

MEMORIAL
OF THE
PEOPLE OF RED RIVER
TO THE
British and Canadian Governments,
WITH REMARKS ON THE
COLONIZATION OF CENTRAL BRITISH NORTH AMERICA,
AND THE ESTABLISHMENT OF
A GREAT TERRITORIAL ROAD
FROM
CANADA TO BRITISH COLUMBIA.

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Submitted to the Canadian Government, by Sandford Fleming.  
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MEMORIAL

OF THE

People of Red River Settlement

TO THE BRITISH AND CANADIAN GOVERNMENTS.

*To His Excellency the Right Honorable CHARLES STANLEY Viscount
MONCK, Governor General of British North America, &c., &c.*

MAY IT PLEASE YOUR EXCELLENCY :—

I have the honor to state that the last American mail from Pembina, brought a communication to me enclosing certain resolutions adopted at public meetings held at the Red River Settlement, together with a Memorial to the British and Canadian Governments on the subject of opening up such a line of road as would afford to that settlement free access without being dependent on a foreign country.

I have also the honor to state that I have been charged with the presentation of the said Memorial, and have been requested to promote the important objects mentioned therein so far as in my power.

I have therefore, in view of presenting the Memorial, felt it my duty to prepare some observations to accompany it, illustrative of the adaptability of the country in central British North America, for successful colonization, the commercial and political importance of a means of communication being formed at an early period, and the character of such a communication as would in my humble opinion be best suited for the economical development of the country, whilst at the same time it would meet the wishes and very greatly promote the interest of the people of the Red River Settlement.

I may here be allowed to observe that the people of Red River, although unable to incur the whole of the expense required to open such a line of communication, offer in their Memorial to bear a considerable portion of it.

In view of the foregoing, I have respectfully to request that Your Excellency will be pleased to receive the Memorial referred to, together with the observations which accompany it, on the subject thereof. And I am induced to pray on behalf of the people of Red River, that Your Excellency will be graciously pleased to take the subject into early and favorable consideration.

I have the honor to be Your Excellency's

Most obedient, humble servant,

SANDFORD FLEMING.

QUEBEC, March 23rd, 1863.

MEMORIAL

OF THE PEOPLE OF RED RIVER SETTLEMENT TO THE BRITISH AND CANADIAN GOVERNMENTS.

The people of the Red River Settlement hereby desire briefly to set forth their views and wishes in reference to the proposed opening up of the road from Canada to British Columbia through the Red River and Saskatchewan region, and the establishing of a telegraphic line along the same.

The people of Red River have long earnestly desired to see the Lake Superior route opened up for commerce and emigration, and they rejoice to hear of the proposal to open up a road and establish a line of telegraphic communication through the interior to British Columbia, entirely within British territory, believing that such works would greatly benefit this country, while subserving at the same time both Canadian and Imperial interests.

With reference to that section of the country lying between this settlement and Lake Superior, it is respectfully submitted that the difficulties to be encountered in opening up an easy communication are entirely overrated.

It is true that this route, for reasons which need not here be alluded to, has of late years been neglected; yet when the fact is generally known that this was the regular route by which the North West Fur Company imported and exported heavy cargoes for more than a quarter of a century, and which the Hudson Bay Company have used more or less for nearly three-quarters of a century, it must be granted that the natural difficulties cannot be so great as they are commonly reported to be.

We, the people of this settlement, are so anxious to have a proper outlet in this direction, that we are quite prepared ourselves to undertake at our own expense the opening of a road from this settlement to Lake of the Woods, a distance of ninety or a hundred miles, if England or Canada will guarantee the opening of the section from Lake of the Woods to Lake Superior.

From our intimate knowledge of the country lying between this place and the Rocky Mountains, we consider the project of a road in that direction perfectly practicable at a comparatively small outlay. At all times during the summer season, loaded carts go from this place to Carlton, Fort Pitt, and Edmonton, on the upper Saskatchewan; and last summer a party of Canadians, about two hundred in number (en route to British Columbia), passed over the same road, and went with their vehicles to the very base of the Rocky Mountains; clearly showing that along the whole way there are, even at present, no insuperable obstacles to the passage of carts and wagons. And if, in its present natural unimproved state, the road is usable, it must be evident that only a comparatively small outlay would be requisite to make it all that could be desired.

The whole country through which the proposed road would run, almost from Lake Superior to the Rocky Mountains, is remarkably level. The surface of this vast region is

generally speaking, like the ocean surface in a calm, and besides being so remarkably level, it is, for the most part, free from those heavy forests which, in Canada and elsewhere, cause such delay and expense in road making. We believe a railway could be here laid at a cheaper rate than in most countries.

Having thus cursorily alluded to the practicability of the road, on which point our local knowledge and experience ought to give our views some weight, and while admitting the intense interest and satisfaction with which we view the prospect of a work fraught with so much good to us politically, socially, and commercially, we might be allowed to point out very briefly the views we entertain regarding its importance to England and Canada alike.

Canada would derive great benefit from the Overland Carrying trade, which would spring up immediately on the establishment of this route, and the constantly growing traffic of this district and British Columbia would thereafter be an ever-increasing source of profit.

Besides this, it may reasonably be presumed that the people of Central British America, present and prospective, would prove permanent and liberal customers in the markets of England and Canada. Be it remembered, moreover, that a vast Fur business is carried on in this country, and that, towards the Rocky Mountains, gold has been discovered in many quarters. Besides gold there are iron, lead, coal, petroleum, and other minerals which, together with the rich fur trade, would prove a source of great wealth, not only to this country, but to Canada; and although the colonization and settlement of the vast area of cultivable land would somewhat curtail the territorial limits of the fur business, still, the millions of acres north of the fertile tract will, in all probability, remain a rich fur country for centuries to come.

This is the most natural highway by which commerce and general business with the East could be carried on. It would be also the most expeditious. And as a result of such commerce and traffic along this route, Central British America would rapidly fill up with an industrious loyal people; and thus from Vancouver's Island to Nova Scotia, Great Britain would have an unbroken series of colonies, a grand confederation of loyal and flourishing provinces, skirting the whole United States frontier, and commanding at once the Atlantic and Pacific. In this connection we feel bound to observe that American influence is rapidly gaining ground here; and if action is long delayed, very unpleasant complications may arise. Thus both politically and commercially, the opening up of this country and the making through it a national highway, would immensely subserve Imperial interests, and contribute to the stability and glorious prestige of the British Empire.

These views the people of Red River desire most respectfully to present for the consideration of the British and Canadian Governments, and they earnestly hope that this year may witness the formal commencement of operations with a view to a telegraphic line, and a road from Lake Superior to this settlement, if not through the whole extent of country from Canada to British Columbia.

JAMES ROSS,
Chairman of Public Meetings.

RED RIVER SETTLEMENT,
January 21st, 1865.

LETTER

From the Secretary of Public Meetings, held at the Red River Settlement, to consider the subject of opening up a means of inter-communication through British Territory; enclosing the foregoing Memorial and Resolutions adopted in relation thereto.

RED RIVER SETTLEMENT, January 22, 1863.

SANDFORD FLEMING, Esq., C. E.

SIR,—I have been instructed to notify you that a large and influential meeting of the settlers took place last evening, when the following Resolutions were unanimously adopted:—

1. *Resolved*, That it is the earnest wish of the people of Red River to see the Lake Superior route to British Columbia opened up for commerce and immigration, and to see a Telegraphic Line laid along the same,—believing that such would greatly benefit this country, while subserving at the same time both Imperial and Canadian interests.

2. *Resolved*, That a Memorial be drawn up and forwarded to the Imperial and Canadian Governments, briefly setting forth our views.

3. *Resolved*, That with a view to give effect to our present movement, we do hereby nominate Mr. Sandford Fleming, of Toronto, Canada, personally to represent our interests, both in Canada and England, with reference to the objects mooted in the Memorial, and to press upon the Imperial and Colonial Governments the views contained in said Memorial.

