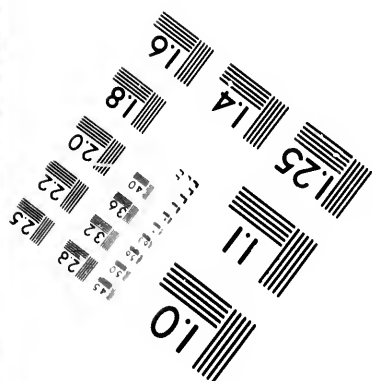
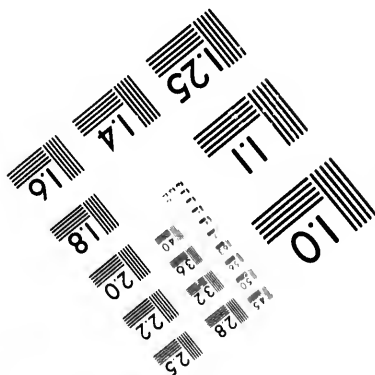
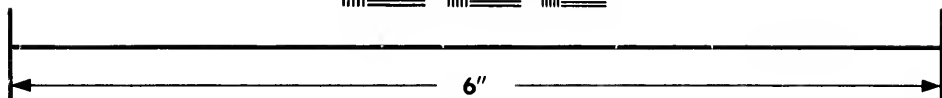
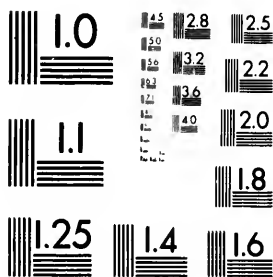


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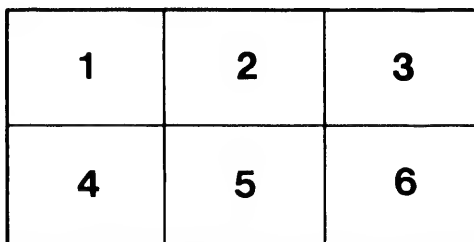
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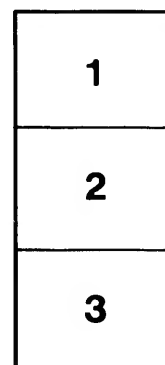
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TO THE

PHILOSOPHY OF RAILROADS.

BY

THOS. C. KEEFER, C. E.

TORONTO:

PRINTED BY LOVELL AND GIBSON, CORNER OF YONGE AND MELINDA STREETS.

1856.

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Having been virulently assailed in the editorial columns of the *Toronto Leader*—the paid mouth-piece of a clique of Railway practitioners, who affect to despise everything Canadian—except our debentures—I submit, as the best answer to this attempt to blacken my personal and professional character in the Capital City of my native Province—and amongst many old friends and school-fellows,—the articles from the *Montreal Herald* which have called forth this labored, malignant, but pointless Grand Trunk denunciation.

That the publications which the *Leader* so flimsily professes to despise, have been keenly felt, is evident from the sharp cry of the wounded plotters through the columns of their organ. The *Leader*, with more shrewdness than honesty, labors to insinuate that my reply to the assaults of the Railway jobbers, is dictated by disappointed ambition. It is only necessary to refer to the fact, that I did not seek anything at the hands of the Government, but that the proposition came from them; moreover, as I never anticipated any other result than that which has taken place, the correspondence in the *Herald* which has given so much offence, would not have appeared at all, had not the same gentleman who has shewn so much discretion in publishing Mr. Brassey's letter, unneces-

sarily held me up to the country as an Engineer who might be influenced by Grand Trunk money. As an Executive Councillor he affected to fear the inveterate corrupting tendencies of the Company over which he presided—whose morality he was quick to discriminate, but helpless to reform—but to those who are familiar with the philosophy of the school to which he belongs, the reason assigned will be regarded as *lucus a non lucendo*; for had there been any possible grounds for the “painful suspicion,” I should undoubtedly have received the hearty support of the President, Engineer, and pensioners of the Grand Trunk Railway.

The following letter was sent to the *Leader*—but its receipt is not even acknowledged in this day’s issue (May 14 :

Toronto, May 13, 1856.

To the Editor of the Leader.

SIR,—I believe it is the practice of impartial Journalists to publish the articles upon which they have occasion to comment. I think you will admit, that the personal attack in your paper of this day’s date, entitles me to ask as a matter of justice at your hands, that you would be good enough to publish those productions of mine upon which you have so strongly animadverted.

I have the honor to be, Sir,

Your obedient servant,

THOS. C. KEEFER.

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The following reply to the attack in the *Leader* of the 13th May, appeared in the *Globe* of the next day :

To the Editor of the GLOBE.

SIR,—I was invited to deliver last winter, an introductory course of lectures upon Civil Engineering, before the University of McGill College at Montreal ; in doing which I took occasion to utter some wholesome, but, possibly to some parties, distasteful truths. It so happened that a short time after the last lecture had been delivered, the President of the Grand Trunk Company thought proper to drag my name before the Legislative Council and the country, as an Engineer who had been once thought of, as one of the parties to be appointed to examine the Grand Trunk Railway, but who, having been weighed in the balance—of an account due by that Company—had been found wanting. I am free to confess that the fact of my ever having had any pecuniary transactions with that Company, was in itself suspicious ; I therefore felt it due to my own character fully to explain the whole affair, and at the same time to prove that there were other reasons, besides the discreditable one imputed to me by the President, why I had been rejected. Some extracts from these lectures—supposed to be applicable to the times—as well as my explanations were published in the *Montreal Herald* of last week, and it appears the latter at least have attracted the notice of the parties concerned, so that I have been honored with something over a column of mingled advice and abuse by one of the literary bravos, whose obedient steel is plunged in—ink, at the beck of the railway magnates, who have seized upon this unfortunate country and afflicted it with the "*Toronto Leader*." The combined efforts of the Assistant Commissioner of Public Works the President and Chief Engineer of

the Grand Trunk Company, (besides others too insignificant to mention) have resulted in the following indictment:—

