway ;

which position I continued to hold until the summer of 1875, when the work came under the control of the Provincial Government.

During this time, and with the entire approval of the Board of Directors, a majority of whom were appointed by the Provincial Government, and the Corporation of the City of Quebec, I had made a location of the line, and prepared plans and specifications of the entire work. I had also found responsible parties who, upon my representations as to the probable cost and value of the Railway, were willing to undertake, and did undertake the full construction and equipment of the Railway, in accordance with the provisions of the charter of the Company, and the laws then in force.

I had also fully committed myself, in my published official reports, with reference to the probable future business and net earnings of the Railway; as well as to the present and prospective value of the large amount of timbered lands, which had been granted as a subsidy to the Railway Company; and the consequent desirability and safety of the debentures of the Company, as financial investments; all of which reports had been freely circulated throughout the principal money markets of the world. In addition to which, I had myself visited Europe, for the purpose of explaining and verifying these reports.

In view of the foregoing facts, together with the further consideration, that the reputation which I had acquired, during the practice above referred to,

has always been, and still is my only working capital in life; and the only legacy which I can reasonably hope to leave to my family, I beg to submit, that I cannot be expected to remain entirely passive, while the Government Engineer is constantly endeavoring to undermine and destroy this reputation, by insinuating that, but for his timely interference, the North Shore Railway would have been an engineering and a commercial failure; and consequently, that if ever constructed, the Government and the country will be indebted to him alone for the fact of its being a first-class Railway.

In pursuance of this one object of self defense, the annexed letters were published by me in the newspapers of Quebec, about a year since; and they were also transmitted to the Honorable the Prime Minister of the Province, accompanied by the following communication:

Quebec, 12th Sept., 1876.

MR. PREMIER,

I take the liberty of placing in your hands the enclosed copies of letters, which I have recently felt called upon to publish, with a view of protecting, so far as it may now be possible, my personal character, and professional reputation, from the injurious effects of the many misrepresentations made by Mr. A. L. Light, your Government Engineer, both in his official reports to the Government, and in his published letters to the newspapers of the country, respecting the character of the work, and the

administration of the Engineering Department upon the North Shore Railway, during the period of my official connection with that Road, as its Consulting and Acting Chief Engineer.

These official reports of the Government Engineer are now on file in the Department of Public Works; and they have also been officially placed before Parliament, in printed form, for the general use and information, not only of Parliament, but of the general public; whereas, my own official reports, which were made at the time, to the late North Shore Railway Company, in reply to, and in refutation of these misrepresentations, will never become entirely available in correcting the false and injurious impressions created by them, respecting myself, either in the minds of the present, or any future Government; or in the minds of the general public, for the reason that the Railway Company is no longer in existence; and its official records will, consequently, very soon pass into oblivion.

I would therefore most respectfully request that the enclosed letters, dated respectively: August 7th, 14th, and 20th, 1876, together with the accompanying printed copies of my official reports therein, and above referred to, and entitled respectively: "*Views of the Chief Engineer*," dated Jan. 30, 1875—" *Review of Engineering Expenses*," dated Feb. 2, 1875—" *Report of the Chief Engineer upon the situation*," dated March 4, 1875—and "*Historical Review of the Government Standard*," dated April 6, 1875, all of which are numbered in their proper order, from 1 to 7 inclusive, may be placed on file in the Office of the Minister of Public Works, for future reference, in connection with the official reports of the Government Engineer, above referred to;

and to which they are intended to afford full replies and explanations respecting all matters connected with the character of the work done; and the cost of engineering, upon the North Shore Railway, during the time when I had the honor to occupy the position of Consulting and Acting Chief Engineer of the Railway Company.

Trusting that I may be pardoned, Mr. Premier, for presuming to trouble you with a matter which, although it may at present appear to be entirely personal to myself; yet one which I apprehend may, sooner or later, become of some interest to your Government, as affecting the success of the important Railway policy which you have in hand;

I have the honor to remain,

Mr. Premier,

Your very obedient servant,

SILAS SEYMOUR.

The Honorable

C. B. DEBOUCHERVILLE,

Premier of the Province of Quebec,

Minister of Public Works, &c., &c.

To which the following was received in reply :

[*Translation.*]

DEPARTMENT OF AGRICULTURE AND PUBLIC WORKS.

Quebec, 16th September, 1876.

SIR,

In answer to your letter of the 12th of this month, I have the honor to inform you that the documents

you have transmitted, on the same date, to the Honble. Prime Minister, have been registered in the books, and filed in the records of this Department.

I have the honor to be,

Sir,

Your very humble servant,

(Signed,)

ERNEST GAGNON,

Secretary.

GENERAL SEYMOUR,
Engineer, }
 Quebec. }

With the same object in view, I have, during the past month, found the leisure to prepare and publish, in pamphlet form, a hasty review of a portion of a most remarkable pamphlet, which has recently been promulgated to the public by the same Government Engineer ; which portion relates, more particularly, to the subject of “ *Foundations in Deep Water* ” upon the North Shore Railway ; which subject is also treated of, to some extent in the letters above referred to ; and I have therefore deemed it advisable to republish these letters, at the present time, in pamphlet form, in order that they may be preserved for future reference, and also be conveniently appended to the former pamphlet.

A careful perusal and consideration of the facts, as stated in these pamphlets, and the published documents therein referred to, must, it is confidently believed, result in the conviction that the advent of the present

Government Engineer upon the North Shore Railway, and his permanent official connection therewith, have already proved, and must continue to prove to be the greatest misfortunes that could have befallen the Government and people of the Province of Quebec, in connection with that most important Enterprise.

It will also become apparent, by a perusal of these documents, that the course taken by the Government Engineer, during the Fall and Winter of 1874, and the Spring of 1875, was such, that the Provincial Government and the City of Quebec refused to pay, upon the current estimates, their respective quotas of the subsidies which had been granted in aid of the Railway; and that the Contractor was consequently obliged to suspend the work; and the Railway Company was compelled, by the force of circumstances, to abandon the Enterprise, and to place it at the disposal of the Provincial Government.

During the summer of 1875, a new contract was entered into between the Government and the Contractor, by the terms of which, and of the subsequent law which sanctioned it, the work was placed under the control of three Railway Commissioners to be appointed by the Government; and the Government Engineer was clothed with the powers, which, under the original contract, had been vested in the Chief Engineer of the Railway Company.

During the latter part of January, 1876, the Government appointed three Commissioners to supervise in

its behalf, the construction of the entire line of Railway, extending from Quebec, via Montreal and Ottawa, to Portage du Fort, a total distance of some three hundred and forty miles, and at a total cost of between eight and ten million dollars. These Commissioners were all gentlemen of high standing and good repute ; but, unfortunately, neither of them were practical railway men.

After having been thus chiefly instrumental in causing a year's delay in the progress of the work, and in wiping out the Railway Company, the Government Engineer found himself, at the opening of the working season of 1876, in the position which he had evidently been seeking to attain, since his first advent upon the North Shore Railway, to wit : where, by superseding the former Chief Engineer, and being under no control but that of a confiding and inexperienced Board of Railway Commissioners ; and having found a clause in the Government contract, which, as he vainly supposed, placed all the resources of the Contractor, as well as those of the Government, at his disposal, he could carry out at once his own peculiar views as to changes in the alignment and gradients of the road ; and also in the plans of Foundations, Masonry, Bridging, Ballasting, Depot-buildings, Machine-shops, Rolling-stock, &c., &c., and thus safely assume the credit, (as inferred from his letter to the *Canadian Illustrated News* of May 15, 1876) of having made "*certain sweeping changes for the better on the works, since they came under Government control.*"

It seems, however, from the revelations contained in the Government Engineer's pamphlet, that matters have not worked so smoothly in that direction, during the first year's experience of the Government Engineer in his new position, as he had fondly anticipated ; for the reason that the Contractor claims to have some right to protection under the contract, as well as the Government. And hence it appears, that during the past winter, the Contractor addressed a communication to the Prime Minister of the Province, in which he alleges that his rights and privileges under the contract, are constantly being interfered with by the Government Engineer ; also, that he is required by the Government Engineer to do a large amount of work that is not embraced in the contract, for which no extra allowance is made in the estimates ; also, that he has been compelled to take down and rebuild work that had been previously accepted by the Government Engineer ; also, that he has been subjected to all sorts of delays and damages by reason of changes in, or the non-approval of plans, by the Government Engineer ; also, that he has done a large amount of legitimate contract work, and incurred a large amount of expenditure, which have not been included in the monthly estimates returned by the Government Engineer, &c , &c., &c.