4. *Resolved*, That the thanks of this meeting are due, and are hereby tendered to those in Canada who are interesting themselves in matters affecting the welfare of this country, and to those newspapers which so warmly espouse our cause.

I enclose you the Memorial alluded to in the Resolutions, and have to request, on behalf of the meeting, that you would be kind enough to get the Resolutions and Memorial published far and wide in Canada and England. A very general and earnest wish is expressed that you, sir, would do all in your power to further the charge committed to you.

Since the above was written, another meeting was held, at which the foregoing Resolutions and the accompanying Memorial received the full and hearty concurrence of the assemblage.

I have the honor to be, sir,

Your obedient servant,

WILLIAM COLDWELL,

Secretary.

REMARKS

TO ACCOMPANY THE MEMORIAL OF THE

PEOPLE OF RED RIVER,

ON THE ESTABLISHMENT OF A LINE OF COMMUNICATION FROM

CANADA TO BRITISH COLUMBIA.

Respectfully submitted to the Government of Canada, agreeable to Resolutions adopted at a Public Meeting held at the Red River Settlement, January 21st, 1863.

By SANDFORD FLEMING.

In submitting to the Government of Canada the Memorial of the people of Red River on the subject of opening up a line of communication from the Province of Canada to the Red River Settlement and thence to British Columbia, the writer feels it his duty to comply as far as he possibly can, with a desire expressed by those who were pleased to place the important charge in his hands, that he should do all in his power to further the objects mentioned by them. He therefore respectfully begs leave to accompany the memorial with the following observations.

Between Canada and the Red River Settlement, a long stretch of country intervenes, in many places rough, and in some respects unsuited for early and prosperous settlement. The great lakes Huron and Superior skirt the southerly margin of the easterly half of this district, and they extend the navigable waters of the St. Lawrence to a point within about 400 miles of Red River. From this point on the northern shore of Lake Superior the settlement may be reached by a somewhat tedious canoe navigation, rendered difficult and laborious by reason of the great number of portages which exist. This is the only outlet besides one leading to the Arctic seas, which the settlers have within British territory, and by reason of the many obstructions which exist, it has almost entirely fallen into disuse. It is the Lake Superior line of communication which the people of Red River so anxiously desire to have opened up and improved, and it is on this account that they eagerly advocate the construction of a Road which, in connecting the Atlantic Provinces with British Columbia, must necessarily open up a route for them to the settlements of Canada.

The opening up of a means of easy communication between Lake Superior and Red River might fairly be advocated as an act of simple justice to our fellow-subjects in that remote settlement, who have been practically exiled from civilization for more than two generations; who have endured hardships of no ordinary description in contending with many difficulties whilst endeavoring on those vast plains to cultivate the soil and earn a laborious livelihood,* and who, if they have not increased so rapidly in numbers and importance as other colonists in settlements favored by nature and good government, have at least succeeded in establishing an important nucleus for further colonization. The Red River settlers have been apparently long neglected, and, until recently, almost forgotten by the rest of the Empire, but the discovery of gold on the slopes of the Rocky Mountains, the progress of settlement on the Pacific coast, together with other events of recent date are now, however, forcing attention on the advantages which would result from the pos-

* See Appendix B.

session of a short and facile line of communication to those regions. It is, therefore, earnestly hoped by the people of Red River that, in connection with the project of a road extending within British territory between the two oceans, they may now attain the object of their wishes.

However valuable the possession of a road from Canada to British Columbia might be considered, simply as a means of intercourse between these two countries, it is obvious that their great distance apart would be an insuperable obstacle to its construction, were it not for the favorable character of the intervening territory of which the Red River district forms a portion. The climate and soil of Central British North America is now so well known that it seems almost superfluous to allude to it, yet as the permanent success of any line of communication through the country depends so much on its adaptability for settlement and colonization, it may not be altogether out of place to present a few extracts from the best and most recent authorities on the subject before proceeding to discuss the advantages of the undertaking, commercially, its political necessity, and its character as an engineering work.

CENTRAL BRITISH NORTH AMERICA--ADAPTABILITY FOR SETTLEMENT.

The recent exploring expeditions sent out by the Imperial and Canadian Governments have been the means of giving to the world most valuable information regarding the climate, soil, natural productions, and mineral wealth of that vast unoccupied region lying between Lake Superior and the Rocky Mountains. Several American authorities have recently given expression to their views with regard to the capabilities of the country under discussion, and the opinions of those gentlemen must, for obvious reasons, be taken as especially interesting. The writer feels that he can best serve the main object in view by collecting the information obtained from these various sources.

M. Bourgeau, who accompanied the expedition of Capt. Palliser as Botanist, made the following memorandum :—

"I submit the following remarks on the advantages for agricultural settlement in Rupert's Land and the Saskatchewan prairies of British North America, having been appointed by Sir William Hooker to accompany Captain Palliser's Expedition as Botanist.

"I had especially to collect the plants that grew naturally in the country traversed by the Expedition, and also their seeds. Besides my botanical collection, Dr. Hooker advised me to make thermometrical observations at the various stations, and, above all things, to take the temperature of the earth at certain depths, as well as that of the interior of forest trees; also to notice the richness and poverty of the vegetation of the country, and the maladies to which plants are exposed. In the second letter and notes addressed to Sir William Hooker, which have already been published, I have treated these questions with all the care that was permitted to me by observations taken in the midst of the harassment and fatigue of a long journey; but it remains for me to call attention to the advantages there would be in establishing agricultural settlements in the vast plains of Rupert's Land, and particularly on the Saskatchewan, in the neighborhood of Fort Carlton. This district is much more adapted to the culture of staple crops of temperate climates—such as wheat, rye, barley, oats, &c., than one would have been inclined to believe from its high latitude. In effect the few attempts at the culture of cereals already made in the vicinity of the Hudson's Bay Company's trading posts, demonstrate by their success how easy it would be to obtain products sufficiently abundant, largely to remunerate the efforts of the agriculturist. There, in order to put the land under cultivation, it would be necessary only to till the better portions of the soil. The prairies offer natural pasturage as favourable for the maintenance of numerous herds, as if they had been artificially created. The construction of houses for habitations by the pioneers in the development of the country, would be easy, because in many parts of the country, independent of wood, one would find fitting stones for building purposes; and in others it would be easy to find clay for bricks, more particularly near Battle River. The other parts most favourable for culture would be in the neighbourhood of Fort Edmonton, and also along the south side of the north Saskatchewan. In the latter district extend rich and vast prairies, interspersed with woods and forests, and where thick wood plants furnish excellent pasturage for domestic animals. The vetches found here, of which the principal are *Vicia*, *Hedysarum*, *Lathyrus*, and *Astragalus*, are as fitting for the nourishment of cattle as the clover of European pasturage. The abundance of

buffalo, and the facility with which the herds of horses and oxen increase, demonstrate that it would be enough to shelter animals in winter, and to feed them in the shelters with hay collected in advance, in order to avoid the mortality that would result from cold and from the attacks of wild beasts, and further to permit the acclimatizing of other domestic farm-yard animals, such as the sheep and pig. The harvest could in general be commenced by the end of August, or the first week in September, which is a season when the temperature continues sufficiently high and rain is rare. In the gardens of the Hudson's Bay Company's posts, and still more in those of the different missions, vegetables of the leguminous family, such as beans, peas, and French beans, have been successfully cultivated; also potatoes, cabbages, turnips, carrots, rhubarb, and currants. No fruit tree has as yet been introduced; but one might perhaps, under favorable circumstances, try nut-trees, also apple-trees belonging to varieties that ripen early. Different species of gooseberries, with edible fruits, grow wild here; also different kinds of *Vacciniacæ* are equally indigenous, and have pleasant fruits that will serve for the preparation of preserves and confectionary. The *Aronia ovalis* is very common in this country; and its fruit, commonly known as the *Poire*, or service-berry, is dried and eaten by the Indians, who collect it with great care; and it also serves the purpose of making excellent pudding, recalling the taste of dried currants. The only difficulty that would oppose agricultural settlements is the immense distance to traverse over countries devoid of roads, and almost uninhabited. The assistance of Government or of a well organized company, would be indispensable to the colonization of this country. It would be important that settlements should be established in groups of at least fifty house-holders, for protection against the incursions of the Indians, who are, however, far from being hostile to Europeans. It stands to reason, that the colonists ought to be taken from the north of Europe or from mountain districts, being those accustomed to the climatological conditions and culture of the soil most resembling this interesting country, to the resources of which I call attention. The produce of agricultural settlements thus established would yield subsistence to the Indians, whose resources for food, supplied only by hunting, tend to diminish every day. The presence of European settlers would form a useful model for this primitive people, who, notwithstanding their native apathy, still appreciate the benefits of civilization."

