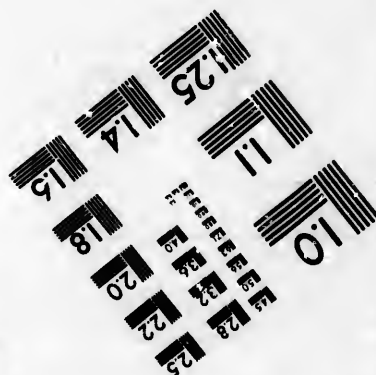
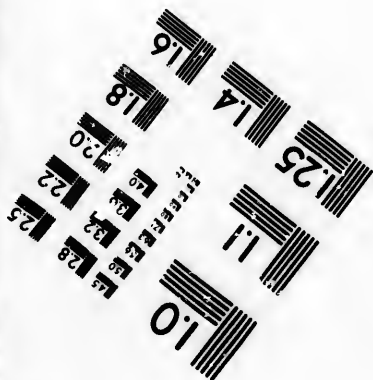
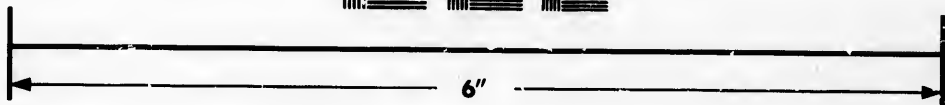
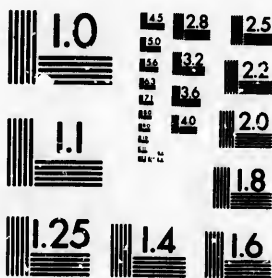


**IMAGE EVALUATION
TEST TARGET (MT-3)**



**Photographic
Sciences
Corporation**

23 WEST MAIN STREET
WEBSTER, N.Y. 14580
(716) 872-4503

128
132
125
22
20
18

**CIHM/ICMH
Microfiche
Series.**

**CIHM/ICMH
Collection de
microfiches.**



Canadian Institute for Historical Microreproductions / Institut canadien de microreproductions historiques

10

© 1982

Technical and Bibliographic Notes/Notes techniques et bibliographiques

The Institute has attempted to obtain the best original copy available for filming. Features of this copy which may be bibliographically unique, which may alter any of the images in the reproduction, or which may significantly change the usual method of filming, are checked below.

L'Institut a microfilmé le meilleur exemplaire qu'il lui a été possible de se procurer. Les détails de cet exemplaire qui sont peut-être uniques du point de vue bibliographique, qui peuvent modifier une image reproduite, ou qui peuvent exiger une modification dans la méthode normale de filmage sont indiqués ci-dessous.

- Coloured covers/
Couverture de couleur
- Covers damaged/
Couverture endommagée
- Covers restored and/or laminated/
Couverture restaurée et/ou pelliculée
- Cover title missing/
Le titre de couverture manque
- Coloured maps/
Cartes géographiques en couleur
- Coloured ink (i.e. other than blue or black)/
Encre de couleur (i.e. autre que bleue ou noire)
- Coloured plates and/or illustrations/
Planches et/ou illustrations en couleur
- Bound with other material/
Relié avec d'autres documents
- Tight binding may cause shadows or distortion
along interior margin/
La reliure serrée peut causer de l'ombre ou de la
distortion le long de la marge intérieure
- Blank leaves added during restoration may
appear within the text. Whenever possible, these
have been omitted from filming/
Il se peut que certaines pages blanches ajoutées
lors d'une restauration apparaissent dans le texte,
mais, lorsque cela était possible, ces pages n'ont
pas été filmées.
- Additional comments:
Commentaires supplémentaires:

- Coloured pages/
Pages de couleur
- Pages damaged/
Pages endommagées
- Pages restored and/or laminated/
Pages restaurées et/ou pelliculées
- Pages discoloured, stained or foxed/
Pages décolorées, tachetées ou piquées
- Pages detached/
Pages détachées
- Showthrough/
Transparence
- Quality of print varies/
Qualité inégale de l'impression
- Includes supplementary material/
Comprend du matériel supplémentaire
- Only edition available/
Seule édition disponible
- Pages wholly or partially obscured by errata
clips, tissues, etc., have been refilmed to
ensure the best possible image/
Les pages totalement ou partiellement
obscurcies par un feuillet d'errata, une pelure,
etc., ont été filmées à nouveau de façon à
obtenir la meilleure image possible.

This item is filmed at the reduction ratio checked below/
Ce document est filmé au taux de réduction indiqué ci-dessous.

10X	14X	18X	22X	26X	30X
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12X	16X	20X	24X	28X	32X

The copy filmed here has been reproduced thanks to the generosity of:

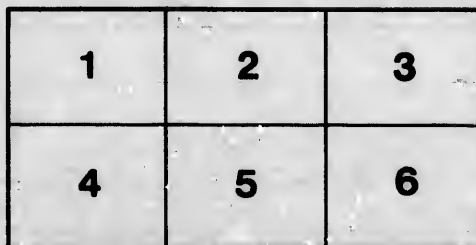
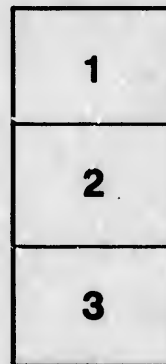
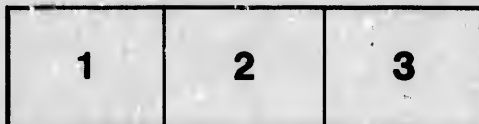
Library of the Public
Archives of Canada

The images appearing here are the best quality possible considering the condition and legibility of the original copy and in keeping with the filming contract specifications.

Original copies in printed paper covers are filmed beginning with the front cover and ending on the last page with a printed or illustrated impression, or the back cover when appropriate. All other original copies are filmed beginning on the first page with a printed or illustrated impression, and ending on the last page with a printed or illustrated impression.

The last recorded frame on each microfiche shall contain the symbol \rightarrow (meaning "CONTINUED"), or the symbol ∇ (meaning "END"), whichever applies.

Maps, plates, charts, etc., may be filmed at different reduction ratios. Those too large to be entirely included in one exposure are filmed beginning in the upper left hand corner, left to right and top to bottom, as many frames as required. The following diagrams illustrate the method:



L'exemplaire filmé fut reproduit grâce à la générosité de:

La bibliothèque des Archives
publiques du Canada

Les images suivantes ont été reproduites avec le plus grand soin, compte tenu de la condition et de la netteté de l'exemplaire filmé, et en conformité avec les conditions du contrat de filmage.

Les exemplaires originaux dont la couverture en papier est imprimée sont filmés en commençant par le premier plat et en terminant soit par la dernière page qui comporte une empreinte d'impression ou d'illustration, soit par le second plat, selon le cas. Tous les autres exemplaires originaux sont filmés en commençant par la première page qui comporte une empreinte d'impression ou d'illustration et en terminant par la dernière page qui comporte une telle empreinte.

Un des symboles suivants apparaîtra sur la dernière image de chaque microfiche, selon le cas: le symbole \rightarrow signifie "A SUIVRE", le symbole ∇ signifie "FIN".

Les cartes, planches, tableaux, etc., peuvent être filmés à des taux de réduction différents. Lorsque le document est trop grand pour être reproduit en un seul cliché, il est filmé à partir de l'angle supérieur gauche, de gauche à droite, et de haut en bas, en prenant le nombre d'images nécessaire. Les diagrammes suivants illustrent la méthode.



THE
INTERCOLONIAL RAILWAY.

ANALYSIS OF THE
FRONTIER, CENTRAL
AND
BAY CHALEURS ROUTES.

BY
J. O'HANLY, P.L.S. & C.E.

OTTAWA:

PRINTED BY G. E. DESBARATS

1868.



THE
INTERCOLONIAL RAILWAY.

ANALYSIS OF THE

FRONTIER, CENTRAL

AND

BAY CHALEURS ROUTES.

BY

J. O'HANLY, P.L.S. & C.E.

OTTAWA:

PRINTED BY G. E. DESBARATS.

—
1868.