To all of which charges and allegations, the Government Engineer replies by printed pamphlet, addressed over his own signature, to the Railway Commissioners ; in which pamphlet the Contractor's charges are styled

as "pretended grievances," and his entire communication is branded as a "cunningly, if somewhat unscrupulously devised jeremaide." He also accuses the Contractor, through his agents, of attempting "to thwart the Government Inspectors,"; also "of covertly countermanding their orders to sub-contractors, and inciting the latter to do work inferior to specification,"; also "of having persistently endeavored to evade his contract, and has thus himself caused the delay of which he so bitterly complains,"; also "of there having been no loss of time but what the Contractor is himself answerable for, and caused by his repeated attempts to evade his contract," &c., &c.

In the conclusion of his pamphlet, the Government Engineer states, that "the Contractor began the St. Maurice Bridge some three months ago, and has already made mistakes that will prevent its completion this year" *; also, that "the correspondence produced by the Contractor, in support of his statements, is unreliable; facts are either distorted, or suppressed to suit his convenience; and in one instance he has not hesitated to resort to fabrication, in order to bolster up his case;" and further on, in the same paragraph, this fabrication is stigmatized as a "*gross forgery*;" and finally: "I do not hesitate to say, in closing my remarks, that all

* NOTE.—Since the foregoing was in type, I have been informed by Mr. I. J. C. Reeves, of Messrs. Clark, Reeves & Co., who are the Contractors for building the St. Maurice Bridge; and also by Mr. D. R. Kelly, the Agent in charge of the work, that the bridge will, in all probability, be completed by the 1st of Nov. next; or, at the latest, by the 15th.

‘difficulties,’ ‘delays’ and ‘losses’ that have occurred in the prosecution of this work, have been caused by the Contractor’s mismanagement and want of energy ; and by his persistent efforts to evade his contract,” &c.

Referring generally to the very voluminous pamphlet, as published to the world by the Government Engineer, a copy of which was first placed in my hands by a gentleman from the United States ; and which also contains the charges and allegations made by the Contractor, above referred to, it is quite clear that, if one half of the Contractor’s charges are well founded, the Government Engineer should long since have been dismissed by the Government, from his high and responsible position, on account, either of gross incompetency, or a culpable neglect of duty.

It is also equally clear, that, if one half of what the Government Engineer alleges against the Contractor is well founded, the contract should long since have been cancelled by the Government, under the fifteenth clause, which provides, that the Contractor “shall proceed with the said work at once, and prosecute the same with all possible speed, and according to the instructions given from time to time by the Government Engineer ; and failing this, upon a report from said Engineer to that effect, the work may be prosecuted by the said Trustees or Commissioners, at the costs and charges of the said Contractor ; or, that if the Contractor fails to prosecute the said work in a proper manner, or at a rate of progress that will ensure its completion within the time

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specified, (to wit: Dec. 1st, 1877), that then, and in any of the said cases, the Government shall have power to cancel the whole contract, and to enter into other arrangements for its completion, without any procedure at law being at all necessary, by express condition."

It would certainly appear, to any one who is at all capable of construing the above provision of the contract correctly, that the duty which it imposes upon the Government Engineer, under such a condition of things as is described in his pamphlet, is very clearly defined; and that it does not point in the direction of an appeal to the public opinion of the country, through the agency of a pamphleteering crusade against the Contractor.

The course pursued by the Government Engineer, has, on the contrary, reduced the Government, through its Railway Commissioners, to the mortifying necessity of calling to their aid the services of a competent and experienced Railway Engineer, for the purpose of tiding over the difficulties which exist between the Contractor and their own Engineer; and thus of allowing the work to drag its slow length along, under a condition of things which, if one may judge from the contents of the Government Engineer's pamphlet, may be expected to produce, within a few years, (in case the Government Treasury holds out) such an abortion, in the guise of a Railway, as has never yet been seen, either in Canada, or upon the American Continent. And all this at a cost of from a quarter to a half million dollars more than was contemplated and provided for in the contract.

The Government Engineer also seems to take peculiar pleasure, while he has undisputed possession of the field, in administering a severe castigation to, and probably checking off some old scores with Mr. Robert H. McGreevy, the Contractor's brother and agent.

In relation to this gentleman he says: "It moreover became imperative to maintain a rigid inspection, owing to the continual disposition shewn by Mr. Robert McGreevy, the Contractor's brother and agent, to thwart the Government Inspectors. Both engineers and inspectors report him in the habit of covertly countermanding their orders to sub-contractors, and inciting the latter to do work inferior to specification;" and again: "the want of uniformity caused by Mr. R. McGreevy's disposition to do inferior work, &c.;" and again: "it was found impossible to get Mr. Robert McGreevy, the Contractor's brother and agent, to do good work;" and again: "is not due to any cessation of Mr. Robert McGreevy's mischievous interference;" and lastly: "I am moreover of opinion *that the work cannot progress favorably* under Mr. Robert McGreevy's ignorant supervision. His underhand interference with the engineer's orders, is in direct *violation of the contract*, and is productive of the *most disastrous results to the work*, as will be best seen by the letters appended."

If the foregoing statements are well founded, they certainly afford very urgent additional reasons for the enforcement, not only of the 15th clause of the contract, above referred to; but also of another clause, which

gives the Engineer power, *and makes it his duty*, to discharge from the work any person "who may prove to be either incompetent, or disrespectful or rictous in his conduct ; and the person so discharged shall not be employed thereafter, upon any portion of the work."

Instead; however, of promptly and fearlessly discharging his duty, as prescribed in the contract, it appears that he has allowed the works to progress in a manner which, according to his own admission, "is productive of the *most disastrous results to the work.*" What then, may it not well be asked, has become of those "*sweeping changes for the better*, that have been made on the works, since they came under Government control," so triumphantly alluded to in the Government Engineer's letter to the *Canadian Illustrated News*, and to which the annexed letters are a reply ?

And may it not also be asked, whether the matter in relation to which, and for my own personal protection, I made an appeal to the Honorable the Prime Minister of the Province, a year ago, has not long since become one which, as I then predicted : "may, sooner or later become of some interest to the Government, as affecting the success of the important Railway policy which you have in hand ?"

It is not my present purpose, and it would seem quite unnecessary for me, to make any further comments upon the course taken by the Government Engineer in publishing to the world such an exposure, not only of his own incompetency and neglect of duty ; but also of

such a condition of things as, from the contents of his pamphlet, are shown to exist within the organization of the Railway Department of the Provincial Government; which department, as before stated, has under its control, the expenditure of from eight to ten million dollars of the people's money.

Neither do I consider it proper for me, at the present time, to indulge in any reflections upon either the Provincial Government, or upon its Board of Railway Commissioners, for allowing such a publication to be made, particularly at a time when the creditors of the Province, at least, should be thoroughly convinced that the strictest order, vigilance, and economy are being observed in such obligations and expenditures as must necessarily be incurred, in order to insure the early, and proper completion of the great North Shore line of Railway; without, at the same time, involving the Province in financial bankruptcy and ruin.

SILAS SEYMOUR,
General Consulting Engineer.

Quebec, Sept. 25, 1877.

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NORTH SHORE RAILWAY.

SEYMOUR ON LIGHT.

I.

SWEEPING CHANGES FOR THE BETTER.

MR. EDITOR,—My attention has recently been called to the following letter, which appeared some time since in the *Canadian Illustrated News*, and was also subsequently published in the *Montreal Gazette* and other papers:—

(To the Editor of the Canadian Illustrated News.)