(Signed,)

E. BOURGEOIS.

In the report of Mr. Simon Dawson on the exploration of the country between Lake Superior and Red River Settlement, and between the latter place and the Assiniboine and Saskatchewan, he says that "the climate of the Red River Settlement will compare not unfavorably with that of Kingston, Canada West—that, as a general rule, the season during which agricultural operations can be carried on at Red River is somewhat longer than in Canada east of Kingston, while in winter the cold is more intense, although not uniformly so, than in any part of Canada, west of Three Rivers. In regard to salubrity, there are no diseases, so far as I could learn, incidental to the country. Ague is unknown, and a population more healthy than that of the Red River Settlement cannot be met with anywhere."

Mr. Lorin Blodget, the celebrated American Climatologist writes of the country in the following terms: "Next is the area of the plains east of the Rocky Mountains, not less remarkable than the first, for the absence of attention heretofore given to its intrinsic value as a productive and cultivable region, within easy reach of emigration. This is a wedge-shaped tract, ten degrees of longitude in width at its base along the 47th parallel, inclined north-westward to conform to the trend of the Rocky Mountains, and terminating not far from the 60th parallel in a narrow line, which still extends along the Mackenzie for three or four degrees of latitude, in a climate barely tolerable. Lord Selkirk began his efforts at colonization here as early as 1805, and from personal knowledge, he then claimed for this tract a capacity to support thirty millions of inhabitants. All the grains of the cool temperate latitudes are produced abundantly. Indian corn may be grown on both branches of the Saskatchewan, and the grass of the plains is singularly abundant and rich. Not only in the earliest explorations of these plains, but now, they are the great resort for buffalo herds, which with the domestic herds, and the horses of the Indians and the colonists, remain on them and at their woodland borders throughout the year.

"The simple fact of the presence of these vast herds of wild cattle on plains at so high a latitude, is ample proof of the climatological and productive capacity of the country. *Of these plains, and their woodland borders, the valuable surface measures fully five hundred thousand square miles.*"

Professor Hind, who spent two summers in the country in charge of an expedition sent out by the Canadian Government, thus writes: "The basin of Lake Winnipeg extends over twenty-eight degrees of longitude, and ten degrees of latitude. The elevation of its eastern boundary at the Prairie Portage, 104 miles west of Lake Superior, is 1,480 feet above the sea, and the height of land at the Vermillion Pass is less than 5,000 feet above the same level. The mean length of this great inland basin is about 920 English miles, and its mean breadth 380 miles, hence its area is approximately 360,000 square miles, or a little more than that of Canada.

"Lake Winnipeg, at an altitude of 628 feet above the sea, occupies the lowest depression of this great inland basin, covering with its associated Lakes Manitoba, Winnipegosis, Dauphin, and St. Martin, an area slightly exceeding 13,000 square miles, or nearly half as much of the earth's surface as is occupied by Ireland.

"The outlet of Lake Winnipeg is through the contracted and rocky channel of Nelson River, which flows into Hudson's Bay.

"The country possessing a mean elevation of one hundred feet above Lake Winnipeg is very closely represented by the outline of Pembina Mountain, forming part of the eastern limit of the cretaceous series in the north-west of America.

"The area occupied by this low country, which includes a large part of the valley of Red River, the Assiniboine, and the main Saskatchewan, may be estimated at 70,000 square miles, of which nine-tenths are lakes, marsh, or surface rock of silurian or Devonian age, and, generally so thinly covered with soil as to be unfit for cultivation, except in small isolated areas.

"Succeeding this low region there are the narrow terraces of the Pembina Mountain, which rise in abrupt steps, except in the valleys of the Assiniboine, Valley River, Swan River, and Red Deer's River, to the level of a higher plateau, whose eastern limit is formed by the precipitous escarpments of the Riding, Duck, and Porcupine Mountains, with the detached outliers, Turtle, Thunder, and Pasquia Mountains. This is the great *Prairie Plateau* of Rupert's Land; it is bounded towards the south-west and west, by the Grand Coteau de Missouri, and the extension of the table land between the two branches of the Saskatchewan, which forms the eastern limit of the *Plains* of the north-west. The area of the *Prairie Plateau*, in the basin of Lake Winnipeg, is about 120,000 square miles; it possesses a mean elevation of 1,100 feet above the sea.

"The plains rise gently as the Rocky Mountains are approached, and at their western limit have an altitude of 4,000 feet above the sea level. With only a very narrow belt of intervening country, the mountains rise abruptly from the plains, and present lofty precipices that, frown like battlements over the level country to the eastward.* The average altitude of the highest part of the Rocky Mountains is 12,000 feet (about lat. 51°). The forest extends to the the altitude of 7,000 feet, or 2,000 feet above the lowest pass.

"The *Fertile Belt* of arable soil, partly the form of rich, open prairie, partly covered with groves of aspen, which stretches from the Lake of the Woods to the foot of the Rocky Mountains, averages 80 to 100 miles in breadth. The north Saskatchewan flows through the Fertile Belt, in a valley varying from one-fourth of a mile to one mile in breadth, and excavated to the depth of 200 to 300 feet below the level of the prairie or plains, until it reaches the low country, some miles east of Fort-à-la-Corne. The area of this extraordinary belt of rich soil and pasturage is about forty millions acres. It was formerly a wooded country, but by successive fires it has been partially cleared of its forest growth, but abounds with the most luxuriant herbage, and generally possesses a deep and rich soil of vegetable mould. 'This region in winter is not more severe than that experienced in Canada, and in the western districts, which are removed from the influence of the great lakes, the spring commences about a month earlier than on the shores of Lake Superior, which is five degrees of latitude farther to the south. * * The depth of snow is never excessive, while in the richest tracts the natural pasture is so abundant, that horses and cattle may be left to obtain their own food during the greater part of the winter.' †

* Dr. James Hector on the physical features of the central part of British North America.---Edin-Nat. Phil. Journal.

† Dr. James Hector on the capabilities for settlement of the central part of British North America.

"The Fertile Belt of the Saskatchewan Valley does not derive its importance from the bare fact that it contains 64,000 square miles of country available for agricultural purposes, in one continuous strip 800 miles long, and on an average 80 broad, stretching across the continent; it is rather by contrast with an immense *sub-arctic* area to the north, and a *desert* area to the south, that this favored 'Edge of the Woods' country acquires political and commercial importance. A broad agricultural region, capable of sustaining many millions of people, and abundantly supplied with iron ore and an inferior variety of coal, and spanning the eight hundred miles which separate Lake Winnipeg from the Rocky Mountains, more than compensates for the rocky character of the timbered desert between the Lake of the Woods and Lake Superior."

Capt. Palliser thus describes the Fertile Belt:—"It is now a partially wooded country, abounding in lakes and rich natural pasturage, in some parts rivalling the finest park scenery of our own country. Throughout this region of country the climate seems to preserve the same character, although it passes through very different latitudes, its form being doubtless determined by the curves of the isothermal line. Its superficial extent embraces about 65,000 square miles, of which more than one-third might be considered as at once available for the purposes of the agriculturalist."