1st. That I once estimated the improvement of the Rapids of the River St. Lawrence at £10,000, while some other parties have estimated this work at £200,000. The *Leader* has understated my estimate about fifty per cent., and forgot to mention that the Engineer of the Board of Works also estimated this improvement at £25,000 or £30,000. A house, a ship, or a bridge, designed for the same purpose, will be estimated differently, if they are to be built of wood or iron—and with respect to the matter in question my plan involved no blasting under water—while the others were wholly or partially based upon this expensive, and in my judgment unnecessary operation. As a case in point, I may mention that in 1847, Mr. Killaly estimated the landing piers below Quebec as follows:—Berthier £2,000; L'Islet £2,000; Cap Orrigneaux £2,000; Rivière du Loup £3,000; Father Point £1,500; total £10,500. I believe the cost has been at least ten times greater: but, no doubt, Mr. Killaly can explain the changes and alterations of plan, or other causes, which have occasioned the discrepancy.

2nd. That a Montreal paper once stated that a culvert built by me, under the Lachine Canal, had fallen in, and an arch had crumbled away. The culvert did not exactly fall in, but the water fell into it. This culvert was built upon a plan forced upon the Montreal Corporation by the Board of Works, which retained the right of supervision over it during construction, and it so happens that I protested in writing against it, as likely to let the water in, and my predictions were unfortunately verified. The story about the arch is all moonshine. No arch upon the Montreal Water Works has “crumbled away,” or given way, as the *Leader* can easily satisfy himself, by enquiring of Mr. Walter Shanly.

3rd. That I deprived Captain Bell of the Montreal Harbour Commission, of the credit of some tables of dredging, compiled by him, and also of the discovery of a new channel. This is just the reverse of the facts. If the *Leader* had seen my report, he would have found that Capt. Bell's name is affixed to the table compiled by him, after a form furnished by me. Moreover, I believe I was

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the first person connected with the commission who gave that full credit to Capt. Bell, which he so well deserves, and which is to be found in my report. If Capt. Bell has "complained bitterly," to anybody else, which I cannot believe, he has always to me expressed his warmest acknowledgments of my notice of his labours. With respect to the discovery of the channel, I never claimed it—for the simple reason that there was no discovery. Captain Bayfield discovered all the channels of the St. Lawrence long before Capt. Bell or myself ever saw them.

4th. That I have endeavoured to deprive the American Engineers and the Hon. Jno. Young of the credit due to their labours in connection with the Victoria Bridge. This is also a wholesale perversion of the facts of the case. A preface was written to my Report upon the Bridge, for the very purpose of noticing the labours of my predecessors; and the only report of an American Engineer on the subject, is printed in the appendix. Lastly, my report was addressed to the Hon. Jno. Young, was printed under his directions and at his expense, and if there had been any such omissions in it as the *Leader* charges, he could and would have expressed his dissatisfaction, which he certainly did not do; nay more, he could have prevented its publication altogether.

This is the sum of the *Leader's* attempt to break down my personal and professional character; and if he can find anything more to say upon the same subject, I have no doubt the exigencies of the Grand Trunk, or the revenge of its *victims*, will speedily produce it.

The *Leader*, in conclusion, gives two reasons for my appointment having been defeated by his owners; first, "my having shown a positive opposition to the Grand Trunk enterprise from the beginning." I am happy to be able to state, for the *Leader's* sake, that this part of his article, at least, has some truth in it. I did oppose that enterprise in 1852, and have seen many good reasons for doing so since—but the Company cannot charge me with having since written one word to damage an enterprise to which we were so irrevocably committed; nor until they had first attacked me, and after they had pleaded their own bankruptcy, and demanded that we should pay their debts, finish their works, and let them

keep the road, the control of our commerce, and what Mr. Jackson calls the three P's, Power, Patronage, Profit. The second reason is, "That I was perfectly inexperienced as to the value of the iron tubular bridges, &c." Before reporting upon the Montreal Bridge, I made it my business to visit England and France, for the purpose of learning something of iron bridges; but the *Leader* has forgotten to inform his readers whether either Mr. Killaly or the two gentlemen appointed as "skilled engineers," have ever constructed any tubular iron bridges, and where.

I cannot accept the *Leader's* estimate of my professional liability, but there is one fact alluded to in his article which I feel bound, in consideration of its general economy of the truth, to acknowledge. He says that I made a survey of the Grand Trunk Railway from Toronto to Montreal, "not one rod of which has been maintained." I think this very likely—inasmuch as the contractors, having controlled the engineering, have probably followed the line where there was the least work, or the most land belonging to the faithful and to the privileged speculators. I found a route between this city and Kingston where the grades would not have exceeded thirty feet per mile. The Chief Engineer of the Board of Works in 1852, surveyed *for the Government*, the line since followed between Montreal and Kingston, and established the grades at *twenty-five feet* to the mile, and yet with a knowledge of that fact before him, the Assistant Commissioner of Public Works allowed a maximum grade of *fifty-three feet* per mile, to go into the contract, by which means the earth-works upon this section are about fifty per cent. lighter than those upon the commonest American or Canadian roads. How much more than fifty-three feet has been used can only be discovered by the spirit level. Thus the unequalled surface of a route which it should have been our aim to have made unrivalled for speed and capacity, between tide-water and the interior, has been utterly disregarded, and all the natural advantages which the smooth and level valley of the St. Lawrence afforded, have been sacrificed to the profits of contractors. The truth is, Mr. Editor, I knew too much of the line between Montreal and Toronto to be allowed to inspect it "under authority," and hence the vigorous and successful exertions made to defeat my nomination in the Executive Council.