QUEBEC, 15th May, 1876.

DEAR SIR,—On my return here from the United States, after an absence of some time, my attention was called to an article that appeared in your issue of the 6th instant, referring to the Quebec Railway System, wherein mention was made of certain sweeping changes for the better that had been made on the works since they came under Government control.

I hasten to say that these remarks do not apply to the Northern Colonization Railway. In my official report on this road, made to the Government in the autumn of 1874, as Government Engineer, I had very little fault to find with it, and that little was immediately proposed to be rectified, in the frankest manner, by Mr. Legge, the eminent Chief Engineer, and Mr. Duncan McDonald, the well-known Contractor.

These objections, after all, were mere differences of opinion, to which one man had probably just as much right as the other, and had nothing whatever to do with any intention of putting in inferior work. They consisted mainly in the question of the true height the rail level should be above the natural surface, in a snowy region. The depth culverts should be founded, to avoid action of frost, and the best kind of hydraulic cement.

On this work the "best steel rails and iron bridges, an enlarged grading, substantial foundations, larger and safer masonry, and the abolition of several dangerous draw-bridges," had been already adopted, and to a great extent carried out in a general satisfactory manner, at the time of my visit.

By the insertion of this correction, you will simply do justice to the many professional gentlemen who have hitherto conducted in a praiseworthy manner this great provincial work, and much oblige.

Yours very faithfully,

A. L. LIGHT.

The statement made by Mr. Light in the foregoing letter, to the effect that these remarks respecting "*certain sweeping changes for the better*" that had been made on the works, since they came under the Government control," "do not apply to the Northern Colonization Railway," seems, whether intended or not, to leave the inference quite clear, that they do apply in full force, and without any qualification, to the North Shore Railway; which is the only other line of railway that has recently "come under Government control."

It is quite apparent also, that the subsequent remark contained in his letter, to the effect that: "These objections, after all, were mere differences of opinion, to which one man had probably just as much right as the other—and had nothing whatever to do with any intention of putting in inferior work," was intended for the sole benefit of the "eminent Chief Engineer," and the "well-known Contractor" of the Northern Colonization Railway; while, at the same time, the entire letter does not fail to convey the idea, that this remark would be *entirely out of place* in connection with the North Shore Railway.

It is further stated that, the "very little fault which I had to find with the work on the Northern Colonization Railway, was immediately proposed to be rectified, in the frankest manner, by Mr. Legge, the eminent Chief Engineer, and Mr. Duncan McDonald, the well-known Contractor."

The following extracts from Mr. Light's "Official Report," will show how "very little fault" he had to find with it, &c.

THE NORTHERN COLONIZATION RAILWAY.

(Extracts from Report dated January 20th, 1875.)

" I now proceed to notice the grading of the road, by which is meant all matters connected with the arrangement of the gradients, including the construction of the earth-works, and ballasting. In this arrangement I cannot altogether concur, and I regret it the more, as all other matters were so entirely satisfactory.

" The earth-works, in my opinion, are two feet too narrow, and the grades in many places laid too low. In fact, economy has been rather too closely studied in this one particular, for the railway to be as economically and regularly worked in this climate, as it should be; or to be in keeping with all its other really first-class appointments.

" Were but a thousand dollars a mile more spent on this item, in raising the rail level more above the snow line, it would have a great and permanent effect in reducing working expenses." * * * *

" The embankments are intended to be fifteen feet wide at formation level, and the cuttings twenty feet. I have already expressed an opinion in a former report that these widths should not be less than seventeen feet, and twenty-four feet respectively, for a first-class railway. The proposed widths in cuttings are too narrow to afford that ample drainage required in this climate, and the embankments are not sufficiently wide to support the requisite quantities of ballast to prevent the road heaving up by the frost; and at the same time steady the track, (especially around curves) at the high velocities, that from the general directness of this road, might otherwise be safely maintained." * *

" The width of formation, however, can be rectified hereafter when required, and the quantity of ballast also may be increased, though never so easily and cheaply as when the road is being built in the first instance.

" The question of the lowness of the grade, however, is a more serious matter, this 'being difficult to alter afterwards, without changing the entire plan of the road ; and I would therefore suggest, that on the unfinished portions between Greenville and Aylmer, the gradients should be re-examined, and raised bodily in some instances ; and the long bold sweeping grades, so much in vogue on the Northern Colonization Road, be broken up somewhat, so as to roll where necessary more over the surface ; and thus many long and shallow cuttings, liable to be packed with snow, and difficult to drain, may be avoided. By this means a more workable road in winter will be obtained, at little if any additional cost.

" It is a matter of fact that an undulating railway, so long as the undulations are short, and do not exceed an inclination of 30 feet on a mile, can be worked quite as easily as a level road, the downhill compensating for the ups. By this means many troublesome cuttings may be avoided, which I am confident, when unnecessarily made in this climate, can only be effectually cured by filling them up again with ballast to the original ground level.

" A higher grade level will also have a further beneficial effect in getting rid of some open culverts now proposed to be put in the road, from the fact of the banks being too shallow to admit of covered structures. These open culverts are simply dangerous traps to catch an engine in, and should be avoided if possible." * * *

I will now proceed to show how "that little was immediately proposed to be rectified in the frankest manner, by Mr. Legge, the eminent Chief Engineer" of the Northern Colonization Railway.

In doing this I shall take the liberty of referring to a very able communication in review of Mr. Light's report, addressed by Mr. Legge to the Secretary of his Company, under date of February 8th, 1875, from which the following are extracts :

"Passing over the introductory and descriptive portions of the report, and acknowledging the careful and correct manner in which the several points have been referred to and discussed, reference will at once be made to the three or four items to which some exception has been taken by Mr. Light, as follows :—

- 1st. Lowness of grades in several localities.
- 2nd. Narrowness of embankments and cuttings.
- 3rd. Open or beam culverts.
- 4th. Steep grade in descending from Hochelaga height to level of City.

"With reference to all these matters, I may at once state, that generally I concur entirely with Mr. Light in the abstract views he has given ; but circumstances frequently are more powerful in compelling deviations or modifications from the "abstract right" than can well be withstood.

- 1st. *With reference to lowness of grade at several points between Greenville and Aylmer.*

"It will, no doubt, be brought to Mr. Light's recollection on reference being made to the circumstance, that when

passing over that portion of the line, his attention was called to this matter ; and that the grades had, where required, been elevated from one to two feet, as shown on the profile book of the resident Engineers." * * *

Mr. Legge here proceeds at considerable length to explain why these changes had not been entered upon the profiles furnished to Mr. Light, (from which it would appear that Mr. Light could really have known nothing about the height of the grades, when he wrote his report,) and then closes this branch of the subject as follows :—

“ This explanation will, it is hoped, prove satisfactory, in so far as height of grade is concerned, as no one can be more fully impressed with its importance, in a snow point of view, than is the writer.

“ I may state, that in the event of the Government Engineer requiring any extra height given to that already mentioned, I will be prepared to give the subject my best attention and consideration, to meet his views in so far as possible.”

2d. Narrowings of Embankments and Cuttings.

“ The width of embankments at formation level has been placed at fifteen feet ; and in cuttings at twenty feet ; dimensions which are fully carried out.

“ Mr. Light publishes a table giving widths on several broad gauge roads, (5 feet 6 inches) of from 16 to 20 feet for embankments ; and from 20 to 24 feet for cuttings. The average of these dimensions will not differ materially from those of your road, when reduced to the same gauge, and measured on the ground. No doubt the figures given are nominally correct, and taken from the specifications

for the various roads ; but I fancy, from what little I know of several of them as actually built, that the existing width, at formation level, in embankments, will not exceed fifteen feet, if indeed it equal that figure.