Dr. Hector, Geologist to the Palliser expedition, says of the Fertile Belt:—"The most valuable feature of this belt of country, which also stretches from Touchwood Hills, Carlton, and Fort Pitt, south of Fort Edmonton to the old Bow Fort at the Rocky Mountains, is the immense extent it affords of what I shall term winter pasturage."

"This winter pasturage consists of tracts of country partially wooded with poplar and willow clumps, and bearing a most luxuriant growth of vetches and luxuriant grasses. The clumps of wood afford shelter to animals, while the scrubby brush keeps the snow in such a loose state that they find no difficulty in feeding; the large tracts of swampy country, when frozen, also form admirable feeding grounds, and it is only towards spring, in very severe winters, that cattle and horses cannot be left to feed in well chosen localities throughout this region of country."

"The proportion of arable land is also very considerable, and even late in autumn, which is the driest period of the year, and when the Saskatchewan for some weeks is fordable at Edmonton, there seems to be no want of water in the form of small streams and lakes. In spring I found the snow deeper in the neighborhood of Fort Pitt than at Edmonton."

Mr. James W. Taylor, in an elaborate report to the Government of the United States on the relations between that country and North-West British America, thus describes the climatic adaptation to agriculture of the Red River district:—"The climate of the Red River valley is characterized by extremes of temperature probably greater than any other part of the continent, while the annual mean is higher than that of the same parallels of Western Europe, including some of the best agricultural regions of that continent. The difference between its hottest and coldest months, as compared with other climates of great annual range, will be shewn in the following table, as also the difference between the mean winter and summer temperatures:

Place.	Annual mean	Difference between hottest and coldest months.	Difference between summer and winter.	Latitude.	Longitude.
	°	°	°	°	°
Red River Settlement.....	34.38	82.15	74.61	50.15	.....
Fort Snelling, Minnesota.....	44.6	59.7	54.5	44.33	93.10
Green Bay, Wisconsin.....	44.8	52.6	48.1	43.31	89.28
Detroit, Michigan.....	47.2	42.8	40.8	42.20	82.58
Montreal, Canada.....	42.3	55.7	51.0	45.31	73.34
Ozenburg, Russia.....	35.6	66.38	59.66	50.46	55.63

"It is the excessive cold of the long winter season, embracing five months of the year in this latitude, which reduces the annual mean.

"The mean for the three winter months of December, January and February, at the Red River settlement, is $6^{\circ} 85'$. At Fort Snelling it is 16° ; at Green Bay, $19^{\circ} 9'$; at Detroit, $26^{\circ} 8'$; at Montreal, $16^{\circ} 3'$.

"But it must be remembered that the Red River settlement lies upon the very edge of this climatic belt, in close proximity to the arctic declivity of Hudson Bay, and it is by far the coldest part of the whole basin of the Winnipeg. The climate grows rapidly warmer on the same parallels westward, even when there is an increase of elevation.

"It is warmer at Fort Benton, on the Missouri, than at St. Paul,—Fort Benton being $7\frac{1}{2}$ degrees of longitude west of Saint Paul,—while it is $2\frac{1}{2}$ degrees of latitude further north, and 1,843 feet higher in relative elevation.

"The mean winter temperature at Fort Benton,' says Blodgett 'is twenty-five degrees, the same as that of Chicago, Toronto, Albany and Portland, Maine. At Saint Paul it is but fifteen degrees, being ten degrees less. It is not so cold as this on the south branch of the Saskatchewan.'

"The Red River Winter.—Mr. Blodgett claims that the whole Saskatchewan Valley has a climate very nearly as mild in its annual average as that of St. Paul, which would give it a winter mean of fifteen degrees, and an annual mean of forty-four degrees, which represents the climate of Wisconsin, Northern Iowa, Michigan, Western Canada, Northern New York, and Southern New England.

"But though the winter of this region is a period of intense cold, during which the mercury often remains frozen for days together, its effect upon the physical comfort is mitigated by a clear, dry atmosphere, such as makes the winters of Minnesota the season of animal and social enjoyment. The buffalo winter in myriads on the nutritious grasses of its prairies up to as high a latitude as Lake Athabasca. The half-breeds and Indians camp out in the open plain during the whole winter with no shelter but a buffalo-skin tent and abundance of buffalo-ropes, and the horses of the settlers run at large all winter and grow fat on the grasses which they pick up in the woods and bottoms. As compared with Fort Snelling, the winter of Red River Settlement will be shewn as follows, including the months of November and March in the natural winter group:—

Localities.	November.	December.	January.	February.	March.
Red River	21.19	8.31	10.55	1.71	9.9
Fort Snelling	31.7	16.9	13.7	17.6	31.4

"Red River Spring.—Spring opens at nearly the same time from Saint Paul to Lake Athabasca; April and May are the natural spring months of this whole climatic belt. The abruptness of the transition from winter to spring in these northern latitudes is a wonderful feature of the climate. In the Red River settlement the mean of March is $9^{\circ} 9'$. In April it rises to $39^{\circ} 83'$, and in May to $58^{\circ} 46'$. Compare this with the springs of Minnesota and Western Canada:—

Localities.	March.	April.	May.
Red River	9.9	39.83	58.46
Fort Snelling	31.4	46.3	59.0
Toronto	23.0	42.27	50.52

"Agricultural Capacity of the Summer Months.—This rich upward swell of the spring temperature is prolonged through the summer months of June, July and August, to include the amplest measures of heat for all agricultural purposes. Corn thrives well at a mean temperature of sixty-five degrees for the summer months, requiring, however, a July mean of sixty-seven degrees. Wheat requires a mean temperature of from sixty-

two to sixty-five degrees for the two months of July and August. These two great representative staples of American agriculture carry with them the whole procession of useful flora that characterize the northern belt of the temperate zone. Now the mean temperature of Red River, for the three summer months, is $67^{\circ} 76'$, nearly three degrees of heat more than is necessary for corn, while July has four degrees of heat more than is required for its best development. The mean of the two months of July and August is sixty-seven degrees, five degrees above the requirement of wheat.

"The following figures will show at a glance the excess of Summer heat in the Red River valley above the measures required for the best agricultural development:

Mean summer temperature of Red River	-	-	-	$67^{\circ} 76'$
Required for corn,	-	-	-	$65^{\circ} 00'$
Excess,	-	-	-	$2^{\circ} 76'$
Mean temperature of July,	-	-	-	$71^{\circ} 16'$
Required for corn,	-	-	-	$67^{\circ} 00'$
Excess,	-	-	-	$4^{\circ} 16'$
Mean temperature of the two months of July and August,	-	-	-	$67^{\circ} 00'$
Required for wheat,	-	-	-	$62^{\circ} 00'$
Excess,	-	-	-	$5^{\circ} 00'$

"The following table will serve for comparison between the summer temperature of the Red River with the rich agricultural climates of the south :

Localities.	June.	July.	August.	Summer mean.
Red River.....	69.10	71.16	63.3	67.76
Fort Snelling	68.4	73.4	70.1	70.6
Chicago	62.7	70.8	68.5	67.3
Muscatine, Iowa	66.4	70.5	68.9	68.6
Kenosha, Wisconsin	61.7	68.6	65.7	65.3
Utica, New York	64.2	68.5	66.7	66.5
Toronto.....	59.93	67.95	64.6	63.98

"It will thus be seen that the summer climate of Red River is warmer than that of any of the localities indicated in the above table, except Fort Snelling and Muscatine, Iowa; warmer than that of Northern Illinois, Western Wisconsin, Northern New York, or Western Canada. Its June is warmer than in any of the points given, its June and July warmer than any except Fort Snelling, while its Augusts are cooler than any of the rest. The last named locality,* in the same latitude as the Red River settlement, with a corresponding geographical position, is its equivalent in annual mean temperature, but the difference between the extremes of summer and winter temperature is much less in the inferior European than in the American plain. No part of the United States has so low an annual mean. Fort Kent, Maine, with a mean of 37° , is its nearest approach.