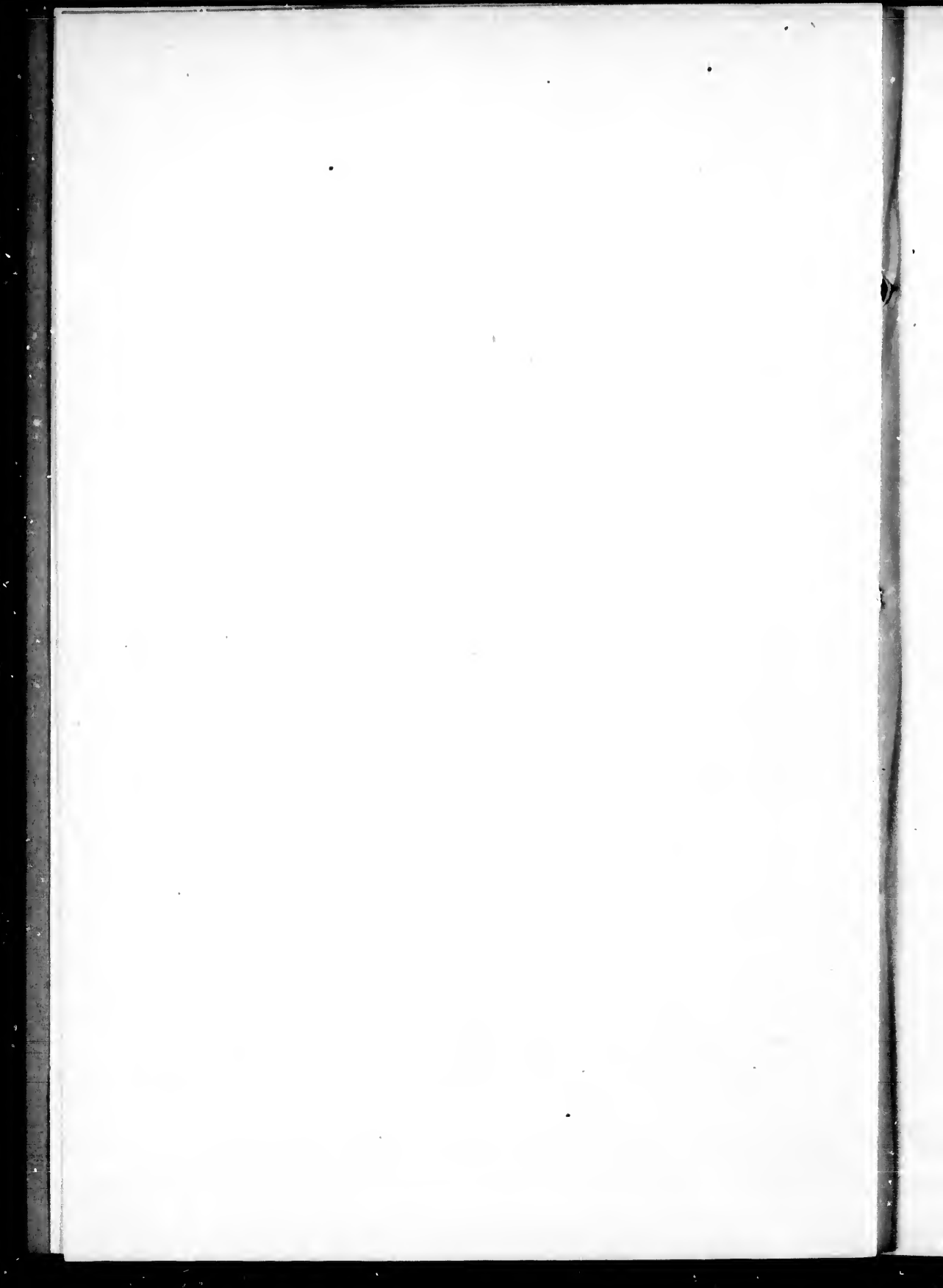
TO THE READER.

The following paper on the Intercolonial Railway Route was written some four or five months ago. Having been subsequently submitted to an esteemed friend for his opinion, in whose possession through inadvertence it remained until it was semi-officially announced, and universally believed, that the Government had come to a final decision on the route of this great national undertaking; and their selection agreeing with that advocated in this paper, the necessity for its publication no longer existed.

It was accordingly consigned to the waste basket, from which, in all probability, it would never have been exhumed, but for the dictatorial tone and affected superiority—ignorant as arrogant—of certain officious outsiders in the conduct of our internal affairs—an interference, which, whencesoever emanating, we should, whatever may be our family differences, be united as one man in resenting and condemning.

THE WRITER.

Ottawa, 26th October, 1868.



THE INTERCOLONIAL RAILWAY ROUTE FROM AN UPPER CANADIAN ASPECT.

Whilst the Confederation of the British American Provinces has placed the construction of the Intercolonial Railway beyond peradventure, the question of route—in itself of paramount importance—remaining yet undecided, is a legitimate subject for discussion. To connect the cities of Quebec and Halifax has been the primary object of this gigantic enterprise. In every stage of its progress, in every phase of its eventful history, in all its vicissitudes, its promoters have steadily kept this law before the public, adhering to it with a tenacity, zeal and perseverance, worthy of so successful a *finale*. May we not find in this determination the true cause of the long delayed prosecution of this scheme, the irritation to which it gave rise, and the estrangement it occasioned amongst the Sister Provinces. The Canadian people were deterred from embarking in a work of such magnitude—in incurring an expenditure so vast, without a reasonable prospect of remuneration. And if they have acquiesced at last, it is from no vain delusion, no fallacious hope of realizing a profit on their investment. They have accepted it as the price of national unity—the additional weight to depress the balance in favor of colonial alliance—the pearl that attracted the coy and unwilling bride—daughter of Neptune—to share our lot “for better, for worse.”

As a commercial investment it has few, if any, advocates. Were this otherwise, English capital would have gladly sought it, backed as it has been by Imperial approbation. If the traffic from all sources be found adequate to the cost of maintenance—running expenses, management and repairs—the people of this country will not repine. The most sanguine expect little more; and many believe that for years, if not for generations, it will be a constant drain on the public exchequer. Notwithstanding these forebodings, our people have uncomplainingly assumed the burdens it imposes.

Hence, we designate it a purely national work, undertaken solely for national purposes, conceived in national ambition, dedicated to national greatness; and without a flagrant violation of national faith, we are irrevocably committed to the original project—connecting Quebec with Halifax. To an intelligent comprehension of, and impartial decision on, this momentous question, the foregoing considerations must be steadily kept in view. Nor can there be room for doubt, but the tax-payers of this country will exact from the managers of this trust a faithful stewardship. This management must embrace three essential conditions; viz., the greatest safety, the least expenditure, the shortest distance—consistent with efficiency and practicability.

A portion of the original scheme at each extremity—from Quebec to Rivière du Loup and from Halifax to Truro—having been already constructed, the present project consists in connecting Rivière du Loup in the

Province of Quebec with Truro in the Province of Nova Scotia. From the peninsular configuration of Nova Scotia, any Railway joining these two points will comprise two principal divisions, which, for convenience of reference as well as geographical position, shall be denominated Western and Eastern—the former comprising that portion from Rivière du Loup to the St. John and Shediac Railway, near the isthmus, which joins Nova Scotia to the continent; and the latter across the isthmus to Truro.

The limited extent and definite direction of the Eastern division will necessarily confine the choice of route to engineering considerations.

Not so with the Western Division which traverses the Province of New Brunswick throughout its entire length. Hence we find various localities in that Province eagerly contending for this rich prize, prompted, we fear, more by local and personal considerations than the general welfare. Nor are we surprized at this rivalry; and can readily believe that each claimant may fancy that the public good is best promoted by adopting his particular views.

In order more clearly to comprehend the nature and extent of the rival claimants, and the respective merits of the competing routes, it will first be necessary to examine the form of New Brunswick and the distribution of its population.

New Brunswick is an irregular oblong, whose greatest side nearly coincides with the Meridian. It is bounded on the South and East almost entirely by water, and the River St. John flows through and along its western border. The coasts of a new country are invariably first settled, population penetrating into the interior by its estuaries and navigable streams. This rule is universal, and quite independent of soil and climate, sections or districts developing proportionally to these facilities. Hence we find the population of New Brunswick almost exclusively located on the east, south and west sides, with the north and a vast tract in the interior a primeval forest. This irregular and unequal distribution of the population of New Brunswick has given birth to the contention about the different routes, and unnecessarily delays the completion of the Railway.