“ The Grand Trunk, Great Western, and Northern roads for example. The Intercolonial, European and North American, Nova Scotia, and several other lines embraced in Mr. Light’s table, were either built directly by the several Governments, or by very wealthy companies supported largely by Government aid. Many of them were originally provided with iron rails, and wooden bridges ; and even at that early date, with cheap labor and materials, cost very considerably more than our present line, with steel rails, iron bridges, and comparatively high labor ; depending also on but a moderate financial foundation for success.” * * * * *

After dwelling at some length upon the early history of his road, and the successive stages of its developement into a first class railway, “at the comparatively low cost of say \$32,560 cash, per mile.” Mr. Legge proceeds as follows :

“ Fixing therefore on fifteen feet for the width of embankments at sub-grade, for a gauge of 4 feet 8½ inches, a fair medium was adopted.

“ These embankments are, to a large extent, made up by carts and horses ; and become more compact than even the original ground itself. A reference to the accompanying sketch, or cross-section, will show a width of this solid embankment, at sub-grade exterior to each rail, of about five feet, having a similar compact character of embankment for supporting the exterior ballast.

" In the specifications, the rail is placed one foot six inches above formation level, or say the top of rail, one foot ten inches.

" The upper surface of the tie is, in practice, usually two inches above the dressed surface of the ballast, giving a depth of ballast of say one foot four inches.

" The width on the top of this ballast as mentioned in the specification, is ten feet, with slopes of one to one, at which inclination good coarse gravel will stand very well. There will consequently be a berm, or margin on each side of the railway track, between the foot of the ballast slope, and the top slope of the earth work, of one foot two inches, to prevent any wash over of ballast. Under these conditions, each rail will have an average of solid ballast, exterior to it, of two feet nine inches; an ample margin for safety and security, and if I may be allowed to state so, quite as much as any first class railway in Canada will be found to possess; their specifications and tables to the contrary notwithstanding." * * * *

" The extra width of several feet, recommended for the cuttings, in so far as the snow difficulty is concerned, I do not consider of much moment.

" Whether they be 20 feet, 22 feet, or 24 feet in width, is of but little practical consequence, the snow will blow or drift in: and in either case, the difficulty will have to be encountered and removed by mechanical means.

" In all our cuttings, deep catch water drains are excavated along the top of the slopes, so that no water can flow into them from the surface of the ground. The small quantity which will form in the cuts, is conveyed away in drains of from two to three feet in width, between the foot of the slope and the road-bed.

“ I may mention that, in many place where the earth was required to make up the adjoining embankments, the cuts have been widened to provide the material. Where rock has been encountered in cuttings, in the progress of the work, the grades have been elevated, as suggested by Mr. Light, provided the extra cost of elevation did not exceed that of the rock removal.

“ In connection with this part of the report, I regret not being able to coincide exactly with Mr. Light, who recommends that : “ the long, bold sweeping grades, so much “ in vogue on the Northern Colonization Road, be broken “ somewhat, so as to roll where necessary, over the sur- “ face ; and thus many long and shallow cuttings, liable to “ be packed with snow, ice, and difficult to drain, may be “ avoided. &c., &c., &c.”

“ In the first place, it may be observed, that but few, if any, such shallow cuts exist on the M. N. C. R., in so far as the amended rail level is concerned ; certain cuts must be encountered, and cannot be avoided.

“ The fewer *ups and downs* permitted in the road-bed, coupled with a minimum of curvature, the cheaper will be the cost of haulage, and cost of repairs ; both to the rolling stock and permanent way.” * * *

After explaining the necessity for adopting open or beam culverts in some cases ; and also for the steep grade of 85 feet per mile, near Montreal, Mr. Legge refers, with “ much pleasure,” to the most unwarranted statement contained in Mr. Light’s report, respecting the comparative cost of engineering expenses upon the two roads ; (which statement, as I was afterward informed, was ordered to be expunged from the report, by a member of the Govern-

ment ; and I find that it is suppressed from the printed copy of the report which was laid before Parliament) ; Mr Legge then proceeds as follows :

“ In conclusion, I again express regret at not being able, under the circumstances, to agree entirely with Mr. Light in the strictures he has been good enough to make on the works of this railway.

“ No two people can see a thing in exactly the same light : neither I suppose can Engineers. All have their hobbies, or peculiar manner of doing work ; each no doubt equally good.” * * * * *

The following extract from Mr. Light's Official Report upon the North Shore Railway, will show that, at the date of that Report, he had at least *no greater fault* to find with the character of the work upon that Road, than upon the Northern Colonization.

THE NORTH SHORE RAILWAY.

Extract from Report dated Nov. 25, 1874 :—“ I now proceed to touch upon the second part of your instructions, viz : Whether the works are well done, substantial, and permanent in character ; and if they are in accordance with the specifications ; and progressing in a satisfactory manner.” * * *

“ The question whether the works are substantial and permanent in character, in all respects, can be answered in the affirmative, with two exceptions, viz : the earth-works constituting the road-bed, are insufficient, although in accordance with the profiles. The bridges are to be of wood, the latter also are agreeable to contract ; and the plans proposed for them are generally arranged for good

work. The alignment is good, and will generally admit a high rate of speed.

“ The inclination of the gradients is generally all that can be desired, but they are laid too low.” * * *

Further on, he expresses the same extreme views as to the width of road-bed, &c.—as are expressed in his report on the M. N. C. R. ; and he also recommends that :

“ The “ formation level ” between here and Three-Rivers, should generally also be raised up bodily, from one to three feet throughout its entire length, with the exception of the river crossings, and at five or six points where cuttings of medium depths occur.” * * *

It is very well known, however, that his views respecting width of road-bed, &c., were afterwards so far modified as to bring them quite within the requirements of the specifications which were previously in force, and which are still in force under the Government contract ; and also, that he finally required that the grades be raised only “ an average of one foot ” ; all of which was cheerfully assented to by the Railway Company, the Chief Engineer, and the Contractor ; and was being carried out in good faith, long before the work passed into the hands of the Government.

It is therefore somewhat difficult to perceive where the “ *sweeping changes* ” have come in, even upon this road, since the work has come under “ *Government control* ”—except so far as they relate to the substitution, in part, of iron for wooden bridges ; and also of steel for iron rails ; and these latter changes would have been made by the Railway Company, long before the date of Mr. Light's Report, had its means been sufficient to cover the increased expenditure.

Deferring for the present, any remarks or conclusions of my own upon the case ; I will now leave it for others to judge, as to how far the facts bear out the statement contained in Mr. Light's letter of 16th May, 1876. (which he hastened to place before the public,) that " I had very little fault to find with it, and that little was immediately proposed to be rectified in the frankest manner, by Mr. Legge, the eminent Chief Engineer, and Mr. Duncan McDonald, the well-known Contractor ;" and also the other statement, made further on in the same letter, that " on this road the best steel rails and iron bridges, an enlarged grading, substantial foundations, larger and safer masonry, and the abolition of several dangerous draw-bridges, had been already adopted, and to a great extent carried out in a general satisfactory manner at the time of my visit ;" and also the unavoidable inference to be drawn from the entire letter, to the effect that, "*sweeping changes for the better*" had been made by the Government *only* upon the North Shore Railway, where there had also been an " intention of putting in inferior work," &c.

I will also leave it for Mr. Light himself, or for the Honorable, the Board of Railway Commissioners, whose servant he is, to explain either the necessity, the expediency, or even the propriety of placing before the public, over the signature of a person who holds a high and responsible position under the Government, a communication which contains so many erroneous statements, and conveys so many false impressions ; for the avowed purpose, as stated at the close of the letter, of doing " justice to the many professional gentlemen who have hitherto conducted in a praiseworthy manner this great provincial work ;" while

its real effect, if not its real purpose, is to do very great injustice to others, who are equally entitled to public confidence.

Quebec, August 7th, 1876.

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II.

EXCESSIVE ENGINEERING EXPENSES.

MR. EDITOR,—In my letter of the 7th inst., reference was made “to the most unwarranted statement contained in Mr. Light’s report, respecting the comparative cost of engineering upon the two Roads,” &c.

As a justification for using the term “most unwarranted,” in connection with the statement referred to, I have thought proper to prepare the following statement of facts in connection with the case, which I think will satisfy any unprejudiced mind, that the use of the term, was quite justifiable, under the circumstances.