"Autumn.—The mean temperatures for the autumnal months are as follows, compared with Minnesota :

Localities.	September.	October.	November.	Mean.
Red River	59.26	42.20	21.19	40.88
Fort Snelling	58.9	47.1	31.7	45.9

*Ozenburg, Russia.

"November, which in Minnesota belongs partly to autumn and partly to winter, belongs entirely to the winter season in the more northern latitude of Red River. The reader will see that the fall plunges into winter almost as rapidly as the spring emerges from it.

"*Climate of the Red River settlement compared with Minnesota, Wisconsin and Michigan.*—The following table will illustrate the climate of the Red River valley as compared with other and better known latitudes :

TABLE OF MONTHLY MEANS OF RED RIVER AND MINNESOTA, WISCONSIN AND MICHIGAN.

Months.	Red River.	Fort Snelling.	Green Bay.	Detroit.
	°	°	°	°
December.....	8.31	16.9	20.8	26.9
January	10.55	13.7	18.9	27.0
February	1.71	17.16	20.0	26.6
March.....	9.09	31.4	31.3	35.4
April	39.83	46.3	43.4	46.3
May.	58.46	59.0	55.8	56.0
June.....	69.10	68.4	62.2	65.6
July.....	71.16	73.4	71.5	69.7
August	63.3	70.1	67.9	67.5
September	59.26	58.9	57.2	60.0
October.....	42.20	47.1	46.5	47.7
November	21.19	31.7	34.3	38.2

TABLE SHEWING THE MEANS OF THE SEASONS FOR THE ABOVE LOCALITIES.

Localities.	Winter.	Spring.	Summer.	Autumn.	Annual mean.
	°	°	°	°	°
Red River.	6.85	35.79	67.76	40.88	34.38
Fort Snelling.....	16.1	45.6	70.6	45.9	44.6
Green Bay.....	19.9	43.5	68.5	46.0	44.5
Detroit	26.8	45.9	67.6	48.7	47.2

"Thus it will be seen that while the winter curve in the region immediately south and west of the great lakes exhibits an extraordinary depression, its rich summer measures place it in the best agricultural belt of the temperate zone.

"*Bountiful Summer Rains.*—The Saskatchewan valley is a singular exception to the almost universal sterility which characterizes the continent west of the 98th meridian. The great American desert derives its barrenness from the lack of rain.

"The Winnipeg basin, on the other hand, is abundantly supplied with moisture during the summer months, although the dryness of the winter months reduces the mean annual precipitation below that of points lying nearer the ocean.

"No rain-tables have ever been constructed for any portion of this district, except for the single year 1855, at the Red River settlement. The following table exhibits the results compared with Minnesota and Western Canada :

RAIN IN INCHES.

Months.	Red River.	St. Paul.	Toronto.
	1855.	19 years.	1855.
March .....	.65	1.30	1.62
April.....	6.80	2.14	2.79
May.....	4.0	3.17	4.78
June	6.0	3.63	4.07
July.....	12.0	4.11	3.24
August.....	12.5	3.18	1.45
September.....	5.0	3.32	5.9
October.....	.20	1.35	2.48
November.....	3.12	1.31	4.59
December.....	.80	.67	3.80
January.....	.50	.73	1.36
February.....	.60	.52	0.97
Totals.....	52.17	25.43	36.35
Means for the Seasons.			
Seasons.	Red River.	St. Paul.	Toronto.
Spring.....	11.45	6.61	9.19
Summer.....	30.5	10.92	8.76
Autumn.....	8.32	5.98	13.27
Winter.....	1.90	1.92	5.13

"By multiplying the figures for November, December, January, February and March by 10, the result will show the fall of snow, probably the actual form of the precipitation in those months.

"The column for Red River, exhibiting the moisture of a single year, cannot be adopted as the uniform measure of precipitation in that country; but if, as Blodgett informs us, a difference of one-eighth will cover the range of any non-periodic variations of the rain fall in the basin east of the Rocky Mountains, (a rule that is confirmed by a comparison of the Toronto column for the same year with the means for several years given in his work,) it may serve as an approximative index to the rain standard of the country. The excessive rains of that summer, which has no equivalent on the continent, except the winter rain of the Pacific, is probably much beyond a uniform mean, or, if regarded as an approximation to a constant term, may be accounted for by its contiguity to Hudson Bay and Lake Superior.

"A region liable to such occasional rains cannot certainly be deficient in moisture. The reader will observe the great preponderance of moisture in the spring and summer months, with the extreme dryness of winter. Converted into snow, the whole winter fall will be 22 inches, the same as at Saint Paul, while that of Canada is 61 inches, and most of the Eastern States 120 inches. *This extreme lightness of the winter precipitation characterizes the whole of the plains east of the Rocky Mountains, without reference to latitude, including the Saskatchewan valley, and is a fact of great importance in determining the adaptability of those regions for railroads.*

"We have no measurements of the local precipitation of the Saskatchewan Valley, but the general fact of a comparatively humid summer, with an autumn and winter of extreme dryness, is well ascertained.

"The rain measures in the elevated belt of country, including the western slope of the Missouri plateau, adjacent to the Saskatchewan Valley on the South, will afford an approximative standard for the latter.

"The following table compiled from Blodgett, will exhibit the rain-fall in the whole belt across the continent, between the parallels of 47 deg. and 50 deg.

RAIN TABLE, SHOWING THE MEAN ANNUAL PRECIPITATION BETWEEN THE 47th AND 50th PARALLEL:

In Vancouver's Island, - - - -	65 inches.
Western slope of the Rocky Mountains - - - -	30 "
Eastern slope of the Rocky Mountains - - - -	25 "
Missouri Plateau to 100th Meridian - - - -	20 "
Between Red River and 100th Meridian - - - -	25 "
East of Red River to Lake Erie - - - -	30 to 34 "
West of Lake Erie to the Atlantic - - - -	36 "

MEAN FALL BY SEASONS:

Winter Fall.	Spring Fall.	Summer Fall.	Autumn Fall.
30	15	8	20
5	6	6	6
4	6	6	4
2	5	6	4
2	5	6	4
3 to 5	6 to 8	10	6 to 10
5 to 10	6 to 8	10	10

"A fall of six inches is given by Blodgett as the mean for the summer in this belt, between the Rocky Mountains and Red River.

"This is amply sufficient for all the purposes of luxuriant vegetation, as is shown in southern England, Prussia, the Crimea, and interior of Russia.

"But according to all analogies, the higher summer temperature of the Saskatchewan Valley would be accompanied by a corresponding increase of humidity, and this fact is further shown by the permanent volume of its streams in the summer months.

RESULTS OF AGRICULTURE AT RED RIVER SETTLEMENT.*

"For all the great northern staples—wheat, corn, oats, barley, potatoes, sheep, and cattle—the range and duration of the summer heats form the decisive condition. The data we have furnished prove conclusively the climatic adaptation of the Red River and Saskatchewan valleys to successful agriculture.

"*Indian Corn.*—The measures of heat, as we have before shown, are ample for the development of corn in this district, and, in fact, some varieties thrive well at the Red River Settlement, but it is not claimed as a profitable staple. It is chiefly cultivated in small garden patches for the green ears, but the cool nights of August frequently prevent its ripening, except in the driest soils. Some varieties of Canadian corn, requiring a growing period of not more than seventy days, would, however, form a sure crop in Red River.

"Indian Corn, indeed, according to Blodgett, is restricted as a profitable staple to the middle region of the west, between parallels of 42° and 43°.

"*Wheat.*—Wheat is the leading staple of the upper belt of the temperate zone. The range of wheat extends from the borders of the tropics northward to the parallel of 60° north, and requires a minimum mean temperature of 62° or 65° for the two months of July and August. The whole region between Red River and the Rocky Mountains is embraced between the mean summer temperatures of 65° and 70°, which include also the most fertile districts of New England, New York, Pennsylvania, Michigan, Wisconsin, and Minnesota.