Tues. C. KENNEDY.

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To the Editor of the MONTREAL HERALD.

SIR,—In the *Toronto Leader* of the 26th ult. there is a report of an explanation made by the Hon. John Ross respecting the appointment of skilled engineers, while he was both President of the Grand Trunk Railway Company and of the Executive Council. Mr. Ross says that immediately after his return from England, on the 15th December, he objected to my appointment because I was “making a large claim upon the Company at that time and still unadjusted.” Mr. Ross says “his hon. friend the Speaker had obtained the concurrence of his late colleagues to this statement, as agreeing with their recollection of the fact.” As to the fact of my having an unadjusted claim against the Grand Trunk Railway Company, there were others at the Council Board who knew, as well as Mr. Ross, that that claim had been “adjusted” a full year ago. If Mr. Ross means that the money has not been paid, that is true; but he knows that his Company have no power over the amount, and that it is as effectually “adjusted” as is an account where a note of hand is given in payment. The assumption that his “personal friend” could be influenced by any claims, adjusted or otherwise, can only be sustained by also assuming that the Grand Trunk Railway Company have the power to influence the arbitrator (Mr. Robert Stephenson) mutually agreed upon between us. If they had any such power, and if Mr. Ross’ theory of adjustment be received as valid, I should expect my account would remain unadjusted until my death, or until the Province had sold out the last dollar of interest in the Grand Trunk, in order that I could be disqualified from making any professional report thereon.

A member of Parliament, as soon as he heard of the appointment of Messrs. Benedict and Street, made it his business to ascertain from the Hon. Mr. Cavley why I had been passed over, and was told, as the reason, that I “had refused to act *with* the Board of Works.” As the law required the skilled Engineers to act *with* the Board of Works, it is not probable that I could have made so absurd a condition. I did refuse

to act *under* the Board of Works, because I considered that that Department was on its trial—that the very naming of skilled Engineers by the Legislature proved that they had no confidence in the reports of Mr. Killaly; and I knew that if I consented to take my instructions from that Department, my hands would be tied, and I would be compromised, by having undertaken a duty which I would not be permitted to discharge.

If either of the reasons assigned by Messrs. Ross or Cayley influenced the Council, they were both equally without foundation. Had the Executive desired to know whether I would or would not have acted with the Board of Works, it would not have been difficult to make the enquiry.

About twelve months since—when the £900,000 grant was before the House—I was applied to, on behalf of Mr. Cayley, to know if I would act, solely or in conjunction with others, to carry out the provisions of that act. I replied to the hon. gentleman who wrote on Mr. Cayley's behalf that I was willing to act if the Government really desired a *bona fide* examination and report; at the same time, I told him that our negotiation would amount to nothing; that the Grand Trunk Company would never permit such an examination, and that if they did, I would be the last person they would assent to. However, I was assured by influential supporters of Mr. Cayley, that it was only upon the condition of an examination, etc., by some Engineer, independent of the Board of Works and the Grand Trunk Company, that they had supported the grant, and that in fact there was a distinct understanding with Mr. Cayley that I should be selected for the duty.

I heard nothing more of the matter until September, when I received a telegraph from Quebec, from a member of the Government, enquiring if I would act. This telegraph was sent to Hamilton, although I had been for the previous week in Montreal; and by some unaccountable means, although all other letters were forwarded, this telegraph remained at Hamilton until I went up there, it being then a month old. I replied by letter, although as no answer had been sought for to

this missing telegraph, I supposed something had transpired after sending it which made an answer unnecessary. When in Toronto, in January, I was informed by an authority I cannot question, that my name, associated with Mr. Wallace, of the Brantford Road, had actually passed the Council, but that upon the return of the President of the Grand Trunk Company, these appointments had been upset, at the instance, as I have been told, of the Chief Engineer of the Grand Trunk Company and Mr. Killaly.

I was shortly after called upon, in conjunction with the Chief Engineer of the Grand Trunk Company, to name a third arbitrator in the matter of the Toronto Esplanade. I named the Chief Engineer of the Board of Works, supposing a Company which had so many Government Directors would not object to an undoubtedly competent public officer. Mr. Page was agreed upon, but was afterwards objected to, on the ground that he had formerly acted for Cotton and Manning. Mr. Ross named only two parties—Messrs. Benedict and Street! Afterwards, on proceeding to Toronto, I learned that these same two parties were the Government nominees as “skilled engineers.” I was, therefore, satisfied that their nomination was pure and simple, a Grand Trunk proposition; for if, in a matter in which that Company were interested to an amount exceeding fifty thousand pounds, they selected out of the whole province Messrs. Street and Benedict to be their umpire, I am justified in assuming that the appointment of these two gentlemen to investigate the affairs of the Grand Trunk was brought about by the same agency which nominated them in the matter of the Toronto Esplanade.

After this explanation, it is scarcely necessary to prove that neither of the conflicting reasons assigned by Messrs. Ross and Cayley for my appointment are *bona fide*; the fact is, my appointment was an impossibility, from my want of the necessary qualifications—viz., the possession of the entire confidence of the Grand Trunk Company.

If, as stated, I was once appointed, what becomes of the assertion that I had refused to act with the Board of Works?