Extract from Mr. Light’s Report upon the Montreal Northern Colonization Railway, dated Jan. 20, 1875 :—

“The estimate to the end of December, in round numbers, stands as follows :

Cash expenditure for surveying, locating, engineering, &c., &c.....	\$ 64,127
Cash expenditure for clearing, grubbing, grading, masonry, ties, and materials delivered, land purchased, &c., &c.....	946,446
	<hr/>
Estimate in gross.....	<u>\$1,010,573</u>

“ The sum of \$64,127 expended on engineering, covers cost of supervision, as well as the expenses of the Railway Company ; being less than 7 per cent upon the actual outlay on works.

“ This compares favorably with similar expenses on the North Shore Railway, where these three items to date, amount to about \$180,000. While the value of the work done is but \$220,000 ; the engineering being about 80 per cent on the actual outlay for work done.”

REMARKS UPON MR. LIGHT'S STATEMENT.

1st. “ The sum of \$64,127 ” did not “ cover the Expenses of the Railway Company,” nor the Contractor's expenses for “ General supervision of work,” for the reason that no such items were provided for in the contract.

The items, as reported in Mr. Legge's estimate, are as follows :

“ Work of grading 95 miles of line as per accompanying cer- tificate.....		\$946,446 92
Expenditure in engineering and surveying, and laying out works to 31st Dec., 1874.....	\$46,465 31	
Office expenses and Chief en- gineer's salary.....	17,464 98	64,127 29
		<hr/>
		\$1,010,574 21 ”

The item of “ office expenses ” therefore, which Mr. Light very unjustifiably assumed as being the “ expenses of the Railway Company ” were evidently the office expenses connected with the Engineer Department.

2nd. The three items in the estimate upon the North Shore Railway, referred to by Mr. Light, as corresponding with the above items, under the head of "Engineering," in Mr. Legge's estimate, are as follows :

Engineering.....	\$120,664	15
Expenses of Railway Company	23,704	00
General Supervision of work.....	23,921	14
	<hr/>	
Making a total of.....	\$168,289	29
Which amount Mr. Light quotes at about....	180,000	00
	<hr/>	

Making a difference of..... \$11,710 71

The above item of Engineering, includes, not only the "Salary of the Chief Engineer," but also the "Office Expenses" of the Department ; together with such "Supervision" or Inspection of the different works, as properly pertained to that Department.

It is therefore quite apparent that the item of \$120,664.15 in the estimate upon the North Shore Railway, (and not \$180,000, as assumed by Mr. Light,) is exactly identical in its nature, with the item of \$64,127 upon the Montreal Northern Colonization Railway.

The contract, under which the above estimate was made, provides that the contractor shall pay the entire "expenses of the Railway Company : " and therefore, this item was very properly included in the estimate. The same contract also provides that the Engineer shall include in his monthly estimates, the "payments made" by the Contractors, under the head of "General Supervision of Work," including the general expenses of carrying on the work, supervising engineers, overseers, agents, office expenses, &c.,

&c., the amount of which was based entirely upon the monthly vouchers returned to the Chief Engineer by the Contractor ; and therefore this item was also entirely legitimate.

All these matters were fully explained to Mr. Light by myself, before he prepared his report ; and that he must have understood them clearly at the time when he made the foregoing "*most unwarranted statement,*" will appear by reference to pages 2 and 3, of his published report upon the North Shore Railway, dated 25th November, 1874.

3rd. It appears evident therefore, that in order to make out a case against the North Shore Railway ; and, if possible, to cast discredit upon its Chief Engineer, Mr. Light was obliged, at that early period of his connection with the road, as Government Engineer, to resort to the grossest mis-statement of facts, as connected with the engineering expenses upon both the North Shore, and the Northern Colonization Railways ; and that, instead of embodying this mis-statement in his report upon the North Shore Railway, where, if true, it might not have been entirely out of place, he very adroitly slipped it into his report upon the Northern Colonization Railway, from which the most offensive portion of it was afterwards expunged ; but not however until it had produced its full effect upon the minds of the different members of the Government ; who, although probably believing in its truth, considered it so much out of place in the report, that it was ordered to be suppressed, before being printed and laid before Parliament.

Neither was it expunged, before Mr. Legge, the astute Engineer of the Northern Colonization Railway, was affor-

ded an opportunity of calling the attention of his Company to the facts, as officially announced by the Government Engineer, in the following exulting manner :—

Extract from Mr. Legge's Review of Mr. Light's Report, dated February 8, 1875.

“ To me it is a matter of much pleasure to learn from Mr. Light's report, that our expenditures for engineering, surveying, and expenses of the Company, to the first of the present year, compare so favorably with that of the North Shore Railway.

“ The amount of the M. N. C. R. being less than seven per cent on the total, while the North Shore Railway shows the large sum of eighty per cent of its expenditure for Engineering and Company's expenses.”

It is not to be supposed that Mr. Legge had any reason to doubt the correctness of the statement, so far as it related to the North Shore Railway ; and he evidently felt no desire to correct an *official statement* of this kind respecting his own road, particularly when made by the *Government Engineer*, for whose great ability, experience and integrity, he had already, in the same communication, expressed the highest confidence and admiration.

My own attention was accidentally called to the matter, during the latter part of February 1875, by reading Mr. Legge's reply to Mr. Light's report ; a copy of which he was kind enough to send me ; and I immediately applied to Mr. Legge for a copy of that portion of Mr. Light's report which related to this subject, which he also kindly sent to me.

Feeling somewhat indignant at the covert attack thus

made upon the North Shore Railway Company, as well as upon myself personally, I took the first opportunity to place the matter in its proper light, before the Railway Company, by referring to it in a report dated March 4th, 1875, which I was then preparing upon another subject; and again, more at length, in a subsequent report dated April 6th, 1875.

Inasmuch as both of these reports, which were subsequently published, must have come under Mr. Light's notice; it would very naturally be supposed that, unless he still persists in the correctness of his statement, he would have taken the first opportunity, not only to place himself right in the matter; but also to do an act of simple justice to others.

It seems, however, from his recent letter to the *Canadian Illustrated News*, that these acts of justice are reserved entirely for the "many professional gentlemen, who have hitherto conducted" another and more favored "Provincial Work."

It is very well understood, and no one should know it better than Mr. Light himself, that the engineering expenses connected with any Railway, during its incipient stages, are generally 100 per cent of all the expenditures; and that they frequently stand in that ratio until the work of construction is actually commenced; after which the ratio diminishes according to the progress of the work, until it reaches its minimum upon final completion.

Take as an example, the Canadian Pacific Railway, upon which a much longer time has already been spent in engineering alone, than was occupied in the entire surveys, location and construction of the Union Pacific Railway,

under my general advice and direction ; and yet we hear no complaints upon the subject.

By Mr. Light's own showing, there had been more than four times the amount expended upon construction, on the Northern Colonization Railway, at the date of his comparison, than had been spent for the same purpose, on the North Shore ; and therefore it is quite evident that no just comparison could have been made between the two roads, either then, or at any other time, without taking into account all the elements bearing upon the case.

Consequently, Mr. Light must have known that his statement, even if true at that particular date, could, from the nature of the case, convey nothing but an erroneous impression.

All these matters were fully, and I believe satisfactorily explained to the Railway Company, in my reports above referred to ; where it was shown, that although the engineering expenses incurred in 1871 and 1873, amounting to \$43,705 had been practically thrown away, on account of the failure of the county subscriptions ; and the delay of contractors in going forward with the work ; yet, upon the final completion of the work, these expenses would be only $6\frac{1}{2}$ per cent of the entire expenditure, or cost of the road.

While holding the position of Consulting Engineer of the Railway, I deemed not feel authorized to make any further effort to counteract the injurious effects of Mr. Light's mis-representations, than had been made in my official reports to the railway company, while acting as its Consulting and Chief Engineer.