Those inhabiting the south and west sides base their claims on their numbers, and the consequent excess of local traffic. This route, by a strange misnomer, is denominated *the Frontier*, of which several lines have been projected.

Those along the north-east side assert like pretensions to local accommodation with other equally important advantages, examined in the sequel. This route is called the *North-Eastern* or *Bay Chaleurs*, of which several lines are projected. A third party, largely recruited from Ontario and Quebec, advocate, chiefly for its shortness, a third or kind of diagonal route. This is known as the *Central*, of which several lines have been projected.

Amidst such jarring, happily for the public interest, the decision of this question is confided to other heads—Ontario and Quebec—who can approach it unencumbered by local prejudices, who can study it unbiased by personal considerations, who can grasp it divested of selfish motives; and who have the best of all incentives for coming to a just judgment—that they pay “eleven-thirteenths of the cost,” as Mr. Lawrence admits. With such an umpire the question of route ought to be safe.

The following brief analysis of the several routes has been undertaken with a view to direct public attention to their absolute and relative merits, whereby the truth may be elicited, and the general good promoted. The

perusal of Mr. W. M. Buck's pamphlet on "*the shortest route for the Inter-colonial Railway*" first suggested this paper; of which it is in part a review.

It is proposed to examine one line of each route—that selected being considered the type (the best) of its class. Of the frontier route, Mr. Buck's favorite is chosen, being his shortest of three, both in total distance and length of construction; and tho' exceeding Mr. Fleming's lines 1 and 3 in total distance—the former by 3 and the latter by 21 miles—it is shorter in construction than the former by 24 miles, and than the latter by 51 miles.

Of the central route, Mr. Fleming's line No. 6 is selected, being the only one, of several projected, of whose practicability there is anything positively known.

Of the North-Eastern or Bay Chaleurs route, Major Robinson's line is selected, being the only one explored.

And it is fair to assume that one or other of these lines with little or no modification, except such as is necessary in *locating*, will finally be chosen.

FRONTIER ROUTE.

This line nearly coincides with line No. 1 of Mr. Fleming's Report. The distances as given by Mr. Buck, are as follow :

<i>From Rivière du Loup to</i>	Miles built.	To build.	Total.
Province Line (Quebec and N. B)....	0	67	67
Edmundston.....	0	77	77
Grand Falls.....	0	117	117
Woodstock.....	0	189	189
St. Andrew's Railway.....	11	189	200
Intersection with Western Extension (proposed).....	51	189	240
St. Johns.....	51	271	322
Moncton.....	141	271	412
Truro.....	147	380	527

CENTRAL ROUTE.

MR FLEMING'S LINE NO. 6 (SURVEYED)

<i>From Rivière du Loup to</i>	Miles built.	To build.	Total.
Trois Pistoles.....	0	24.5	24.5
Green River Forks.....	0	107.2	107.2
Restigouche.....	0	139.5	139.5
Tobique.....	0	184.9	184.9
Keswick Summit.....	0	240.5	240.5
Little River.....	0	302.1	302.1
Coal Creek.....	0	328.4	328.4
Apohaqui station.....	0	360	360
Moncton.....	53	360	413
Truro.....	59	469	528

BAY CHALEUR ROUTE.

MAJOR ROBINSON'S LINE (MR. FLEMING'S No. 15).

(Distances as estimated by Mr. Buck.) *

<i>From Rivière du Loup to</i>	Miles built.	To build.	Total.
Intersection with Shediac R. W.....	0	371	371
Truro.....	0	480	480

Total distance from Rivière du Loup to Truro.

	Miles built.	To build.	Total.
By frontier Route.....	147	380	527
By Central.....	59	469	528
By Bay Chaleur.....	0	480	480

COMPARISON OF COST.

*The cost of Construction of each route as per Mr. Fleming's Report is as follows :**Central.*

469 miles @ \$46,000 per mile..... \$21,574,000

† *Frontier.*

380 miles to build.

51 miles built and owned by a private Company.

431 miles @ \$46,000 per mile..... \$19,826,000

Bay Chaleur.

480 miles @ \$40,000 (in round numbers) per mile.... \$19,200,000

FRONTIER ROUTE CONSIDERED.

Mr. Buck describes this line as follows :

"The second and more direct line leaves River du Loup on a southerly course; following the valley of River Verte, it crosses the Portage Road, and next the Cabineau River near the Falls; thence to the head waters of River Aux Perches, and then by the valley of this stream to the Degele at the foot of the Temiscouata Lake; thence along the valley of the Madawaska River, crossing at Little Falls; then entering the valley of the St. John River at Edmundston to the point of convergence with the Iroquois line; and thence following the eastern bank of the River to the crossing above the Grand Falls, thence along the western bank to Woodstock, 189 miles from River du Loup."

* Captain Henderson makes the distance from River du Loup to Truro only 472 miles, being 8 miles less than the estimated distance in all the calculations and data of this paper.

† It will be explained farther on why I adopted this estimate.

By an inspection of the map of New Brunswick, it will be seen that from Edmundston, (77 miles from Rivière du Loup) to near Grand Falls, the River St. John forms the boundary between New Brunswick and the United States. For this distance (40 miles) the Railway hugs the American shore.

From a little above Grand Falls, the River St. John for the remainder of its course flows through New Brunswick, leaving between it and the State of Maine a narrow strip in the form of an irregular right angled triangle, whose apex is above Grand Falls and base, Eel River. The perpendicular (boundary line) and base of this triangle are respectively 72 and 6 miles, containing an area of 216 square miles, or about the size of the three Townships, Nepean, Gloucester and Osgoode in this County (Carleton;) and nearly equal to them in population—the former, according to Mr. Buck, being 13,424, and the latter by census of 1861, 13,264.

Above Grand Falls the proposed Railway crosses to the west side of the River St. John near the vertex of the triangle, and runs nearly centrally through this narrow belt or triangle for its whole length; (90 miles) and varying from the American boundary between one half and four miles.

Average population per square mile of this triangle.... 62
 " " lineal " of Railway..... 149

Hence along this portion of the Road the maximum population, that can be depended on for local traffic, has been attained in the Province without crossing the River St. John—an almost insuperable barrier both to freight and passengers.

Then it follows the St. Andrews Railroad to its intersection with the proposed Western Extension (33 miles;) being at that point only 6 miles from Maine. Thence by the latter in a circuitous southerly direction to the City of St. John.

In determining the probable cost of this line, I have followed Mr. Fleming's estimate for the central route, which appears to me very moderate for a Trunk Railway, substantially built as this should be. I think Canadian experience of Railway construction would warrant a larger sum.

Mr. Buck's estimate, which appears ridiculously low for his favorite portion, is as follows :

From River du Loup to Woodstock, 189 miles at \$33,400..	\$6,312,600
“ Moncton to Truro 115 “ 46,000..	5,290,000
Proposed purchase of Woodstock branch 11 “	176,000
“ St. Andrews Railway 40 “	700,000
Repairs, &c., &c.....	100,000
Total.....	\$12,578,600

He values the Roads built, the Woodstock branch at \$16,000 per mile, and the St. Andrews at \$17,500 per mile, and allows not a cent for the construction of the 82 miles of the Western extension to St. John. It cannot be believed that these Roads will be voluntarily relinquished by the present proprietary to the Government of the Dominion for these prices. Such a conclusion is at variance with Canadian practice. But if they do, which seems incredible, the present investments must have turned out profitless to the stockholders, which implies scant traffic or bad construction, either of which hoists Mr. Buck on his own *petard*.

000
000
000
berly
oad,
rs of
le at
ada-
e St.
quois
ssing
, '89
S miles

I think it cannot be denied that the estimate I have adopted is much more likely than Mr. Buck's; and if so, his ingenious argument on *interest, &c.*, is aerial as the "baseless fabric of a vision." Mr. Buck may reply that his opportunities for judging in this particular case are much better than mine, but against this I have universal Railway experience on my side.