And even if not actually appointed, why was my name brought before the Council by Mr. Cayley, and objected to by Mr. Ross, if the former knew I would not act?

Mr. Ross says he proposed Capt. Swift of Boston, but forgot to explain that this gentleman is the confidential agent and in the pay of the Barings, very large shareholders in the Grand Trunk; that he has already been here, and that his opinions were known beforehand; and that under any circumstances he is not a disinterested party, as between the people of Canada and the Grand Trunk Company. He also says he desired names that would give confidence to the Board in England and to the public in Canada. The object of the act had no reference to the Board in England; but after the public in Canada are satisfied, any incidental satisfaction which the report of the "skilled engineers" may give to the Board in England cannot be objected to.

I venture to predict that in the matter of these skilled engineers, the Government have committed a grave mistake. The very effort that has been made to secure the appointment of parties in the confidence of the Railway Company, will rouse the suspicions of the public. I know that the door of Government and Grand Trunk patronage is inexorably closed to me and I am content it should be so; but the public will require to be informed why the only professional business which Mr. Killaly attends to is the Grand Trunk, and why the Chief Engineer of the Department of Public Works is carefully excluded from all insight into the dealings of that Company with the Department? There would be no need of skilled engineers if the Government would order that engineer to examine and report. The public would have confidence in a report signed by Mr. Page, who is a thoroughly competent engineer, and a man of undoubted integrity, but it is greatly to be feared that these are fatal obstacles to his being selected.

I will take another occasion to explain the unadjusted claim which was the pretended cause of my rejection by the Government.

THOS. C. KEEFER.

May 6, 1856.

To the Editor of the MONTREAL HERALD.

SIR,—I have no desire to intrude my business affairs upon the notice of the public, but the fact that the Government have, through the President of the Grand Trunk Railway Company as their mouth piece, assigned as a reason for my non-appointment to examine the Grand Trunk, the existence of certain pecuniary relations between that Company and myself, I am obliged to ask the privilege of explaining this matter through your columns.

I have never had, or sought to have, anything to do professionally with the Grand Trunk Railway: but that Company having fallen heirs to the local Canadian Companies which preceded it, and for which I had acted, became the party to which I was obliged to look for the amounts due me by their predecessors. For the last three years I have been endeavoring to get the amounts due me on account of the Bridge over the St. Lawrence and the Railway from Montreal to Toronto, but so long as Mr. Hincks remained in power, he contrived to chisel me out of a settlement in retaliation for my having presumed to oppose his Grand Trunk scheme in 1852. I waited patiently for the end, feeling assured that the time would come when neither Mr. Hincks nor the Grand Trunk could afford to resist even the few friends whom I possessed. The following petition, which fully explains the nature of my claims, was first presented in the Session of 1854 and was referred, without being printed, to the Railway Committee, when Mr. Hincks, although then out of the Government, succeeded in burking it. The Session was adjourned, and when resumed, in 1855, the Grand Trunk Company again sought legislation—but now to the tune of £900,000 sterling.—I resumed my petition, this time taking the precaution to have it printed, with the intention of having my claims brought up in the debate, and at least an opportunity to test their validity provided for, if possible, in the relief bill. That I had not failed in my calculation may be inferred from the fact that as soon as my petition was printed (in May, 1855) the Company ac-

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cepted my proposition, which was to refer the whole matter to the sole arbitration of Robert Stephenson, their own Engineer.

Considering the facts—1st. That I have never received one farthing for my labors on the St. Lawrence Bridge, which were commenced nearly five years ago. 2nd. That Mr. Hincks, with characteristic insolence and vindictiveness, refused at first to pay me anything for my Bridge survey: declaring that we had no business to make it and that he would not give a button for the opinion of a Canadian Engineer upon such a subject—and that he only consented to render the Grand Trunk Company liable when he discovered that the contract for the Bridge had been based upon my survey. 3rd. That Sir Cusack Patrick Hone, who “fretted his short hour” on the Grand Trunk stage, informed the President of the Kingston and Toronto Company that the Grand Trunk would not recognise my claim—although they were bound by law to pay the expenses of their predecessors; that, in short, the Grand Trunk Company have resisted a settlement of my claims as long as they felt themselves strong enough for any act of injustice, and only yielded from mercenary considerations when it was their interest to do,—I ask if it is not at least cool in the President of that Company to urge before his Excellency in Council, as an objection to my appointment, that I had unadjusted claims against the Company! How many members of that Council, besides its President, were Directors in the Grand Trunk Company? And as such were they not aware that my claims had been “adjusted” by reference to arbitration? Is not “the statement of facts as agreed upon” worthy of the Railway Executives of the departed Governor of Barbadoes?

THOS. C. KEEFER.

PETITION.

*To the Honorable the Legislative Assembly, in Provincial
Parliament Assembled;*

The petition of the undersigned, Thomas Coltrin Keefer,
Civil Engineer, of the City of Montreal;

HUMBLY SHEWETH :

That Your Petitioner was employed in the years 1851 and 1852, as Chief Engineer of the "Montreal and Kingston," and "Kingston and Toronto" Railway Companies. Both these Companies surrendered their charters in November, 1852, in favor of the Grand Trunk Railway Company of Canada, upon condition that the latter Company should assume the expenses of its predecessors.

Your Petitioner presented three accounts for services rendered to the Montreal and Kingston Company, all of which were duly certified by the Chairman of the Provisional Committee, and by the President of that Company. A deduction of more than twenty-five per cent. was arbitrarily made from two of these accounts, and the balance only was paid. The third account was not acted upon, as belonging to the Bridge and not the Railway surveys. Your Petitioner believes he is as fully entitled to the whole amount of the two accounts certified by the proper officers of the Company, whose liabilities the Grand Trunk Railway was supposed to assume, as to the part which has been paid.