"Between these Isothermal lines, extended through these north-western valleys to the Pacific, is embraced the wheat zone of the continent. 'A line,' says Blodgett, 'drawn from Thunder Bay, in Lake Superior, northward to the Mackenzie, at the 60th parallel,

*Continued from Mr. Taylor's valuable reports.

and from that Point south-west to the Pacific coast, at the 55th, would include an immense region adapted to wheat, with only the local exception of mountains and worthless soils.'

"Richardson states that wheat is raised with profit at Fort Liard, in latitude 60 deg. 5 min. north, and longitude 122 deg. 31 min. west, and 400 and 500 feet above the sea.

"*The remarkable law has been observed to govern the development of the cultivated plants that they yield the greatest product near the northernmost limits of their possible growth.*

"This principle announced by Forrey, is noticed by Blodgett, as especially applicable to wheat. Central Russia, the Baltic districts, the British islands, the Canadas, and the northern parts of New York and Pennsylvania, and the upper belt of the north-western States lying upon the cold borders of the wheat range, are the seats of its maximum production.

"'Probably,' says Blodgett, 'the plains of the Saskatchewan and the Pacific coast near Puget's Sound will furnish similar districts. This *a priori* inference is fully borne out by facts, which prove, moreover, that the basin of the Winnipeg is the seat of the greatest average wheat product on this continent, and probably in the world.'

"The limestone substratum of this region, with its rich, deep, calcareous loam and retentive clay subsoil, is always associated with a rich wheat development, while its hot and humid summers fulfil all the climatological conditions of a first-rate wheat country.

"*Instances of the wheat product of Red River.*—'Our soil,' says Donald Gunn, an intelligent settler, 'is extremely fertile, and when well cultivated yields large crops of the finest wheat, weighing from 64 to 74 pounds per imperial bushel. The yield per acre is often as high as sixty bushels, and has been occasionally known to exceed that; and when the average returns fall below forty bushels to the acre, we are ready to complain of small returns. Some patches have been known to produce twenty successive crops of wheat without fallow or manure.'

"Professor Hind, in his official report to the Canadian Legislature, sets the average product at forty bushels to the acre. He notices a product of fifty-six bushels to the acre in the only instance when a measurement was made. Wheat ripens in from ninety to one hundred and five days. It is entirely free from insects or disease of any kind.

"A comparison of the yield of wheat in Red River, with the best wheat districts of the United States, will show its superiority over all others.

Red River produces 40 bushels per acre.

Minnesota produces 20 bushels per acre.

Wisconsin produces 14 bushels per acre.

Pennsylvania produces 15 bushels per acre.

Massachusetts produces 16 bushels per acre.

"*Oats, Barley, Rye, Potatoes.*—The whole group of subordinate cereals follow wheat, but are less restricted in their range, going five degrees beyond wheat in the Mackenzie Valley to the Arctic circle. Barley is a favorable alternate of wheat at Red River, and yields enormous returns, with a weight per bushel of from forty-eight to fifty-five pounds. Oats thrive well. Potatoes are particularly distinguished for their excellent quality and yield.

"*Hay*—'The grasses,' says Forrey, 'are proverbially in perfection only in northern and cool regions. It is in the north alone that we raise animals from meadows, and are enabled to keep them fat and in good condition with grain.'

"In none of the prairie districts of North America are the native grasses so abundant and nutritious as in these northern valleys. This is sufficiently proved by the countless herds of buffalo that pasture throughout the year upon its plains, even up to the latitude of Peace river—a fact which suggests an equivalent capacity for the herding of domestic cattle.

"The Red River colony in 1856 contained 9,253 horned cattle and 2,799 horses, which, in a settlement of 6,523 souls, exhibit a remarkable proportion of stock. Horses roam during the summer and winter through the woods, and keep fat without housing or hay. The unlimited pastoral ranges afforded by the grassy savannas of Red River, with its dry winter climate, seem to supply favorable conditions for successful sheep husbandry. This is confirmed by Donald Gunn. 'Our climate and soil,' he says, 'are peculiarly adapted to sheep. There are twenty-eight years since their introduction into the settlement, and I have never seen nor heard of any sickness attacking them. Well-fed ewes produce fleeces

varying from two to three and a-half pounds. Wethers produce fleeces much heavier. The wool is of good quality, though not very fine. An inferior breed of sheep would not be likely to produce fine wool."

"The same author (Mr. Taylor) thus describes the climate of the country westerly from the Red River Settlement:—"East of the Rocky Mountains the great north-western plains have a continental climate, and I can best illustrate my own conclusions in the premises by comparison with a similar area of European Russia. Draw a line from St. Petersburg 20 degrees east, and another ten degrees south, extending them into the form of a parallelogram, and a region is described whose area corresponds with that between Lakes Superior and Winnipeg on one side, and the Rocky Mountains on the west, and extending from latitude 41° to 54°. No two sections of the respective continents more closely resemble each other than do those above delineated. Both are immense plains, developing the silurian, carboniferous, and, in some measure, a cretaceous geological formation. The Mississippi, Missouri, and Saskatchewan may be set off against the Dnieper, the Don, and the Volga, of Russia; while, in respect to climate and productions, the American District resembles the following particulars of European Russia.

"It is usual to consider Russia in Europe in four distinct divisions: a polar region, including all the country north of latitude 67°; a cold region, extending from 67° to 57°; a temperate region, from 57° to 50°, and a warm region, from 50° to 37°. Our continental latitude, from 41° to 54°, represents the Russian temperate zone from 50° to 57°, as well as three degrees of the cold division, namely, to the latitude of St. Petersburg, or 60° north.

"The temperate region of Russia has a mean annual temperature of from 40° to 50°, and includes within it the finest and most populous portion of the empire, though even here the thermometer has a very wide range, the summer heat, which suffices to grow melons and similar fruits in the open fields, being often succeeded by very rigorous winters. Even the sea of Azof, much further south, usually freezes about the beginning of November, and is seldom open before the beginning of April. The oak is seldom found below latitude 61°; few fruit trees are found beyond 56°, and their regular culture cannot be profitably carried on north of the 53rd parallel. In this latitude (still speaking of Russia) apples, pears, and plums become abundant; and still further south peaches, apricots, &c., flourish. The northern limit of rye is 65°, and barley 67°, and oats even further north.

"Wheat is cultivated in Norway to Drontheim, latitude 54°; in Sweden to latitude 62°; in western Russia to the environs of St. Petersburg, latitude 60° 15'; while in central Russia the limit of cultivation appears to coincide with the parallel of 58° or 59°. It is well understood that the growth of the cerealia and of the most useful vegetables, depends chiefly on the intensity and duration of the summer heats, and is comparatively little influenced by the severity of the winter cold, or the lowness of the mean temperature of the year. In Russia, as well as in Central America, the summer heats are as remarkable as the winter cold. The northern shore of Lake Huron has the mean summer heat of Bordeaux, in southern France, or 70° Fahrenheit, and Cumberland House, on the Saskatchewan, exceeds in this respect, Brussels or Paris. It is remarked by Sir John Richardson, (and such also is the analogy of Russian Europe,) that the prairies south of 55° enjoy milder winters than the more eastern districts.

"I have no doubt that potatoes and the hardier garden vegetables, oats, rye, and barley, can be profitably cultivated as far north as 54° in the Saskatchewan district; that wheat, and such fruits as yield cider, are safe as far as 52°; that maize may be cultivated at least to latitude 50°; while the country between 44° and 51° is as nearly as possible the counterpart of the temperate zone of European Russia. With the same system of canalage, and a reasonable degree of railroad connexion, our vast northern plain can sustain as dense, and, with our institutions and land tenures, a denser population than the heart of the Russian empire.

"Its capacity to support life is shown by the variety and abundance of wild animals. Many of these might be domesticated, and would constitute a great resource. Besides innumerable fur-bearing creatures, there are four different kinds of deer; the cariboo or reindeer ranges from 50° to 66°; the Rocky Mountain goat, whose wool is highly prized in the manufacture of shawls, frequents the highlands from 40° to 60°; the bison swarms

in the prairies west of longitude 105°, and south of latitude 60°; and the streams and lakes abound in choice varieties of fish. No region of the globe is more richly endowed with these allies and slaves of the human race.