But now that my professional connection with the road

has terminated ; and as Mr. Light seems determined that the mis-statements contained, not only in the report herein referred to, but also in his more recent letter to the " Canadian Illustrated News," shall remain in full force and effect, at least, so far as he is concerned, I feel not only quite at liberty, but that it is my duty to vindicate my own private character and professional reputation ; and also the past history of the important Enterprise with which I have been so long and so intimately connected, and the successful completion of which I still feel the deepest interest, from his insidious attacks, both in the past, the present, and the future.

I am quite aware that the general public will take very little, if any interest in discussions of this nature ; their only desire being that the North Shore Railway shall be speedily constructed ; but in what manner, by what means, or by whom, are matters of comparative indifference to them.

But I also believe that there are many persons in this community, who, while they may have an equal, and perhaps a greater interest in the final result, will still regard with proper contempt and indignation, the efforts of any person, however exalted may be his position, who attempts to prostitute that position, by casting unmerited obloquy and disgrace upon another although perhaps, far more humble and unpretending person ; whose sole and unre-mitted efforts, during the past five years, have been directed to the resurrection of the North Shore Railway, from the state of lethargy, or sleep of death, in which he originally found it ; and placing it in the foremost ranks of the great public *Enterprises* of the day.

To this class of the community I will say, that in the future, as in the past, when speaking of Mr. Light, and the course which he has constantly pursued in relation to the North Shore Railway, (to say nothing of his treatment of myself, either personally or professionally), since the date of his first official examination and report, in connection with the road, I shall endeavor to treat all such honest "differences of opinion" upon purely engineering questions, respecting which, to use his own language, "one man has probably just as much right as the other," with all the respect and consideration, that may be due to our respective positions.

At the same time I will say, that the above treatment will be *sovereign mercy* to the treatment that I shall be quite sure to administer in all cases where I may have reason to believe, that, in changing or rejecting appropriate and well considered plans; in condemning and tearing down well constructed works; and thus unnecessarily increasing their cost, and delaying the completion of the road, he has been actuated by the sole purpose and desire of demonstrating, that everything that had been done upon the road, previous to his advent, had been improperly done; and that the Government and the people, will be indebted to him alone, for a first class Railway, in case it shall ever be completed.

Quebec, 14th August, 1876.

III.

ELEVATION OF THE GOVERNMENT STANDARD.

MR. EDITOR.—In my published letters of the 7th and 14th inst., Mr. A. L. Light, the present Government Engineer in charge of that portion of Q. M. O. & O. Railway, formerly known as the North Shore Railway, stands charged and convicted of the most gross, and apparently malicious insinuations and mis-statements, respecting the character of the work, and the administration of the Engineering Department upon that road, of which I was the acting Chief Engineer, previous to the date of its becoming a Government work.

This vindication of my own character and professional reputation, and the consequent public exposure of Mr. Light's insidious attempts to undermine and destroy them, was rendered necessary on my part, solely on account of the voluntary and uncalled for publication by Mr. Light, in the newspapers of Canada, of a letter in which these insinuations and mis-statements, instead of being confined to his official reports, were publicly promulgated to the world. Had it not been for this, I should have remained silent ; and have been quite willing to trust to the record of my own official acts and reports, in connection with the road, for any and all explanations, or vindications, that

the circumstances might at any time have rendered either expedient or necessary.

The evidence upon which Mr. Light's conviction rests, consists chiefly in his own reports, and other official documents, all of which are either referred to, or quoted from; and they are all quite as accessible to Mr. Light and others, as they are to myself; and therefore there can be no difficulty in explaining or refuting my charges, provided the facts contained, either in these, or other authentic accords of the past, will warrant the undertaking.

Having now waited several weeks, either for an explanation, a defense, or a manly retraction of these mis-representations, I am forced to conclude, that Mr. Light either regards my charges and allegations as being unanswerable; or that he considers the high and responsible position which he holds under the Government, as affording him full license and justification for anything which he may choose to say or do, in connection with the North Shore Railway, however it may affect either the cost of the work, the time of its completion, or the character and reputation of those who may have been connected with it, previous to its coming under Government control.

I propose, therefore, in the present letter, to briefly pass in review, so much of Mr. Light's history in connection with the North Shore Railway, as will afford those who may take an interest in the matter, a fair opportunity to judge of the reliability of his statements; and also of his professional capacity as a Railway Engineer.

The first inspection of the work by Mr. Light, after his appointment by the Government, was made quite late in the Fall of 1874. The first portion of the line, between

Quebec and Three Rivers, was passed over during a driving snow-storm; and the remaining portion, when the ground was covered, to the depth of several inches, by snow.

While everything was fresh in his mind, he prepared and submitted to the Government, his first report, dated Nov., 25, 1874, (referred to in my letter of Aug. 7, 1876,) in which he gave a general approval of the location of the line, the inclination of the grades, and the character of the work, with only two exceptions, viz., the insufficiency of the earth-works, and the wooden bridges.

On the 12th of January, 1875, or within two months after the date of his first report; and without having made any further inspection of the work, he submitted a second report upon the same subject, in which he states substantially as follows :—

1st. "The road-bed between Quebec and Three Rivers is laid entirely too low and narrow to be continuously and economically worked in this climate."

2nd. "The culverts or water passages, through embankments, are built upon imperfect plans," and therefore, "are liable to fail."

3rd. "The masonry in the bridging, although apparently good of its kind, is generally too small, the piers especially." Referring particularly to "the only pier as yet completed, viz: that on the west side of the Jacques Cartier River," he says: "this pier is founded on rock, which from its want of elasticity, like the stone sleepers on the old railways, will augment the shattering effect of passing trains, that will surely wreck it, sooner or later."

4th. "The proposed plan of founding piers on soft bot-

toms in the deep waters of the larger rivers, which in some instances are 25 feet deep at low water, although economical, I consider hazardous."

5th. "The superstructure of many of these bridges, especially from Quebec to Portneuf, is much longer than the water-way of these streams require."

6th. "The cement and sand being used at Portneuf bridge, the only place I found masonry in progress, were very indifferent. The latter indeed quite unfit for the work, as I pointed out to the resident Engineer."

It would certainly be quite difficult for any one who is at all familiar with such matters, or who had a just appreciation of the proper character and qualifications of even an ordinary Civil Engineer, to say nothing of the far greater responsibilities which are supposed to attach to an Engineer who represents the Provincial Government of Quebec, to believe it possible that the above report could have been written and officially signed by the same person who, only a few weeks previously, had written and officially signed another report respecting the same work, from which the following is an extract :

"The question whether the works are substantial and permanent in character, in all respects, can be answered in the affirmative, with two exceptions, &c., &c."

And yet this was done by Mr. A. L. Light, the present Government Engineer ; against the effects of whose later insidious attacks and public misrepresentations, I am now endeavoring to protect myself. Does Mr. Light, or even the Government which he represents, suppose for a moment, that I can allow an unsullied reputation of more than thirty years standing, to be effectually undermined

and destroyed, through the agency of means and influences, emanating from such a source, without at least making an effort to prevent it ? To me the idea is preposterous.

In the legitimate pursuit of this one and only object, I shall not pause, at the present time, to consider the probable motives which governed Mr. Light's proceedings ; nor the influences which may have been brought to bear upon him, by other parties, in order to induce him to prostitute his high position, and to degrade the honorable Profession, of which he claims to be a member, merely for the purpose of bringing obloquy and discredit upon so humble an individual as myself.

Neither shall I be diverted from my purpose ; nor submit to be driven from my true position, as Defendant in the case, through the base instrumentality of slanderous editorials, promulgated through an unscrupulous and toadying press.

Referring again, therefore, to the early history of Mr. Light's advent upon the North Shore Railway, it is proper to state ; that after his second effort to describe the character of the work upon the road ; both the Provincial Government and the Corporation of the City of Quebec, refused to make any further advances to the Railway Company, until these glaring defects in the construction of the road had been rectified ; and it therefore became imperative that a standard should be decided upon at once, which would meet the requirements of the Government, and be acceptable to the Company and the Contractor. The Government and City Engineers were accordingly called upon to furnish this standard.