The third account, on which no action has been taken, was for services as Engineer in the survey for the Railway bridge over the St. Lawrence, at Montreal. In the charter granted for the construction of this bridge, the Company are bound to pay for so much of the plans and surveys as they may make use of, provided the amount shall not exceed the sum of five hundred pounds sterling.

Your Petitioner fears that this limitation of the liability of the Grand Trunk Railway Company may be used to his prejudice. If it be claimed that no use has been had of the surveys made by Your Petitioner, payment therefore may be

refused altogether. Your Petitioner believes it was the intention of the Legislature that the projectors of the bridge survey, as pioneers of the enterprize, should be protected in their expenditure of time and money : that even if this survey had proved of no practical use to the Grand Trunk Railway Company, the same principle by which they were bound to pay for Railway surveys, whether used by them or not, should be applied in the case of the bridge. But your Petitioner is prepared to prove that the contract made for the construction of this bridge, was based upon the survey made by him, none other survey having, at that time, been made. The existence of such a survey was necessary to a contract, and had there been no survey, it is extremely doubtful (looking to the subsequent change in the money Market,) whether any contract would have been made so as to have secured the commencement of the work as has now been done.

Your Petitioner has an account against the late Kingston and Toronto Railway Company, for one year's salary similar to the one partly paid on account of the Montreal and Kingston Company. He has been informed by the late Chairman of the former Company that, since the relinquishment of their charter, no meeting of the Directors could be obtained, but that he, the late Chairman, had in settling his accounts, brought the claim of your Petitioner under the notice of the Grand Trunk Railway Company, and had received a reply to the effect that the Directors of this Company "could not recognize the claim of the Engineer."

When your Petitioner's account for a precisely similar claim of one year's salary against the Montreal and Kingston Company was partly paid, a large reduction was arbitrarily made therefrom, ostensibly upon the ground that a similar account would be presented on account of the Kingston and Toronto Railway Company, which latter account, when presented, was ignored altogether.

Confident that the intention of the Legislature was practically to place the Grand Trunk Railway Company as the successor, in the same position, as to liabilities, which its prede-

cessors would have occupied had they survived, your Petitioner prays that in any further legislation sought for by the Grand Trunk Railway Company your Honourable House will cause to be inserted a clause empowering all parties having legal claims, against the Directors or Provisional Committees of the late Montreal and Kingston, and Kingston and Toronto Railway Companies, to maintain the same against their successor, the Grand Trunk Railway Company of Canada.

And your Petitioner, as in duty bound, will ever pray.

THOS. C. KEEFER,
Civil Engineer.

Montreal, April, 1856,

EXTRACTS FROM LECTURES ON CIVIL ENGINEERING.

* * * * *

It may be argued that, after our public works are completed, the number of Engineers will be limited, and insufficient to sustain a special school of instruction. The first is to a certain extent true; it is not probable that there will be anything like a proportionate progress with regard to public works for the future; and it is pretty certain that, though we may have the will, we will not have the power to expend money at the rate we have been doing in the last four years. But this by no means is an argument that we will have less need, on the whole, of practical and scientific information on Engineering subjects. For, as many persons are more able to make money than to keep it,—so it is easier to construct public works than to take care of them—particularly under corporations or public governments.

With corporate bodies a "concern," as it is called, is sometimes made a losing one by ignorance or design, whereupon it falls into hands which, despairing of dividends, manage it for the sake of the incidental. A Railway which never pays a dividend, may yet pay a commission and, so long as its receipts or credit are sufficient to pay working expenses, public

spirited individuals will be found, who will give their energies to retrieve a sinking property, in consideration of moderate salaries, and the usual commission on the rolling stock annually purchased, the iron for the repair shops, the rails for renewal, the purchase of fuel, oil, &c. If the property be promising or productive, any tendency to plethora is carefully kept down by resort to similar contrivances,—at least until, by judicious management, the despairing stockholders can be bought out.

This is an unfavourable view of human nature, but it is believed to be true, to a greater or less degree, as to some of the most, as well as to some of the least, productive railways; and it is chiefly the result of ignorance on the part of the shareholders at large as to the nature, wants and value of their property. "Knowledge is power," and the strong in railway knowledge prey upon the weak.

With popular governments the case is much worse, as no other qualification than political interest is needed, at least none is so effective, and the result of this system is, that Michigan sold her railway long ago; Pennsylvania, in despair, has advertised all her public works for sale, while the last State Engineer of New York recommended the sale of the Erie Canal, a work capable of yielding a nett revenue of millions, as the only means of protecting it from the plunder of State officials. In a fit of despondency we, a few years since, sold all our public works except the canals, and unless these can be better managed than they have been, they will also be brought to the hammer. Indeed, I believe a proposition for their purchase or lease has lately been made. The Lachine Canal has been converted into a mill race, and in its present state is incapable of a large trade—the only remedy having been delayed and suspended while the railways have been pushed on. The navigation of the Ottawa at St. Anns has been trampled down by the same iron heel.