"The rigorous winter climate is no obstacle to the future occupation of these northern plains. The corresponding district of Russia, with the same climate, is, as already shown, the most populous and flourishing portion of the empire. There is much misapprehension on this subject. Mr. E. Merriam, a distinguished meteorologist, states, in a review of the recent Arctic expeditions, that nature has qualified men to breathe an atmosphere 120° above zero, or 60° below it, a difference of 180°, without injury to health; and the doctrine of physicians that great and sudden changes of temperature are injurious to health is disproved by recorded facts."

Other authorities could be cited, who have written on Central British North America, some of whom have perhaps colored its capabilities as a field for colonization too highly, whilst others have equally undervalued its advantages. It appears, however, pretty well established, that although the climate is rigorous, it is nevertheless extremely salubrious, and that although, as in all countries, wide areas of inferior land exist, there is likewise a vast extent of soil of the richest and most productive description. With regard to the mineral wealth of the country, the following, condensed from Mr. Taylor's valuable report, will suffice. Professor Isbister, of London, England, is given as the authority for the statements made:—

GEOLOGY AND MINERAL WEALTH OF THE TERRITORY.

From the shores of Lake Superior to the eastern banks of Lake Winnipeg, the geological formation is that of the crystalline rocks, a system which is not generally favorable to agriculture, although here and there many fertile spots are to be found. This comparatively sterile region extends northward to the Arctic sea; Lake Athabaska, and Great Slave Lake being situated on its most westerly limit. To the westward of these lakes, and Lake Winnipeg, and between them nearly to the Rocky Mountains, the whole territory is of the silurian and devonian formations, both eminently favorable to agriculture, the former prevailing throughout the fertile peninsula of Upper Canada. At its base, the silurian deposits range a thousand miles from east to west, and extend about five hundred miles to the northward, where the devonian commences and continues to the Arctic sea. It is this part of the territory through which the Saskatchewan and Mackenzie rivers flow, which is so highly praised for the fertility of its prairie lands. About one hundred and fifty miles east of the Rocky Mountains, the great coal bed commences, which gives our territory so important an advantage over that which lies to the south. So far as has been ascertained, it is over fifty miles in width, and extends continuously over sixteen degrees of latitude, to the Arctic ocean.

The lignite (or tertiary coal) formation is still more extensively developed; and as the occurrence of coal in any form in these high latitudes is a question of much interest, the result of Sir John's Richardson's observations and enquiries on the subject, to which he has given much attention, are here briefly stated.

At the junction of the Mackenzie and Bear Lake River, the formation is best exposed; it there consists of a series of beds, the thickest of which exceed three yards, separated by layers of gravel and sand, alternating with a fine grained friable sandstone, and sometimes with thick beds of clay, the interposing layer being often dark, from the dissemination of bituminous matter. The coal, when recently extracted from the bed, is massive, and most generally shows the woody structure distinctly. Different beds, and even different parts of the same bed, when traced to the distance of a few hundred yards, present examples of 'fibrous brown coal,' 'earth coal,' 'conchoidal brown coal,' and 'trapezoidal brown coal.' Some beds have the external characters of a compact bitumen, but they generally exhibit on the cross fracture concentric layers, although from their jet-like composition, the nature of the woody fibres cannot be detected by the microscope. Some pieces have a strong resemblance to charcoal in structure, color, and lustre. From the readiness with which the coal takes fire spontaneously, the beds are destroyed as they become exposed to the atmosphere, and the bank is constantly crumbling down, so that it is only when the debris has been washed away by the river that good sections are exposed.

Formations similar to that found on Mackenzie River, extend southward along the eastern base of the Rocky Mountains, as far as the Saskatchewan river. Sir John Richardson gives a detailed account of the various localities between these two points in which beds of coal have been exposed, all pointing to the existence of a vast coal field, skirting the base of the Rocky Mountains for a very great extent, and continued probably far into the Arctic sea, where, as is well known, lignite apparently of a similar character has recently been discovered by Captain McClure, in the same general line with the localities above mentioned.

The importance of this coal field in connexion with the construction and working of a Pacific Railway can hardly be over estimated. Beyond the Rocky Mountains the geology of the territory is not so well known. There are ranges of mountains, (Laurentian,) but they are interspersed with great valleys, very favourable for agriculture, and heavily timbered.

While the geologist has found in his researches many proofs of the wealth of the north-west territory, the mineralogist has not been far behind him. Almost upon the landing upon the shores of Hudson Bay of the first fur-traders, the country has been represented as rich in minerals. Sir Alexander Mackenzie, in 1789, discovered "pieces of petroleum, which bears a resemblance to yellow wax, among the stony, flake-like slate," on the banks of the Mackenzie; and the Indians informed him that "rocks of a similar kind were scattered about the country at the back of Slave Lake, where the Chepewyans collect copper." All the Indians whom he met had either copper or iron tops to their spears, and near the river of Bear Lake he met with lumps of iron ore and springs of mineral water. Along the course of the Mackenzie, as far as 66° north latitude, and also in the Rocky Mountains in 56° north latitude, and 120° west longitude, he discovered coal and bitumen, and on the Peace River, a south-western branch of the Mackenzie, he discovered salt springs.

Franklin and Richardson, in their joint expeditions, discovered, at Lake Winnipeg, a beautiful china-like chert, and "arenaceous deposits and rocks having a close resemblance to those of Pigeon Bay, Lake Superior, where argentiferous veins occur"; at Cumberland House, on the Saskatchewan, salt and sulphur springs and coal; at Elk river, *bitumen in such quantity as to flow in streams from fissures in the rock*; upon the shores of Lake Athabasca, the finest plumbago and chlorite slate.

In a letter addressed to Sir R. Murchison, Sir John Richardson says, in referring to the country about Slave river; "The great quantity of gypsum in immediate connexion with extremely copious and rich salt springs, and *the great abundance of petroleum in this formation*, together with the arenaceous, soft, marly, and brecciated beds of dolomite, and above all, the circumstance of the latter being by far the most common and extensive rock in the deposit, led me to think that the limestone of the Elk and Slave rivers was equivalent to the sechstein of the continental geologists." The salt springs, situated further to the south, from which large quantities of pure common salt are deposited, Sir John Richardson classes as belonging to the celebrated Onondaga salt group of the New York Helderberg series. By Sir William Logan's report it appears that from the latter springs "no less than 3,134,317 bushels of salt were profitably manufactured in 1851." From the many valuable salt springs which exist throughout the Hudson Bay territory, the finest salt could be obtained, which article would of itself become a considerable source of wealth, were the country occupied by settlers in any number, and were the valuable and varied fisheries of its coast and rivers prosecuted to any extent.

Of the mineral wealth of a large portion of the territory, Sir John Richardson thus speaks in general terms, in a communication published in the Journal of the Geographical Society for 1845: "The countries, by the expeditions of Sir John Franklin and Captain Back, are rich in minerals; inexhaustible coal-fields skirt the Rocky Mountains through twelve degrees of latitude; beds of coal crop out to the surface on various parts of the Arctic coast; veins of lead ore traverse the rocks of Coronation gulf, and the Mackenzie river flows through a well-wooded tract, skirted by metalliferous ranges of mountains, and offers no obstruction to steam navigation for upward of twelve hundred miles."

The recent gold discoveries in North West America, which have justly attracted so much attention, and which are of the highest importance in connection with the coloniza-

tion of the country, are so fully dwelt upon by the newspaper press, that it does not appear necessary to allude to them further here.

THE POLITICAL AND COMMERCIAL IMPORTANCE OF A COMMUNICATION TO RED RIVER, ON BRITISH TERRITORY.