The argument founded on the time occupied in the construction of the various lines, and the difference of interest thereby accruing on capital account, has not even the merit of skilfulness. By Mr. Buck's line there are 380 miles to build, 469 by central, and 480 by Bay Chaleur. With the capital provided, what is to prevent the construction of 480 miles in the same time as 380. Suppose the government let the 380 miles in 19 contracts of 20 miles each, can they not in the same way let the 480 miles in 24 contracts of 20 miles each? Is it unreasonable to expect that the 24 contracts would be completed as soon as the 19? Nor can I see any difficulty in having either route finished and open for travel within 3 years from the commencement of active operations, to which period contractors should be strictly limited.

Against Mr. Buck's commercial and industrial statistics I have nothing to urge—they exhibit an amount of prosperity in that section truly gratifying. Though I cannot help thinking that they are rather highly colored, particularly the following extract: "The traffic along the Portage Road is very great, and continues a steady stream day and night."

It is amazing that capitalists have not hitherto found out this field for profitable investment for their surplus funds. The cause may be found in the exploded practice of Railway competition with navigable rivers, more particularly when the freight is lumber. Who, in his senses, would entertain a proposition for a railway from this city up along the Gatineau River to accommodate its extensive lumber trade, supposing that stream navigable for steamers. There is not a timber manufacturer in Canada who would transport his lumber by rail in preference to water. Yet this is the chief argument in favor of this route for local traffic. Canadians have long felt the mistake of locating the Grand Trunk contiguous to our magnificent system of inland navigation, and its proximity to our frontier; and it is hardly likely that they will be induced to repeat the folly.

But our author with the greatest *nonchalance* treats the idea of future aggression as utterly chimerical. In support of his thesis he quotes, like a nameless individual does Scripture, an extract from the Queen's speech at the opening of the Imperial Parliament—this is not the first time that the Sovereign's name has been invoked to prop a desperate cause—a quotation from an after-dinner speech of the American Minister, Mr. Adams, at a Liverpool banquet; another from a speech of Mr. Bright's in the English House of Commons; another from Earl Derby at the Lord Mayor's supper; and last, not least, a paragraph from a letter of Mr. Lawrence to the Minister of Public Works; and which for its *naïveté* alone is worth insertion.

Says this new disciple of peace—

"There are no grounds for alarm from our American neighbors. Their commercial and other interests are so much in common with ours, *all on the side of peace*, that should any disturbing element arise, it will be disposed of in the future as in the past, by the *pen*, and not the *sword*."

Is not this consoling? The international millenium inaugurated without

even the knowledge of the mighty ones of the earth, who were hitherto considered to exercise such potent influences over nations' quarrels; and the announcement of the glad tidings reserved for an Eastern sage from the Gulf of St. Lawrence. Nearly 2,000 years ago the greatest event of history—the conquest of Satan—unostentatiously transpired in the East, and this—the conquest of Mars—is an epoch only second in importance to it. There is henceforth to be no more war, because it is the interest of mankind to be at peace. Grand discovery! how long thou hast lain concealed in the womb of nature. What seas of blood and heaps of treasure this knowledge would have saved the American people if discovered before the breaking out of their sanguinary struggle. The Monroe doctrine,—“manifest destiny,” “universal absorption,”—the day-dream of our cousins abandoned. The nineteenth century has witnessed much wonderful and gratifying progress, many triumphs of human skill and industry, light gradually diffusing, brightening and warming every cavern and crevice of intellect; and all tending to the amelioration of mankind, but before this last and greatest, the conquest of the electric spark, the domestication of the iron horse, the revelations of the glass, limited only by the bounds of boundless space; all pale like stars before a meridian sun. Thrice happy are we, who live to witness this happy era. Surely the discoverer has not failed to take out a *patent*. But, to be serious, there is no doubt but the influence and efforts of these high personages would do much to diminish the risks of war—a consummation devoutly to be wished for. Yet, despite all their efforts war may come, and that at any moment.

Let us concede that war is a thing of the past—the last surviving offspring of barbarism now happily extinct—and that rusty swords will henceforth be “transmogrified” into glittering pens; this concession, if it proves any thing, proves too much for the author of the “shortest route.” With one fell swoop it sweeps away every necessity, it confounds every argument, it upsets every theory in favor of the Intercolonial Railway, and leaves its construction indefensible—a wanton increase of the people's burdens. For already we have a railroad—the Grand Trunk—to the seaboard more convenient for nine-tenths of the Canadian people, than we can ever hope the Intercolonial to be, as is manifest from the following table of distances:

<i>From</i>	<i>To Portland by Grand Trunk.</i>	<i>To Halifax by Intercolonial (Frontier Route.)</i>
Montreal.....	297 miles.	899 miles.
Quebec.....	325 “	732 “
Rivière du Loup.....	440 “	588 “
Toronto.....	630 “	1232 “

Mr. Fleming referring to this subject says:

“It is evident, therefore, from the favorable position of New York and Portland, that they will continue to be the most convenient winter-outlets for Canadian freight, so long as the Government of the United States abstains from placing restrictions on Canadian Commerce.”—A contingency, carrying freight in bond and passenger travel, highly improbable except in case of war.

If the object of the promoters of the Frontier route is to connect St. John with the Western Provinces at any sacrifice and regardless of expense, it would be much more rational and economical for the Dominion Govern-

ment to subsidize the proposed line from Bangor to St. John (Western Extension), which Mr. Buck says: "Is now under contract for the whole distance within the Province, 88 miles, and the works are going on briskly under a company of American capitalists, who are also pushing the road ahead at the Bangor end in the State of Maine."

By aiding this line, and to maintain faith with the Nova Scotians, constructing the link (109 miles) from Moncton to Truro, all the Provinces of the Dominion would be connected by rail at an expense of

Moncton to Truro, 109 miles @ \$46,000 per mile...	\$5,290,000
Subsidy to Western Extension Railway (say).....	1,000,000
	<hr/>
. Total.....	\$6,290,000

By this means, and provided we are to have no more wars, an immense sum (over twelve million dollars) would be saved to the heavily taxed rate-payers; and if this sum must be expended, let it be devoted to enlarging our canals and extending our communication to the fertile North-West.

The following Table shews the comparative distances by this route and the Intercolonial (Frontier route) to Halifax.

From Halifax to	By G. T. and Bangor,	By Intercolonial,
Montreal.....	346 miles.	899 miles.
Richmond (Eastern Townships)	775 "	829 "
Warwick, " "	799 "	804 "
Toronto.....	1179 "	1232 "
Quebec	874 "	732 "
Rivière du Loup.....	989 "	588 "

From this it will be observed that all parts of the Province of Quebec west of Montreal, and all stations on the Grand Trunk west of Warwick in the Eastern Townships, and the whole of the Province of Ontario are nearer Halifax by the Grand Trunk and Bangor and St. John lines than by the Intercolonial; or, in other words, the whole population of Ontario, and 56 per cent of Quebec would be better accommodated by the Grand Trunk and Bangor to Halifax than by the Intercolonial; and 80 per cent of the people of New Brunswick and the whole of Nova Scotia would be as well accommodated by it. This is an immense advantage in favour of Grand Trunk and Bangor lines: provided always that the *era of war* has passed away.

None can be so stupid or blinded by self-interest as to maintain that in case of war a frontier route is at all tenable. If the American war has demonstrated one thing more clearly than another in modern warfare, it is the importance of Railways as strategic points, and for the maintenance of speedy and uninterrupted communication with the bases of supplies.

Mr. Buck treats as very insignificant—a mere *bagatelle*—a few miles more or less in the distance from *Rivière du Loup* to Halifax; and wonders that a great country would cavil about such trifles. Herein I beg leave to differ with him. Not only the increased distance and unnecessary waste of time, but the permanent maintenance of 47 miles of an unproductive road is an item worthy of consideration; and if it can be avoided without injury to the public interests, it is the duty of the administration to do so, quite irrespective of local interests or influences.

RECAPITULATION OF OBJECTIONS TO THE FRONTIER ROUTE.

The frontier route is objectionable—

1st. Because it is one of the longest proposed lines, and therefore unnecessarily expensive in construction and maintenance.

2ndly. Because for 40 miles (from Edmundston to near Grand Falls) it runs close to the United States.

3rdly. Because near Grand Falls it crosses to the west side of the River St. John, running for a distance of 90 miles through the narrow belt between that river and the American boundary, the maximum distance from the State of Maine being only 4 miles, and the average 2 miles.