Mr. Light now found himself in something like the posi-

tion of the "*Bull in the China Shop*." He had succeeded remarkably well in smashing things up generally ; but he found it quite a different thing to restore them to proper harmony and working order.

The first joint effort of these gentlemen, under date of March, 9, 1875, not proving successful, a special meeting of the Railway Committee was held on the 12th, at which the Government and City Engineers, together with the Chief Engineer and the Contractor of the Road, were present by invitation.

The following extracts from the proceedings of this meeting, are taken from my "*Historical Review of the Government Standard*," dated April 5, 1875 : —

" With reference to the Jacques Cartier Pier already built, Mr. Light said that it must come down ; that it was much too small ; that the cement was worthless ; that there could not be more than 150 or 200 cubic yards in the pier ; and that it could be taken down and properly rebuilt for \$3.00 per cubic yard."

" With reference to the Portneuf Piers, now partly constructed, (to a height of 8 feet ; and 10 feet 5 inches in thickness at top), upon being asked by the Chief Engineer if these must also come down, Mr. Light said that they could remain, and be carried up from their present height with a batter that would bring them out 7 feet at the top."

" Upon being asked by the Chief Engineer, whether the requirements respecting the Jacques Cartier Pier " that there should be no coping, or that it should not be allowed to project," would apply to all the piers upon the road, Mr. Light replied, that it would most certainly apply to all piers, for the reason that the weight of the bridge

coming upon the front edge of a projecting coping, would have a tendency either to detach the coping, or pull over the pier ; and he gave the Committee a beautiful illustration of his idea, by placing a book in a projecting position over the side of the table at which we were sitting, and showing how easily it could be tipped over, by the least pressure upon its outer or projecting edge."

" Upon being asked by Colonel Wm. Rhodes, the President of the Company, whether in re-constructing the Jacques Cartier Pier, Mr. Light would kindly suggest some means of obviating the objections which he had previously made to its being founded on solid rock ; Mr. Light, without suggesting any present means that had occurred to him, for obviating that difficulty, referred the President to Railway experiences in England, where it had been found necessary to substitute wood for stone foundations under the rails, in order to avoid "the shattering effects of passing trains."

Having thus freely exchanged views with all parties interested, another and final effort was made, on the 13th March, 1875, by the Government and City Engineers, to perfect a standard for the road ; which effort proved so far successful, that it was finally assented to by the Railway Company and the Contractor. And the same standard was afterwards incorporated into the present Government contract, as an *Addendum* to the General Specifications, and "Circular No. 2," which were prepared by myself, and were in force under the original contract.

A comparison between the General Specifications (as explained and enforced in "Circular No. 2,") and the Government standard above referred to, will show that the

latter covered nothing that was not fully provided for in the former ; and that the only changes required in the work already done, were the raising of the grade an average of one foot, over the comparatively small amount of earth-works in progress ; together with the tearing down and rebuilding of the Jacques Cartier Pier ; all of which, according to the construction placed upon the original contract by Mr. Walter Shanly and Mr. Sandford Fleming, as well as by myself, could have been accomplished " for less than twenty thousand dollars." (See "*Report of the Chief Engineer upon the situation,*" dated March 4, 1875.)

Thus it will be seen that the former outcry against narrow earth-works, defective culverts, excessive waterways, worthless sand and cement, &c., &c., &c., having failed to accomplish the purpose for which it was originally intended, was no longer persisted in ; and, also, that the very large mountain, after several months of the most excruciating labor, had succeeded in bringing forth a very small mouse.

The efforts of Mr. Light, in the direction of an elevated standard for first-class Government Railways, together with subsequent experiences, have, however, produced several very important, if not clearly beneficial results in Engineering Science, which should not be lost to the world, or to the profession ; among which I would call particular attention to the following, which may very properly be designated as :

MODERN ENGINEERING MAXIMS.

1st. A Civil Engineer, whose skill and experience have elevated him to the exalted position of Government Engi-

neer; while inspecting a line of unfinished Railway, through a country entirely new to him; and at the rate of twenty miles or more per day; a portion of the distance during a driving snow storm; and the remainder with the ground covered with snow; can tell with the utmost precision, the width of all excavations and embankments; the height that the rail should be above the level of the ground; the nature of the plans and foundations of all culverts and water-ways; the strength and quality of the cement and sand used in the masonry; the defects in the plans for foundations in deep water; and the length of span required for each and every bridge.

2nd. Should the first impressions made upon the mind of an Engineer, during his inspection of the work, unfortunately be quite favorable, it will not be either safe or expedient for him to promulgate these favorable impressions in an official report, until after a sufficient time has elapsed, either to obliterate them from his mind, and replace them with others of an entirely different character, or to enable him to strike the proper *key-note*, as dictated by other parties, who may possibly have a much more direct interest in the matter.

3rd. The greater the width of earth-works, the greater will be the facilities for drainage; and also for overcoming the snow difficulty; 17 feet embankments, and 24 feet cuttings, being the least widths admissable.

4th. "Where human life is at stake, a slight margin for safety is generally allowed, in additional width of road-bed, to resist the wear and tear of time, and prevent trains from rolling over the sides of embankments, when they run off the track.

5th. The grade line should be "raised up bodily from one to three feet, throughout its entire length," upon a portion of the line where, for three-fourths of the distance, it already averaged from two to twenty feet above the natural surface of the ground.

6th. Coping should be dispensed with in all bridge masonry; "for the reason that the weight of the bridge coming upon the front edge of a projecting coping, would have a tendency, either to detach the coping, or pull over the Pier."

7th. The ends of the cross-ties should be thoroughly surrounded by ballast, extending outwards several feet in width, in order to facilitate the proper drainage of the superstructure.

8th. "It is a matter of fact that an undulating Railway, so long as the undulations are short, and do not exceed 30 feet in a mile, can be worked quite as easily as a level road; the downhill compensating for the ups."

9th. When an Engineer supersedes another in charge of the construction of a line of Railway, it is expected that he will condemn everything that has been previously done, and change all the plans for future work.

The following may perhaps be more appropriately classed under the head of

MODERN ENGINEERING PARADOXES.

1st. "Culverts or water passages," upon the North Shore Railway, which "are built upon imperfect plans," have withstood the severe tests of two lower Canadian winters, without showing the slightest indications of failure; while those that have been built upon the most

approved plans, on the Northern Colonization Railway, where the climate is much milder, have in several instances tumbled down.

2nd. The masonry in the piers at the Jacques-Cartier and Portneuf Rivers, that was built with "worthless cement," and "sand quite unfit for the work," has proved to be so thoroughly bonded, that it required more labor to tear up the masonry than it did to procure the stone from the original quarries.

3rd. A single pier composed of first-class masonry; standing nearly midway between two massive abutments; and capable of sustaining twenty four times more weight than can ever come upon it; and of nearly three times the relative size and strength of the towers which support the Niagara Railway suspension bridge (which are founded on rock), must come down, because it "is founded on rock, which from its want of elasticity, like the stone sleepers of the old Railways, will augment the shattering effects of passing trains, that will surely wreck it, sooner or later."

An allusion having been made to the tearing down of the masonry at the Port Neuf bridge: which, as already shown, had previously been approved by the Government Engineer, I shall reserve for a future occasion, some remarks respecting that, and other changes in the work and plans, that have been made by Mr. Light's directions; showing the unnecessary loss of time, and the consequent increased expense that have thus far resulted from the practical application of the foregoing Engineering maxims; and the free and unlimited exercise of his arbitrary power.

It appears to me, however, that quite enough has been shown, in this, and my previous letters, to enable any unprejudiced mind to arrive at very just conclusions, respecting the reliability of statements contained, either in Mr. Light's official reports, or in his published letters ; and also respecting his high attainments as a Civil Engineer.

Quebec, Aug. 29th, 1876.

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VALEDICTORY.

CONTRADICTIONS AND ABSURDITIES.