The best antidote to this incompetency in politicians and their proteges, with respect to engineering subjects, is to supply each political party with a sufficient amount of engineering ability, so that when they have no higher motive than the credit of their party, they may at least have the means of making a good appointment; in short, to make some knowledge of engineering an essen-

tial to the embryo Commissioners of Public Works, Railway Commissioners, Canal Superintendents, &c., as is that of the law to the expectant Solicitor or Attorney General, County Judge, or Queen's Counsel. No man can be considered well-educated without some knowledge of Mathematics and Mechanics, although he may make a considerable figure in public life without them—and as a gentleman may study both without being necessarily a Newton or a Descartes, a Watt or an Arkwright, so a popular knowledge of Civil Engineering may be imparted without the necessity of making Smeatons, Telfords, Brunels, or Stephensons.

It is time, therefore, that Civil Engineering became a branch of popular education in our Seminaries of learning, and when this has borne its fruits we shall not feel the want of it in our Legislature as much as is now done. Had there been even a few Engineers in our Parliament (as is the case in the British) there might have been a little less of folly—and something more than folly—perpetrated there. It may be asked, why do not our Engineers go into Parliament? It is to be presumed that some of them could get there as well as Lawyers, Doctors, etc. Most M. P.'s are volunteers; few are dragged like Cincinnatus from retirement; and an Engineer has the same right, as he has the same opportunity, to canvass a constituency, make non-committal speeches, be obsequious to the father, flatter the mother, and kiss the child, as any other man. The probable reason is that, like many other respectable men who keep out of Parliament, they are now better employed; but make them by your colleges as numerous as Lawyers, Doctors, etc., and some of them will be driven there—by necessity.

But it is in the future management of our Railways that the wisest field will be opened for the application of an Engineering education. There is scarcely one of the thousand employees required, who would not be the better qualified for his post, and what is more important to him, be eligible for promotion, if he had the advantage of attending a class in Engineering. Lastly, the necessary growth of the manufacturing interest, and the application of steam and water-power must call for increased Mechanical and Engineering knowledge, and this, with our Canals, Harbours, Railways, Gas and Water Works,

the sewerage of our towns, drainage, &c., open a field more extensive than that of the legal and medical profession combined; and in which, if all the employées have not some Engineering education, all that can be said is, they ought to have it; and, if given the opportunity they will most probably seek it.

Although Engineering is a pursuit eminently calculated for the display of genius, (and I have already adduced this as a reason for not hampering the practice with any protective restrictions,) I do not wish to be considered as maintaining that, to be an Engineer, a man must possess extraordinary endowments; there are many grades in the profession, as in the army; but I wish to guard parents and guardians from supposing that in this profession a man may rise to eminence by mere routine. In every profession the men of mark are limited in number; but, as the most general object in selecting a profession is to obtain a respectable livelihood, ordinary qualifications, allied to industry and integrity, will be sufficient for this purpose *so long as the supply does not exceed the demand*. And here I would draw the great distinction between Engineering and the other professions. Almost every man (as well as woman) requires the services of a doctor at some period of his or her life; without any fault of your own you may be driven to a lawyer; and if you attain even moderate means you will, probably, employ an architect; but few individuals require engineers. Their patrons are extremely limited, and are almost exclusively confined to corporations or governments. Latterly the practice has obtained of including the engineering in large contracts, in which case the contractor becomes the patron or employer of the men whom he formerly took his orders from. This does not increase the number of the employers (as it merely substitutes the contractor for the government or the corporation) while it lowers the position of the engineer from that of an arbiter between both parties to that of an agent of "the party of the second part." This system is only applied to projects which are dependent upon stock operations, and where Governments or Corporations admit their inability to be their own financiers, by giving an influential contractor his own prices and his own engineers, in consideration of his taking such securities as they have to offer, and which he

undertakes to float off by means of his superior connections. Wherever parties possess the power to pay in cash or to negotiate their own securities, they will always give out their work by competition, in which case they secure a working class of contractors—the same, indeed, as are necessary to the speculative middle man, who takes his pay in stock, or bonds—and get their work done as it ought to be done, under a *bona fide* supervision and for moderate prices.

The only occupation for which a practical Engineer is qualified when employment is denied him in the line of his profession, is that of a contractor, and this is a more legitimate and honorable course for him to adopt than that of dabbling in contracts *sub rosa*. In fact when he becomes a party to contracts he should cease to practice as an Engineer, for his legitimate position is similar to that of a broker, who is not allowed to traffic in matters where he is professedly a confidential agent.

There is no reason why the important business of contracting for large works should not become a profession, and men be educated for it as well as for engineering. There is no knowledge the engineer can possess which is not equally valuable to the contractor, and those who are anxious to make a rapid fortune may succeed as contractors, while they will find it impossible as Engineers, to do so honestly.

Civil Engineers proper, as distinguished from mining and mechanical ones, are the most unfortunate of all classes in the matter of employment. The latter, having employment of a permanent character and being usually stationery, are in this respect more like lawyers and physicians; but the Civil Engineer is a lineal descendant of the Wandering Masons or "Brethren of the Bridge." His occupation is gone with the completion of the canal or railway on which he has been engaged; and as a rolling stone, whatever his salary, he gathers little moss. This fact although it forms no excuse, is an explanation why some of the profession, after a few years of employment and a greater number of forced idleness and approximate starvation, adopt the creed of the pickpocket, "that the world owes them a living," and resolve that on the first fitting opportunity they will take care of No. 1. There is often mingled

with this decision a sense of neglect and injury received from society, which gives some color of retribution or at least retaliation to many of the frauds in which engineers have been the principal actors. No matter how regularly or how intelligently he may have discharged his duties, as soon as the work on which he has been engaged is completed, or so far advanced that his services can safely be dispensed with, the engineer is dismissed with empty compliments and an emptier purse, and some quack or favorite, with whom interest supplies the place of all qualifications is appointed to mismanage his work. If, absorbed in the duties of his profession, he has not made friends of the mammon of unrighteousness, he may have no right to claim a preference over those who have carefully attended to this important duty, by the neglect of all others; but it is not difficult to understand that—with necessity impelling and opportunity inviting them—some will be found who will take the first opportunity to render themselves independent of future injustice. These belong to rather a formidable class of public men, who view crime only by its immediate consequences, and consider it no great harm to plunder a corporation or a people, because the loss being distributed may not come home with inconvenience to a particular hearth.