4thly. Because for a further distance of 33 miles it runs contiguous to the State of Maine, making a total distance along the American frontier of 163 miles.

5thly. Because if constructed, it would for 90 miles afford accommodation to a very limited population in New Brunswick, incapable of much extension or increase, unless at the great risk, loss and inconvenience of crossing the River St. John.

6thly. Because experience has shewn that Railways cannot successfully compete with navigable waters in the transport of heavy freight, particularly lumber, which appears to be the chief manufacture of the valley of the River St. John both in New Brunswick and the United States.

7thly. Because this route would have to compete with a navigable river (St. John) for a distance of 197 miles—from Grand Falls to St. John City.

8thly. Because of its contiguity to the American frontier, it would in the event of war be wholly indefensible—a source of weakness rather than strength.

From the foregoing considerations it is manifest that a frontier route fails in the most essential conditions of a great national work. Hence our proposition is reduced to a choice between the *Central* and *Bay Chaleurs* routes.

CENTRAL ROUTE.

Did our figures and lines imply mathematical precision, the *diagonal* or *central* route would, at least, possess the advantage of being the *shortest*. But nature, always averse to straight lines, has compelled art to make so many detours and deflections; that, what is theoretically the *least*, is practically the *greatest*, and this route *central* only in name. This result at once suggests great engineering difficulties, and is found to be in strict accord with Mr. Fleming's Report of the exploratory survey and *reconnaissance* of the country. So that this route is not only the longest, but the most costly of construction and maintenance, whether as a whole or average cost per mile.

All authorities on railway construction are agreed that *gradients* should not exceed 1 in 100 or 52.8 feet in a mile, except in extreme cases, such as the unavoidable crossing of a chain of mountains rectangular to the course of the line, to avoid traversing expensive suburban grounds, or the abandonment of an important point (as a harbor—a military or naval station) along the route.

By Mr. Fleming's elaborate report of this line (No. 6,) we find that from *Rivière du Loup* to Apohaqui station (360 miles), there are 21 miles of *maximum* grade—70 feet to the mile or 1 in 75; and 68.4 miles of

grades, varying from 60 to 70 feet per mile. Of the 160.4 miles from *Trois Pistoles* to Tobique, there are 33.3 miles (over one-fifth) of grades, from 60 to 70 feet a mile. On the section between Green River Forks and Ristigouche (32.3 miles) there are 11.3 miles (over one-third) having a *maximum* grade of 70 feet to the mile, or 1 in 75.

Another very objectionable feature of these *severe* gradients is the uninterrupted length of the *inclines*. Mr. Wishaw in his "Practical Railway Experiments" says: "But steep inclines of greater length than one-half to three-quarters of a mile must not be introduced." He considers "that a considerable portion in undulating or hilly districts may consist of second class gradients, (1 in 100), and where necessary, for the sake of avoiding heavy earthworks, tunnels, expensive viaducts, or bridges, even third rate gradients, provided such inclines can be introduced for short lengths."

The following table shows the uninterrupted lengths of the steepest grades on this line as per Mr. Fleming's report.

3 miles of 64 feet grade commencing at 47th. mile from *Trois Pistoles*.

3.2	"	70	"	"		Echo Lake.
9.5	"	70	"	"	7th.	Green River Forks.
4.5	"	65	"	"	13th.	Ristigouche.
5.5	"	70	"	"	11th.	Tobique.
8.0	"	66	"		from Tobique to	Keswick.

COMPARISON OF CENTRAL WITH NORTH EASTERN.

The most favorable section of the Central line from *Trois Pistoles* to Apohaqui station (335.5 miles) is that from Keswick Summit to Little River (61.6 miles.) By comparing this with the Matapedia section of the North Eastern (70 miles) resurveyed by Mr. Fleming, and reported by Major Robinson as the most difficult of his whole line, we get the following results:

	<i>Keswick Summit to Little River.</i>	<i>Matapedia Section.</i>
Grades under 20 feet per mile.....	21.4 miles.	18.6 miles.
" from 20 to 30 feet "	9.1 "	13.6 "
" " 30 to 40 " "	3.8 "	9.4 "
" " 40 to 50 " "	1.7 "	4.4 "
" " 50 to 52.8 " "	0.0 "	9.0 "
" " of 52.8 " "	1.0 "	0.0 "
" " " 60 " "	0.0 "	2.7 "
" " " 66 " "	8.0 "	0.0 "
Level.....	16.6 "	12.3 "
Total distance.....	61.6	70.0 "

By this table it will be observed that the *maximum* grade of the most unfavorable section of the *Bay Chaleur* route is 60 feet to the mile, whilst the *maximum* on the most favorable section of the central is 66 feet. A further inspection shews that the Matapedia section of 70 miles has only 2.7 miles at 60 feet, whilst the other of 61.6 miles has 8 miles of 66 feet grade to the mile.

Again the quantities on these sections are as follows :

<i>Keswick Summit to Little River. Matapedia Section.</i>				
Earth Excavation.....	1,904,100	Cub. Yds.	1,408,936	Cub. Yds.
Rock.....	170,000	“	190,905	“
<hr/>			<hr/>	
Total Cutting.....	2,074,100	“	1,599,841	“
Culvert Masonry.....	14,931	“	29,317	“
Bridge “	3,410	“	4,535	“
“ iron.....	320 tons.		350 tons.	

I have no data for comparing the extent and character of the curves.

If the central line is adopted, it appears to me that a branch to Father Point (say 50 miles) becomes a national and commercial necessity in connection with the trade of the St. Lawrence. For it cannot be entertained that the construction of the Intercolonial is going to supersede ocean steamship navigation on our majestic River, nor can we expect that these steamships during the summer will ever touch at Halifax.

The branch to Father Point would involve an additional \$2,000,000 to the cost of the Central, making a total for that route of \$23,400,000.

But it may be argued that though the explored line has turned out the *longest, five shorter* lines have been projected. An *infinite* number of shorter lines can be imagined, but there are no reasonable grounds to hope that they will turn out more favorably; nay, from all that is known of that district, there is a strong presumption to the contrary. It is fair to conclude that Mr. Fleming before proceeding with his survey carefully examined Major Robinson's Report, the Crown Land records of New Brunswick and such other data, public or private, as was procurable, to assist him in selecting that line which seemed most favorable for his enterprise; and which I doubt not will eventually be found to turn out so.

To suppose otherwise would imply that Mr. Fleming was wholly unfit for the important and responsible duty to which he was assigned; a conclusion which will not be concurred in by those who know that gentleman's high professional acquirements and experience. But without a survey or reconnaissance *en personne*, an examen of the map of the Province of New Brunswick will shew this by the water courses—a test as unerring as the most careful scientific investigation.

New Brunswick has for its substructure or foundation a spur or branch of the Notre-Dame or Shickshock mountains, dispatched from the parent stem in the vicinity of the head waters of the River Rimouski. This spur has for its base on the west, the River St. John, and on the east, the Gulf of St. Lawrence. The line of greatest elevation of this mountain runs in a meandering parallelism with the lines of its bases, but approaching much nearer the River St. John than its eastern limit. Hence it requires no demonstration to shew that its western declivity is steeper than its eastern. From this curve spring branches or secondary elevations at various angles, extending to its bases; and forming the heights of land between the principal rivers and their tributaries. It is well-known that such branches are loftiest in the neighbourhood of the trunk, gradually sinking towards its bases; and the nearer the base the more abrupt the descent.

A diagonal line thro' New Brunswick from its north-western to its south-eastern angles, such as the proposed central line of railway would

occupy, cuts this dromedary-backed ridge in numerous places, as well as all its principal secondaries. So that such a line occupies the worst conceivable position in New Brunswick for regularity of surface. Indeed the wonder is that any one with a smattering knowledge of physical geography would ever dream of finding a comparatively easy route along it.

OBJECTIONS TO THE CENTRAL ROUTE.

The central route is objectionable—

1st. Because it is the longest line proposed.

2ndly. Because it is the most costly of construction, whether estimated as a whole or computed by average mileage.

3rdly. Because it is the most costly of maintenance.

4thly. Because it would not secure equal facilities for the developement of inter-provincial trade with other routes.