While necessarily engaged in revising the proof sheets of the foregoing letters, as they have passed through the press ; and while, at the same time, the contents of the Government Engineer's late pamphlet were fresh in my mind, so many glaring contradictions and absurdities have presented themselves before me, while comparing the earlier official reports and statements of the Government Engineer, with his more modern efforts in the same direction, that I cannot well refrain from calling especial attention to some of them, before dismissing this very prolific subject.

THE ALIGNMENT OF THE ROAD.

Referring to the Government Engineer's Report upon the North Shore Railway, dated Nov. 25, 1874, as quoted from in one of the preceding letters, he uses the following language in relation to this subject.

"The alignment is good, and will admit a high rate of speed." Whereas :

On page 8 of the Government Engineer's late pamphlet, in referring to a change in the line near Portneuf, he says: "This change I have already referred to. It was a *most necessary* one. It got rid of a 6 degree curve, and 34 degrees of curvature on a long maximum grade, which would have *greatly crippled the line*, no other curves exceeding 4 degrees."

Passing over the radical contradictions contained in the two reports, I will merely remark, that it is difficult to appreciate, either the *necessity* for the change ; or the manner in which this obnoxious 6-degree curve could "greatly cripple the line," when it is considered that the curve was introduced in the immediate vicinity of a long bridge, seventy-five or eighty feet in height, over which the trains would very naturally be required to pass with great caution, and at a reduced rate of speed.

It should also be understood, that the curve was not "*got rid of*," as the Government Engineer evidently intends to make it appear ; but that one of somewhat larger radius was substituted in its place, at an additional cost to the Government of seven thousand dollars.

The point where this curve occurs, is one of the most difficult upon the entire line ; and was studied with very great care, before a final location was determined upon. The curve in question, passes through a long, sloping, thorough cut ; which is composed of the most treacherous materials, and resembles the adjacent river slopes, which the Government Engineer (on page 19 of his late pamphlet) says : "are composed of slippery blue clay, and are liable to heavy land slides." The upper slope of the excavation is therefore liable to slide in at any time, and fill up the cut.

Hence, and also on account of the peculiarly exposed condition of this portion of the line, to *snow obstructions*, it was deemed advisable to make the cutting as short and light as possible, by the insertion of a six degree curve, which, at that time, had been adopted as the *minimum Radius* for the entire Main Line.

It appears, however, that the Government Engineer, in his zeal to find, at least *one defective point* in the alignment of the road, has, by either adroitly and culpably concealing the proper engineering views of the case ; or, as is more charitable to assume, not having any just appreciation of them himself, succeeded in inducing the Railway Commissioners, and the Government, to allow him to throw the line much further into the steep side hill ; and thus to add largely, both to the length and depth of the cutting ; and consequently, to the dangers from exposure to "*land slides*" and *snow obstructions*. And all this at an extra cost of eight thousand dollars, * and without adding a particle to the future business capacity of the road ; but, on the contrary, subjecting this business to almost certain additional expenses, detentions and delays ; which, together with the extra cost of the change, and the annual interest thereon, will eventually be found to be a rather unfortunate, as well as an expensive investment for the Government.

WOODEN BRIDGING.

Referring again to the same Official Report of Nov. 25, 1874, the following language is used in relation to this subject :

" The bridges are to be of wood, the latter also are agreeable to contract ; and the plans proposed for them are generally arranged for *Good Work*."

Whereas, on pages 32 and 33 of his late pamphlet, the

* NOTE.—Since the preceding page was printed, I have been reliably informed, that this "extra cost" is between \$3,000 and \$9,000. I had previously been informed, by the Chairman of the Railway Commission, that it was considerably over \$7,000.

following language is used, in connection with the same subject :

“ The specifications given out by the late Railway Company, were *fifty per cent lighter* than the standard now adopted, *which is as light as is safe.*” And again : “ I could not therefore have approved of work of which I had never seen the designs.” And again : “ I never saw the plans and specifications till December 1876.” And again : “ I merely gave the bridge builder, at his own request, a certificate that he had fulfilled his contract with the contractor; it does not at all follow that I considered the work up to standard; which it was not, being some 50 per cent too light.”

Before the Government Engineer made his report of Nov. 25, 1874, and the examination of the work which preceded it, I had shown him all the plans, specifications and bills of materials for the wooden bridges between Quebec and Three-Rivers; and he had fully approved them. These plans were signed by me, and placed in the hands of the Contractor.

Assuming these plans to be the same as those referred to in the Government Engineer's late pamphlet, it is somewhat difficult to reconcile the statements contained in that pamphlet, with the truth; or to appreciate the force of his remark in connection therewith, to wit : “ the old specification is modified by the clause in the new contract, which binds the ‘ Contractor to make all changes in plans in conformity with Government requirements, from time to time.’ ” Having, however, recently exposed the fallacy of the Government Engineer's theory as to the proper construction of this clause in the Government contract, I will not enlarge upon that subject here.

THE PORTNEUF BRIDGE.

By referring to page 67, of a pamphlet entitled : "*Historical Review of the Government Standard, by the Engineer in Chief, dated April 6, 1875,*" it will be found that, on the 12th of March 1875, in the presence of a Special Committee of the Board of Directors of the North Shore Railway Company, and the Contractor, the Government Engineer stated, with reference to the work already done in the foundations and masonry for this bridge, as follows :

" With reference to the Portneuf Piers, now partly constructed, (to a height of 8 ft., and 10 ft. and 5 inches in thickness at top), upon being asked by the Chief Engineer, if these must also come down, *Mr. Light said that they could remain, and be carried up, from their present height, with a batter that would bring them out .7 feet at top.* "

Referring also to the joint "*Report of Messrs. Baillargé and Light,*" upon the Government Standard, dated March 13, 1875, which is embodied in the present Government Contract, the following language will be found : " The additional thickness required at the Piers of the Bridge at Portneuf, of which *foundations are already in place, can be obtained by altering the batter thereof.* "

Per contra. On pages 18 and 19 of the Government Engineer's late pamphlet, already referred to, the following statement is made with reference to the same matter :

" The plans never were approved by me. In the report above quoted by the Contractor, (to wit : the joint report above referred to), my remarks referred to the 'batter' and 'size' of the masonry ; not to its character, or to the foundation."

If the remarks of the Government Engineer above quoted as having been made in March 1875, several months previous to the signing of the Government Contract, did not convey the idea quite clearly, that the Contractor would not be required to tear down and rebuild these foundations, I must confess to an entire ignorance of the meaning and force of the English language.

FOUNDATIONS IN DEEP WATER.

The manner in which the Government Engineer has repeatedly contradicted himself, with reference to this important item of work, is so fully exposed in my recent pamphlet, entitled "*Foundations in deep water*," that it would be supererogatory to enlarge upon the subject again, in this place.

The Government Engineer's gross fabrication respecting the "*Engineering expenses*" upon the North Shore, as compared with the Northern Colonization Railway; together with the glaring contradictions contained in his Reports of Nov. 25th 1874, and Jan. 12th 1875, in relation to the "*character of the work*", which was then in progress, have also been so thoroughly exposed, in the foregoing letters, that it will be quite unnecessary to dwell upon them again here.

It would seem, in view of the above most remarkable exhibition of the glaring contradictions, and inconsistencies which have hitherto marked the official course of the Government Engineer, that it might be well for him to add another "*Modern Engineering Maxim*" to those already quoted in the foregoing letters, as having been deduced from his past experience upon the North Shore

Railway, to wit : " That, when an Engineer has fully determined to establish a reputation for himself, upon the ruins of his predecessor, he can not be too particular as to the language or statements which he resorts to, lest they may be found to conflict with what he may have either said or written upon previous occasions. "

Having now pursued this subject as far as is agreeable to myself; and at the same time, I feel quite sure, much farther than will prove interesting to those who may attempt to follow me ; I shall leave it, for the present at least, in the hands of others who may happen to feel quite as much interest as myself, in the success of the bold, enlightened and progressive Railway policy of the present Government ; and also in the future welfare of the Province of Quebec.

SILAS SEYMOUR,
General Consulting Engineer.

Quebec, October 5th, 1877.