The remedy for a state of things which brings disgrace on the profession is not easily administered. The engineer, though an indispensable agent, is generally a junior partner in the firm of Grab, Chisel & Co. It is neither in the Legislature nor in the press that reform can be ensured, for in both the firm is sufficiently represented to neutralize any spasmodic or "bunkum" indignation.

The first step is, to put the profession on such a footing that it shall be self-sustaining; and this is to be done mainly by themselves. When engineers whose services are sought after assume the same position as lawyers and doctors, decline to be chartered by any party, but take as many clients or patients as they feel they can do justice to, it will not be in the power of the Government or a corporation to dismiss them to begin the world anew, when past the spring time of life, and laden with the support of a family. This position once established, the engineer is no longer necessarily a wandering Bedouin, but, by being able to have a fixed habitation

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he has some inducement to store, and having secured independence of position he may sustain independence of character. It is only men of some real or supposed reputation who are likely to be placed in positions where they can league with politicians and contractors, and become parties to the robbery of their employers.— If you give these men an opportunity to earn an honest living, you may deprive the other knaves (on whom it would be hopeless to attempt a reformation) of the only accomplices by whose means they can successfully carry out their ends. Public bodies, therefore, must remember that when they insist on the exclusive services of an Engineer, without giving him in return any guarantee of his situation, they induce him to listen to proposals, which he might otherwise spurn, in order to provide for himself and his family, when suddenly dismissed by a chiselling Government or a soulless Corporation.

The government guarantee a life situation to their lowest clerks, but their engineers are hired, as their laborers, by the day. If they would hire them as they do their printers, commissioners and politicians, by the job, allowing them the same privileges, there would be some fairness in it, but they are neither guaranteed their posts nor allowed, like a political lawyer, to work for the state and the public at the same time.

The excuse for the temporary character of their engagement is—that engineers are paid out of appropriations, and not out of the civil list; and this same distinction is the clue to nearly all the political robbery of the last twenty years on both sides of the St. Lawrence. Appropriations are temporary; the civil list is permanent. In public works expenditure is literally covered up; when a work is completed, no man can say what it has cost, for cost depends upon the circumstances. Details are not easily traced, and many things are charged to an appropriation which have not had the remotest connection with the object for which that appropriation was made. In New York and Pennsylvania, which have been the great nurseries of thieving politicians, contractors, and engineers, the official salaries are so low, and the whole state appropriation (for nominal expenses of government) so small that besides

the risk and difficulty attending it, few would think it worth their while to meddle with such paltry sums. Popular clamor having reduced the official salaries to the stipend of clerks, salary is looked upon rather as a badge of office, than as a consideration for services, and the control of appropriations forms the real reward of the successful party. Prohibited from any open interest in contracts, they cannot be deprived of the allotment of those contracts to sleeping partners. The State of New York escaped the bold and successful onslaught of these worthies only by a decision of her Courts, declaring unconstitutional the law under which the appropriations had been made; and the people, taking the alarm, have so hampered their state expenditure with restrictions, as almost to make it impracticable, vainly endeavoring to substitute legislation for common honesty. Pennsylvania rolled up her forty million debt under these auspices, until repudiation reared its head; and is there no risk of our galloping onward, with reckless and shameless stride, upon the same dangerous road?

The worst feature of this system, after those of the wide spread corruption, rapacity and national demoralization which it engenders, is—not that the public are robbed of so much money—but that works are undertaken which are utterly useless and which, by their inevitable failure, destroy confidence in all future undertakings, and injure the commercial character and credit of the country. It matters little what or where the work is, so long as there is an appropriation for it.

Engineers engaged in Parliamentary contests are expected to support the side on which they are engaged *coute qui coute*, as unscrupulously, and with as much nonchalance as if bred to the law. This is a practice which requires peculiar qualifications, and a good deal of experience as a lobby member; great power of face and greater stomach; a confidential undertone with the serious, and a rollicking *abandon* with the junior or more convivial members.

From the exciting nature of this practice, as well as from the damage the reputation is apt to receive from frequent and continued exposure to such surroundings, it should be a speciality, —and limited to the duly qualified practitioners.

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Perhaps the best mode of shewing what the Engineer ought to be is to describe, first his position and what is required of him; and then, the initiation and prosecution of one of those piratical schemes where he figures as an accomplice.

When a contract is entered into, no matter how detailed may be the plans and specifications, or how specific the prices, to the Engineer almost without exception or restraint, is left the determination of the quantities and qualities and, therefore, of the actual cost of the work. In many cases, which cannot previously be provided against, he also determines the prices; but all of these are secondary to the power which he has by alterations, deviations, etc., of influencing the cost of the work, or opening the contract. Without infringing the *letter* he may violate the *spirit* of the contract, and enrich the contractor and himself at the expense of his employers. There is no legislative remedy for this; every attempt to circumscribe the power of the Engineer by new checks, is simply a transfer of that power from intelligent to ignorant hands; and ignorance, however honest, is a more expensive manager and an easier victim upon public works than knavery. The only safeguard is that which every merchant or banker feels he can alone depend upon—the character of the person employed. But to secure an honest Engineer, you must first establish honesty in the Corporation or Government which appoints him; because it is a melancholy fact that appointments have been made, not in ignorance, but *because* dishonesty was a primary qualification, a necessity, and because one Engineer could be made a scape-goat for many politicians, who could plead ignorance as laymen, and when called to account, exclaim, “Thou can’st not say *I* did it.”