5thly. Because without a branch to Father Point it would inflict a serious blow on the commerce of the River St. Lawrence.

6thly. Because for a considerable distance it traverses continuously an uninhabited wilderness, a portion of which belongs to land Companies—a circumstance always detrimental to settlement; and would be found materially to retard that development of the country, which otherwise would be sure to follow the construction of this road.

NORTH-EASTERN ROUTE.

The North-Eastern or Bay Chaleur route, known as line No. 2 of Major Robinson's Report, and described therein as follows:

"Commencing at Halifax and running to Truro at the head of the Bay of Fundy, thence over the Cumberland Mountains to Amherst, then along the coast from Bay Verte to Shediac, thence by a north-westerly course, crossing the Rivers Richibucto and Miramichi, above the flow of the tide, so as not to interfere with the navigation."

"Then by the valley of the north-western Miramichi to Bathurst on the Bay Chaleurs, along the coast of this bay to the Restigouche River, and by it and the valley of the River Matapedia to the St. Lawrence, and by the right bank of the St. Lawrence to Quebec."

"The distance by this route would be as follows:—

	Miles.
" Halifax to Truro.....	55
Truro to Amherst and Bay Verte.....	69
Bay Verte to Shediac.....	26
Shediac to Miramichi River.....	74
Miramichi River to Bathurst.....	56
Bathurst to the Eel River near Dalhousie.....	48
Dalhousie to the mouth of the Matapedia River.....	30
Matapedia River to the mouth of the Naget River near the St. Lawrence.....	86
Along the St. Lawrence from this point to Quebec.....	191
Total distance by this route.....	635."

By Major Robinson's Report it appears, such a survey of this line was made as to place its feasibility beyond all doubt. As has already been

remarked, a portion at each extremity, common to the several lines, has been built, leaving 480 miles of this particular line unconstructed.

We have shewn that this line is the shortest practicable route, being 47 miles less than the frontier, and 48 miles less than the central.

It is also the cheapest of construction, whether as a whole or an average cost per mile. It is less than the central by \$2,374,000; and if the cost of the Branch to Father Point be added by \$4,374,000.

It is less than the frontier route by \$626,000; and if the Branch to Father Point be added by \$4,076,000.

It is also much less costly of maintenance; and by all odds the safest.

It supplies a want long felt in the navigation of the Lower St. Lawrence—connecting Father Point by rail with Quebec.

By causing it to tap the Miramichi River at the head of steamship navigation, it affords facilities, unpossessed by neither of its rivals, for the St. Lawrence Ocean Steamers of landing mails and passengers for the West without such deviation or delay as injuriously to affect their *time*. And without some such accommodation, it can hardly be expected that our steamers can compete with those touching at Halifax. This is the only point available for such a purpose on any of the proposed lines.

This route connects by rail the western Provinces of the Dominion with all the centres of commerce and population intended to be touched by the central, except Fredericton. When the Western Extension, "now under contract * * * and the works are going on briskly under a company of "American capitalists," is completed, which will probably be in advance of the Intercolonial, those prominent places on the frontier line will have similar connections. Hence the north-eastern road has these advantages in common with the others, together with connecting Ontario and Quebec with all the Towns and Harbours on the Bay Chaleur and Gulf of St. Lawrence to Shediac, an advantage enjoyed by no other route.

THE ROUTES LOCALLY CONSIDERED.

The present railway system of New Brunswick consists of the St. Johns and Shediac, sometimes denominated the European and American, 105 miles long; and the St. Andrews and Richmond, otherwise known as the New Brunswick and Canada, with its branches, 90 miles long. Besides these there is a third called the Western Extension—a link of the European and American—extending from the State of Maine to St. Johns, 88 miles, with a branch, 22 miles, to Fredericton. These lines are exclusively confined to the south and west sides of the Province, and seem very ample for the present requirements of that portion; whilst those inhabiting the North-Eastern border have not a single mile either *constructed* or *projected*. It is not our purpose to inquire into the cause of this singular and unequal disproportion; and refer to it merely to point out how it strikes a stranger. Hence as a Provincial work, the claims of the North-eastern side are pre-eminently beyond all compare.

By the adoption of this route the inhabitants of the South and West are not shut out from direct communication with Quebec or Montreal, Toronto or Ottawa; and consequently derive the same advantages from this as from any of the others, *minus* a few miles of *extra* travelling. For this trifling inconvenience they will be more than recompensed by the consciousness of enduring whereby to benefit their countrymen of the North-

east, and who, without which, would be excluded from all participation in the advantages of this road.

We, the inhabitants of the Metropolis of this great Dominion, are content to reach Montreal—the great emporium of the St. Lawrence basin—by the base and side of an isosceles triangle. And a time there was (in the memory of the oldest inhabitant) when we were very thankful to reach it by Ogdensburgh, New York Northern Railroad, Rouse's Point, &c. ; and when the Intercolonial is built, we shall thank our stars that we can get to Halifax at all seasons of the year, though it should be by a very circuitous route. Had we—the heart of the nation—been imperious, we would insist on the shortest route to connect the seat of Empire in the East with that of the West. But no, we are willing to undergo fatigues and inconveniences, if necessary, to secure the well-being of the whole, and above all other things it is our wish to see the Intercolonial so located as to confer the greatest good on the greatest number. Our modesty, as befits our exalted position, contrasts favorably with the pretensions of the Provincial Capital. We would counsel our New Brunswick friends to a moderate exercise (practically) of the second great commandment.

The certain result of rejecting this route will be a demand on the Dominion by the 60,000 souls inhabiting the North-eastern frontier to build a branch from Dalhousie to Shediac (180 miles), by which to put that large and populous section in direct communication with Ontario and Quebec. Nor do we see how so just a claim can be refused. Hence a central or frontier route will entail an additional cost of 180 miles at \$40,000 per mile, \$7,200,000.

This would make the aggregate cost of a central route as follows :—

From <i>Rivière du Loup</i> to Truro.....	\$21,574,000
Branch from <i>Trois Pistoles</i> to Father Point.....	2,000,000
Do from Dalhousie to Shediac.....	7,200,000
	<hr/>
Total.....	\$30,774,000

Those, who may sneer at this conjuncture, should not forget how the Grand Trunk had to yield to the demand of a small section to build the extension from Quebec to *Rivière du Loup* with a certainty that it would not pay running expenses. If so much can be forced from an English company, supposed independent of political influences here, what cannot be extorted by a ring of politicians from a *Road company*, whose existence is dependent on their votes, particularly when their demands are *equitable*.

CLAIMS OF QUEBEC.

I have avoided all reference to the special claims of Lower Canada in the choice of route, as I desired to discuss it on *broad national* grounds. Yet if this line is locally more advantageous to that Province than either the *central* or *frontier*, without detracting from the general usefulness, it is a strong argument in its favour.

FISHING TRADE.

Neither have we alluded to the superior advantages of this route to the fishing trade of Bay *Chaleurs* and Gulf of St. Lawrence, because these

are so manifest that more than a passing allusion seems an unnecessary waste of time.

RECAPITULATION OF REASONS FOR SELECTING THE NORTH-EASTERN ROUTE.

Of the several lines Major Robinson's is preferable.

ON GENERAL GROUNDS.

- 1st. Because it is the *safest*.
- 2ndly. Because it is the *shortest* (practicable.)
- 3rdly. Because it is the *cheapest* of construction.
- 4thly. Because it is the *cheapest* of maintenance.

ON LOCAL AND SPECIAL GROUNDS.

1st. Because it is the only route that can form connection with the Ocean Steamships of the St. Lawrence.

2ndly. Because without such connection these steamers must compete on very unequal terms with those touching at Halifax—a circumstance which cannot but seriously affect the carrying trade of the St. Lawrence and Lakes.

3rdly. Because this line will bring a much greater proportion of the people of New Brunswick into direct communication with Ontario and Quebec than any of the proposed routes.

4thly. Because it equalizes the distribution of Railways in the settled districts of that Province.

5thly. Because it communicates with several of the fishing stations of the *Gulf* and *Bay Chaleurs*.

6thly. Because its rejection will in all probability involve the Dominion in the construction of a branch from Dalhousie to Shediac (180 miles) at an additional cost of seven millions two hundred thousand dollars.