To secure this integrity in the appointing power there must be honesty and intelligence in the Legislature or the Corporation, and these only can spring from an enlightened, a moral and above all, a vigilant constituency. If the people, therefore, complain that they are plundered and deceived, they have themselves to thank for it, in their indifference to the character and motives of adventurers who, unmasked, thrust themselves

upon them, and by the aid of their prejudices, bigotry and a suborned press, obtain the control of their affairs.

The majority of popular representatives may be sufficiently honest, but it is a minority of the more able, bold, and often unscrupulous men who seize the reins; and in whom the mere possession of talent is accounted a sufficient covering for a multitude of sins. Obtuse honesty, therefore, may by ignorant sanction of acute knavery be the greater evil of the two; in other words it is better to have a knave than a fool for a legislator---for the knave knows his own interest (which may sometimes accord with that of the public) and the fool does not.

One way in which a great public enterprise may be initiated and carried through, or at least as far as the money goes, is at least instructive if not amusing. In Upper Canada each township is a sort of German principality, only democratic in its form of Government. The jealousy of the back townships is excited because the front ones have, or are to have, a railway. The Province having kindly undertaken the main line, the whole resources of the back townships are available for branch ones. The municipal loan fund act---that wonderful contrivance which converts beautifully engraved paper into money---provides the means, and intending contractors, in the guise of apostles of progress, point out the way. *Reliable* men are elected, in some of whom the enthusiasm is indigenous, in others carefully counterfeited. All that the community can be induced to swallow is readily voted, but it is still far from the required amount. An eminent contractor then appears upon the stage, who offers to take all the available means provided, and the remainder in first mortgage bonds. In consequence of the doubtful value of these last the price is fixed at about double the expected cash cost of the road. The municipalities are told that their subscription is a mere matter of form, that the earnings of the road will pay the interest, and that it is only a loan of their credit, as an endorsement of their confidence in the enterprise, and not their money that is wanted. If there be any kicking they are told the eminent contractor will by his influence in the legislature, defeat their charter, will support a rival project, or by his influence with the government, prevent the sanction of their by-laws, and the

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exchange of their valueless debentures for Provincial Loan Fund ones. The contract is then entered into—of course wholly on the terms dictated by the contractor—and, where not tricked into conditions, they are bullied. The contractor agrees to do all the engineering, allowing the company to have an engineer of their own to determine the fulfillment, or otherwise, of the previously signed contract; in other words, permitting them to lock the stable after it has been emptied. Through the contractor's representatives in the board of direction, an engineer is suggested to and appointed by the company, who afterward, but of course at too late a date, proves to be a partner, and the company are committed by the acts of their own officer. The contract was taken by the mile. When it was signed it was assumed that the earth works would average twenty thousand yards per mile, but the Engineer discovers they can be reduced to ten thousand—without having any grade steeper than the contract. This is done by running *around* all the hills instead of cutting *through* them, and by raising nearly all the grades to the maximum; and the longer the road is made the better it pays, so long as the work is kept light, for the price is *per mile*. Through the level land, instead of being raised by embankments, it is scantily ditched up from the sides, and the the Company must look out if it be afterward flooded by the spring thaws or buried up in the winter snows, for it is "according to contract." By reducing the excavation one-half in quantity, the proportionate price at which it was estimated in the contract is doubled, and, as the mode of payment is one-half cash and the other half bonds, the cash portion of the estimate covers the cost of the work, and the contractor carries it on as long as the cash of the Company is forthcoming, accumulating, at the same time a fair share of their bonds, on which they are bound to pay him interest. When they have no more cash, and cannot pay their estimates or their interest, he stops his work, still "according to contract," (unless the municipalities will come down with another vote of convertible debentures) and threatens to take possession of the work done, under the mortgage bonds in his hands.

If by extraordinary efforts and sacrifices the road is completed, it is almost a certainty that it will not, for the first

three years, pay the interest upon the mortgage bonds, while the municipalities must take care of that upon their own debentures. The contractor, having received in cash all his outlay, has the road for his profit. If it will pay running expenses it will be run, and the municipalities will have the use of it, at moderate fares, as a return for their investment. The road has perhaps doubled the value of their property and thus paid for itself, and it would be unreasonable to expect it to pay twice.

I have thus endeavored to note some of the qualifications, as well as the conditions and vicissitudes incident to this practice of Civil Engineering. The mental and physical requirements may be summed up in the ancient prayer, "*mens sano in corpore sano*;" for a strong constitution is needed, not only for the exposures of the field, but to sustain the extreme mental tension which numerous and weighty responsibilities produce. There must also be an equable and self-reliant disposition, a steady perseverance in the plan laid down, despite the ignorance and opposition of those who cannot understand it, looking to the future instead of the hour for true appreciation and reward. Above all, if not only fame, but what is more important, conscientious self-approval, in the evening of life, are desired, there must be a jealous regard for personal integrity in a profession beset with such great trials and temptations—threatened poverty and then almost absolute control of large sums of money—ingratitude or misrepresentation, the offspring of ignorance on the part of those whom you may be doing all in your power to benefit. Those are incident to almost every walk in life: and as disasters and difficulties in construction make the experienced practical Engineer, so all artificial obstacles raised by ignorance, malevolence, or opposing interests, will disappear before a patient and resolute perseverance in the thing that is right.