7thly. Because its adoption is very beneficial to the trade and navigation of the lower St. Lawrence by extending our railway system to Father Point.

8thly. Because the selection of either the central or frontier route would necessitate a branch to Father Point, involving an additional expenditure of \$2,000,000 in the former, and \$3,450,000 in the latter.

9thly. Because it will accommodate a much larger population in the eastern section of the Province of Quebec, and traverse a greater extent of that territory than any other of the rival routes, and therefore exercise a powerful influence in the settlement and developement of the resources of that District.

There is also an incidental saving on construction account in favor of this route, owing to its contiguity to the River and Gulf of St. Lawrence. All other things being equal, the facilities for the transport of material and supplies will reduce its cost ten per cent below the central. This would be equal to a saving of \$1,656,000 on the distance from River du Loup to Apohaqui station.

In the final location of this line—for with so much to recommend it, its rejection is barely possible—it appears to us to be indispensable, 1st To touch the River St. Lawrence at Father Point; 2ndly To tap the Bay Chaleur at the head of deep water navigation on the Ristigouche River; and 3rdly.

To touch the Gulf of St. Lawrence at the head of deep water navigation on the River Miramichi, which we believe to be at the town of Newcastle.

MODIFICATION OF THE ROBINSON LINE.

An inspection of the map of New Brunswick suggests a slight modification of Major Robinson's line. Instead of following the coasts of Bay Chaleur from the Nepisiguit River to the mouth of the Matapedia, a line should be run on a generally direct course from the head of deep water navigation on the River Ristigouche to a similar point on the Miramichi. How far such a change is practicable it is impossible for me to say, having no personal knowledge of the country traversed. If practicable, it would materially shorten the distance, without injuriously affecting any of the permanent advantages enumerated. Would it be worth an exploratory survey? It would not necessarily retard the construction of the road, for the route once selected, the other portions could be proceeded with.

Previous to writing this paper the only documents on the Interecolonial, which I have read, were Mr. Buck's pamphlet and Mr. Fleming's report; and have been led to this attempt by a perusal of that remarkable pamphlet. Its arguments, so labored and far fetched and so evidently devised to bolster a rotten project, aroused my suspicions of the general merits of the route, which previously I took for granted to be the most favorable; and curiosity stimulated to this cursory examination. The extracts from Major Robinson's Report being given in Mr. Fleming's.

Since writing the above, I have got hold of Major Robinson's Report with its appendices, and a pamphlet by an anonymous writer in review of Mr. Fleming's report, Mr. Buck's pamphlet and other writings published on this subject. These valuable documents fully corroborate the above views.

As might have been expected, Major Robinson and Captain Henderson's reports bear the undoubted impress of strict impartiality. The author of the anonymous pamphlet, on the whole, ably and honestly written, seems to find special claims for a Northern central—a modification of the Robinson route—which, as regards distance, is objectionable.

The evidence of Major Robinson and Captain Henderson in favor of the Bay *Chaleur* route are so conclusive, nay, overwhelming, that I have subjoined a few extracts from their reports:—

Extracts from Major Robinson's Report.

“As it will be seen in the end, that only one of the lines, viz., the second, has been explored and carried out *successfully* from its terminus on the Atlantic quite through to Quebec, it may be perhaps considered superfluous to enter upon the discussion of rival lines, but the object to be gained by so doing, is to show that so much has been done, and is known of the country as to render further explorations for new lines unnecessary, because, if completed, they would not be likely to be recommended in preference to the one which will be proposed for adoption.”

Speaking of the Central route, he says—

“The fourth obstacle is the broad and extensive range of highlands which occupies nearly the whole space in the centre of New Brunswick,

" from the Miramichi River, north to the Restigouche. Some of these mountains rise to an altitude exceeding 2,000 feet.

" The Tobique River runs through them, forming a deep valley or trough, which must be crossed by the direct line, and increases greatly the difficulty of passing by them.

" The lowest point of the ridge overlooking the Tobique River, at which any line of railway must pass is 1,216 feet above the sea. Then follows a descent to the river of 796 feet in 18 miles, and the summit level on the opposite ridge or crest between the Tobique and Restigouche waters, is 920 feet above the sea, or a rise of 500 feet above the point of crossing at the Tobique water. These great summit levels, which must be surmounted, form a serious objection to this route.

" The Eastern line, by the coast, avoids this chain altogether. The greatest summit level along it will not be above 368 feet, while the distance by each, from the Province line to Bay Verte to the Restigouche River (the northern limit of New Brunswick) will be, as nearly as possible, the same, there being only a difference of one mile in these two routes through this Province.

" The rocks composing this chain of mountains are granite, various kinds of slates, grauwacke, limestone, sandstone, &c.

Extracts from Captain Henderson's Report.

" The line from Bay Verte enters the Province of New Brunswick, and as far as the crossing of the Miramichi River, at the 223rd mile, although running nearly at right angles to the course of the rivers flowing into the Gulf of St. Lawrence, will deviate but little from a general straight course and from the level nature of the country, although it will have to cross the swells of land lying between the different rivers, it may be expected confidently that the heaviest gradients will not exceed 40 feet per mile, the generality being very favorable.

" As far as the Cocayne River the country traversed by the line is very level. The section line, which was run along the head waters of the rivers flowing into the Gulf of St. Lawrence, shows that the highest point is little more than 200 feet.

" The section of country which will be opened up between Bay Verte and the Richibucto River, offers much excellent land for settlement. From thence towards the head waters of the Rouchibouguac are extensive flat barrens, and the country between that and Miramichi is very level. The rivers are all small; and no heavy bridging will, it is expected, be required.

" From this line follows the broad valley watered by the north-west Miramichi, as far as the 260th mile, at gradients varying but slightly from a level, excepting the first five miles, which will require gradients of about 25 feet per mile. The land between the north-west Miramichi waters and the Nipisiguit River traversed by the line is almost a dead level; and it descends to that river by a grade of 25 feet per mile for three miles.

" It is proposed to cross the Nipisiguit River near the Pabineau Falls, and after following the valley of the Nipisiguit a short distance it continues as far as the 325th mile to follow the general direction of the shores of the Bay Chaleurs, passing within a short distance of the town of Bathurst.

“The precise direction of the line will of course depend upon the bridge sites selected on the several streams and rivers flowing into the Bay Chaleurs.

“As far as the 305th mile, the land is very level, and the streams small. The Jaquet River lies in a large deep valley, but it is believed may be approached and crossed about four miles from its mouth without any great difficulty.

“The gradients on this portion of the line will be found very favorable, and will not, it is calculated, exceed seventeen feet per mile, the greater portion being very much less.

“The summit level at the head waters of the Eel River has been calculated at 368 feet, which will probably be found too high. This would involve a grade of about 18 feet per mile for 16 miles.

“It will perhaps be better to avoid this gradient and the curves which will be necessary in descending the valleys of the small streams flowing into the Restigouche, to cross the Eel River and pass through the range of hills lying south of the River Restigouche, about five miles from the Town of Dalhousie. The hill which rises immediately in the rear of that town here falls away almost to the level of the country about Eel River, and from thence the line would follow the bank of the Restigouche, passing through the Village of Campbellton, and continuing between the present road and the shore as far as the mouth of Christopher's Brook. The gradients on this portion would be very slight.

“After crossing the Restigouche River, the line will follow the north bank as far as the mouth of the Metapediac River, at the 350th mile.

“The section of country lying between the Restigouche and St. Lawrence Rivers is a vast tract of high land, intersected in every direction by deep valleys and vast ravines, through which the rivers flowing to the St. Lawrence and Restigouche wind their course.

“The height of land from which these rivers flow respectively north and south, is full of lakes, and along them the mountain ranges rise to a great elevation.

“The average distance between these two rivers is about 100 miles.

“The only available valley which my knowledge of the country, or the explorations we have carried on, enable me to report upon, by which a line of railway can be carried through this mass of highlands, is that of the Metapediac River.”

COMPARISON OF GRADIENTS.

By Major Robinson's report I have been enabled to compile the following Comparative Statement of the grades on the North Shore and Central routes in the Province of New Brunswick, as given by Captain Henderson and Mr. Fleming.*

* This Table includes that portion of the Central line from Green River Forks to Apohaqui Station (252.8 miles). There are nearly 18 miles more to the Lower Canada boundary. These 18 miles comprise part of the *Trois Pistoles* section, and promiscuously included in the gradients of that section.

Grades.	Central.	North Shore.
Level and under 20 feet to the mile,	100.4 miles,	151 miles,
20 to 40 " "	47.7 "	71 "
40 to 50 " "	14.4 "	8 "
50 to 60 " "	43.9 "	4 "
60 to 70 " "	46.4 "	None.
Total lengths.....	252.8 "	234 "

Then by proportioning the lengths of the grades to the total distances, (i. e.) when on 234 miles (the length of the Bay Chaleur route in the Province of New Brunswick,) there are 151 miles of level and under 20 feet grades to the mile, in 252.8 miles there would be 163.2 miles of like grade. By this computation we have—

Grades.	Central.	North Shore.	Difference in favor of North Shore route.
Level and under 20 ft. to the mile,	100.4 miles,	163.2 miles,	+62.8 miles,
20 to 40 " "	47.7 "	76.7 "	+29.0 "
40 to 50 " "	14.4 "	8.6 "	— 5.8 "
50 to 60 " "	43.9 "	4.3 "	—40.5 "
60 to 70 " "	46.4 "	None. "	—45.5 "
	252.8 "	252.8 "	

By the above, it will be observed, that all the easy grades preponderate largely in favor of the Bay Chaleurs line, whilst the severe gradients are in excess on the Central. Captain Henderson has no grades from 60 to 70 feet to the mile, and only 4 miles from 50 to 60 feet, and this grade, he says in a foot note, can be avoided.

In strong contrast to this, we find the Central has 43.9 miles from 50 to 60 feet to the mile, and 46.4 miles from 60 to 70 feet to the mile.

Speaking of grades, Mr. Gillespie says: "The question of the steepest grade admissible on a railroad is not one of practicability, as is often supposed, but only one of comparative economy. Locomotive engines can be made to ascend grades of almost unlimited steepness, by a proportional increase of their power and adhesion, but their ascent becomes less and less useful in proportion as their grades become more and more steep. * * * * The cost of draught in a railroad is nearly as the power employed, so that it will cost nearly twice as much to carry a load on a railroad of 24 feet to the mile, as to carry it on a level route."

Let us now test the economy of the two routes by this standard; and in so doing, we will average the above grades, as follows:

Level and under 20 feet to the mile, average 10 feet,	
20 to 40 " "	30 "
40 to 50 " "	45 "
50 to 60 " "	55 "
60 to 70 " (both exclusive)	65 "
70 " to the mile	70 "

Of these average grades there are as above—

Average grades. 10 feet to the mile,	On Central. 100.4 miles,	On North Shore. 163.2 miles,
30 “ “	47.7 “	76.7 “
45 “ “	14.4 “	8.6 “
55 “ “	43.9 “	4.3 “
65 “ “	28.5 “	None
70 “ “	17.9 “	None
	252.8 “	252.8 “

Now, the maximum tractive power of a locomotive engine of 30 tons weight, on 6 driving wheels coupled, 5 tons on each driving wheel, with tender 15 tons, at a speed of 12 miles an hour, on the above average grades, on the most favorable roadway, is as follows :

Average grade. 10 feet to the mile,	Maximum load in tons. 882 tons,*
30 “ “	477 “
45 “ “	351 “
55 “ “	297 “
65 “ “	256 “
70 “ “	234 “

On the Central line—

100.4 (miles of 10 feet to the mile average grade) x 882 tons (max. load)	= 88552.8
47.7 (“ 30 “ “ “) x 477 “ (“)	= 22572.9
14.4 (“ 45 “ “ “) x 351 “ (“)	= 5044.4
43.9 (“ 55 “ “ “) x 297 “ (“)	= 13038.3
28.5 (“ 65 “ “ “) x 256 “ (“)	= 7296.0
17.9 (“ 70 “ “ “) x 234 “ (“)	= 4188.6
	140703.0

On the North Shore Route—

163.2 (miles of 10 feet to the mile average grade) x 882 tons (max. load)	= 143942.4
76.7 (“ 30 “ “ “) x 477 “ (“)	= 36585.9
8.6 (“ 45 “ “ “) x 351 “ (“)	= 3018.6
4.3 (“ 55 “ “ “) x 297 “ (“)	= 1277.1
	184824.0

That is, 67 is to 88 as the tractive power of the Central is to that of the North Shore, or in other words, 88 tons can be carried on the North Shore Route with the same power and at the same cost as 67 tons on the Central Route.

To illustrate this more clearly, let the reader conceive the two roads with their respective grades completed, and side by side, then two Loco-

* These results have been computed by Mr. D. K. Clark's formula,

$$T = \left(\frac{q-i}{7} \right) E \div \left\{ .00268 \left(i + \frac{V^2}{144\sigma} \right) + i \right\}$$
 where E denotes the weight of the engine; q E, the part that rests on the driving wheels; T, the gross weight of the train and tender; V, the speed in miles per hour; and i, the sine of the gradient whose inclination is as 1 in $\frac{1}{\sigma}$. I have given the data to enable those, who wish, to test the accuracy of the calculations.

motive engines of the same power and making equal time (as above) with a train of loaded cars, when the weight of the train on the North Shore Route will be 264 tons, that on the Central would be only 201 tons; and estimating the paying load one half the gross load, on the former there would be 132 tons paying load, and on the latter 100.

Suppose that on this line there were to be removed 66,000 tons of freight annually, (being about one-tenth of the through freight traffic on the New York Central Railroad for the year ending 30th September, 1865; and less than one-twentieth of the total freight for the same year,) with such locomotives and at such speed as indicated above, to transport this would take 660 trips on the Central line and only 500 on the North Shore line.

In the above year the average annual cost per mile of freight on all the Railroads of the State of New York was \$1.90, being equal to about \$1.40 of our money.

FINANCIAL ASPECT.

Now 660 (trips) x 252.8 (miles) x (\$) 1.40 (per mile) = \$233,587.20
 500 (") x 252.8 (") x (") 1.40 (") = 176,960.00

\$56,627.20

Being an annual saving in favor of the North Shore Route over the Central in the transport of 66,000 tons a distance of 252.8 miles; and amounting for 335.5 miles, the distance from Trois Pistoles to Apohaqui station, to..... \$75,152.00

And a similar gain on the passenger traffic..... 75,152.00

\$150,304.00

Annual saving in favor of North shore gradients =
 Again the North Shore Route has been shewn to be 48 miles shorter than the Central; and the average working expenses per mile for all Canadian Railways for the year 1866 was \$3233.46, which for 48 miles amounts to

155,206.08

Making a total annual saving in favor of North Shore Route of..... \$305,510.08

And this sum capitalized at 5 per cent per annum amounts to over six millions of dollars..... \$6,110,201.60

If to this be added the incidental gain in favor of construction from the facilities of transport of supplies and materials which we have shewn to be..... 1,656,000.00

And the difference in favor of total construction as per mile estimate as follows:—

469 miles Central at \$46,000 per mile = \$21,574,000
 480 " N. Shore at \$40,000 " = \$19,200,000 2,374,000.00

Direct and actual saving by North Shore Route = \$10,140,201.60

If to this we add the cost of the Branch to Father Point, a certain consequence of selecting the Central.. 2,000,000.00

And the further cost of the Branch from Dallousie to Shediac..... 7,200,000.00

Total aggregate gain of selecting the North Shore Route of..... \$19,340,201.60

Hence it is seen that by the adoption of this route the Government of this country will save to the Dominion Treasury no less a sum than over nineteen and a quarter millions of dollars; and woe be to them when the day of reckoning comes, no excuses will save them, if they turn aside from this plain and simple path of duty. Their condemnation will be "written on the wall."

In conclusion I may remark that I approached this subject with all prejudices arrayed against the *Bay Chaleurs* route. I viewed its adoption as a piece of indefensible jobbery, eclipsing in its magnitude the worst of the reputed "corruptions" of the past; and nothing short of the most incontrovertible proofs could alter my predilections.

Respectfully submitted,

J. O'HANLY, P. L. S. & C. E.

Ottawa, June, 1868.

of
ver
the
ide
be

all
ion
orst
most