The community of settlers at Red River, isolated in many respects from, and, until lately, unnoticed by the rest of the world, is now exciting no small degree of attention. The people of Red River remained tranquil in their solitude so long as the vast areas to the south of the international boundary line were as wild and unoccupied as the plains which surround them on all sides. The progress of their republican neighbours in opening and organizing new territories has, however, awakened them to a knowledge of their true condition. They have been silent witnesses of the march of colonization westward from Lake Michigan across the states of Wisconsin and Minnesota to Dacotah; they have seen an industrious population reckoned by hundreds of thousands introduced almost alongside of them, whilst their own settlement scarcely increases in numbers; they know that there is nothing in their own soil and climate to keep them from advancing; they are satisfied with the richness of the one and the salubrity of the other; but they cannot help feeling mortified at the strong contrast between the satisfactory progress of their neighbours, and the absence of prosperity with themselves. Justly or unjustly they attribute their backward condition to the sway of the Hudson Bay Fur Company, and they clamour in a way that cannot be misunderstood, against a farther continuance of a rule which they appear to believe is the chief hindrance to their progress.

The settlement was first formed half a century ago by immigrants from the old country; the population now consists of British-born subjects and their descendants; they live and have always lived on British territory, but they are not yet literally a British colony. They know that they are subjects of the Queen, and this is their pride; they desire to be recognized at the Colonial office, and this is their ambition; they wish to have a voice which, as British subjects, they claim they have a right to possess, in the management of local affairs. Had they the powers and privilege of an ordinary Township Council, they feel that they could do a great deal towards improving their condition and moulding their destinies; but this they have not, and this is their grievance and mortification. Whilst their own settlement is of 50 years standing, they see Minnesota and Dacotah, whose boundaries sweep past at the short distance of 60 or 70 miles, States only of yesterday but already enfranchised.

Practically, too, the people of Red River settlement are at present cut off from all intercourse with the mother country except through a foreign State. The old route by which they had access 50 years ago has, for want of a small expenditure to keep it open, fallen into disuse; no wonder then that they grumble at the seeming indifference of the parent land. "We have no postal communication," says the Red River 'Nor'-Wester,' "with any part of the civilized world except through the United States! For two or three years previous to 1860, the Canadian government maintained a monthly mail to and from this settlement, *via* Fort William, on Lake Superior. This was a step in the right direction, though the arrangement was very unsatisfactorily carried out. But irregular as were the mails, we had a right to expect that they would continue, and gradually, through experience of the route, would work better. The Canadian government has, however, discontinued this small boon, and we are at this moment entirely dependent on the favor of the American government for our means of communicating with the outer world. They have, at great expense, established a fortnightly mail to our frontier, sixty miles from this settlement, almost entirely for our own benefit. Does this fact not present the British government to our views at a disadvantage?"

"If we except the round-about, slow, and very uncertain route through the arctic straits of Hudson Bay, it is only through or from the United States that we can import goods—by an American route alone can we export furs, skins, cattle or anything else! Is this favorable to loyalty? An importer from Britain can at present get but one supply of goods in the year, and counts himself very lucky indeed if, considering the many possible mishaps, he *does* get it; whereas the dealer in American goods can get twenty supplies during the same time if he chooses. Almost any week from May to October, inclusive, a splendid

steamboat may be seen at Fort Garry discharging her cargo of goods, and taking off packages of furs for the St. Paul, Boston or New York market: whose boat is this? American citizens.

"The only decent route into this country for emigrants is through the States. The consequence is that the foreigners who are settling amongst us are for the most part American citizens, or persons thoroughly Americanized. Is their influence favorable to loyalty?

"By frequent intercourse with the Americans, and occasional visits to Chicago, Boston, New York, &c., the impression is fast gaining ground that there is no people like our republican neighbors. We see their fine cities, their railroads, and their steamboats; we read of their rapid settlement of new territories, and of the liberal system of legislation by which the sudden development of the resources of new districts is a matter of every day experience. Meanwhile, we see nothing of England's prosperity and greatness."

These sentiments have doubtless been growing for some time back; it certainly does not appear wonderful that they should gain ground; commercial and postal intercourse with Minnesota fosters them, whilst the entire absence of any advantages, governmental or otherwise, from our own country is not unfavorable to them. British subjects at Red River still cling to British connection, but the association of ideas suggested thereby although pointing to all that is prosperous and great, all that is glorious in history, is at Red River obscured by the fact that it does not bring directly to them any palpable benefits. They bitterly feel that they are neglected; they long to continue British subjects in reality as well as in name, but they do not yet participate in any of the commercial and other advantages which, as fellow-subjects, they have a right to expect from an enlightened and liberal government.

The people of Red River feel that American influences of every kind are operating upon them, and that they must become Americanized if some immediate effort is not made to counteract this tendency. In the Memorial now presented they observe "that American influence is rapidly gaining ground here, and if action is long delayed, very unpleasant complications may arise," and they proceed to point out that the opening up of the country by a national highway, which will give them a means of intercourse with their fellow subjects in Canada and elsewhere, without leading through a foreign land, would very greatly contribute to their weal, and permanently secure to them the political relationship which they so much desire. "If a good road from Canada to Rupert's Land is not speedily opened, who can tell the effect on the minds of the inhabitants of seeming neglect on the part of the mother country and the great and advanced intervening colony, joined with habitual dependence on the United States for means of intercourse with the outer world, and for all which they most want? We have no enmity against the United States. We admire much in their institutions, though, very naturally, we do not like them so much as our own. We esteem their people highly as friendly neighbours, and when some among them abuse and threaten us, we give the great majority credit for more just and reasonable sentiments. But there are those in the States who are ambitious of territorial extension, and who would not only offer to, but force upon others the institutions they themselves value; and if the affections of our countrymen were cooled by supposed neglect, or their interests be involved in a change of allegiance, it is not difficult to foresee that influences might be brought to bear upon them which, we are convinced, would not really favour their own welfare and progress, and which would most seriously affect the prosperity of the great empire of which the ignorant and thoughtless might account them an insignificant part. With these views, we cannot but feel how much is involved in the question of a practicable and not too difficult route from Canada to the Red River.*" No better earnest of the desire of this community of settlers to maintain British connection can be had than the offer made by them in their Memorial, to construct nearly a hundred miles of the road towards Lake Superior. The enterprise of Americans has already given them the commercial advantages of steamboat communication with the heart of Minnesota, but they would greatly prefer a means of communication in the direction of Canada; and to attain this end the people of Red River, although strangers to wealth, are prepared, by their own voluntary contributions and labour, to open up what is really, in connection with the navigable waters of the Lake of the Woods, about half the length of the line of communication to Lake Superior; provided the Imperial or Provincial government will undertake the remainder.

* Canadian Journal.

THE PROPOSED LINE OF COMMUNICATION.

Having thus endeavored to illustrate the claims and aspirations of the people of Red River; having briefly shown the political necessity of adopting such early measures as may be best calculated to open up a line of easy communication between that isolated settlement and Canada, and thus counteract the tendency which dependence on a foreign power for any commercial intercourse they possess, must undoubtedly produce; and having also shown from the best authorities the adaptability of an immense area of Central British America for successful colonization, in view of the establishment of a great national highway from Canada to British Columbia, the engineering character of the undertaking now remains for consideration.

In another place the writer has alluded to the construction of a continuous line of Railway from Canada to the Pacific ocean on British territory. The various schemes previously suggested to open up a highway between the two oceans are there briefly reviewed, and notwithstanding the magnitude of such a Railway, and the impossibility of proceeding with its construction at once, a work of this character is regarded as the only satisfactory means of communication across the continent. It is argued that although a Railway might well be viewed as a thing of the future, it would be advisable to regard it as the final and great object in view in any present attempt to open up the country, and that the work of inter-communication throughout the vast extent of country now lying waste in the interior should be so designed that as the roads advanced from rude to more perfect stages, in harmony with the progress of settlement and the gradual development of traffic, they should ultimately culminate in a great and continuous Railway line from ocean to ocean.

The writer has had no reason to change the views he formerly made public, with regard to the best means to be employed in opening up the country; on the other hand, the Road system for new territories already propounded has been so favorably reviewed by the press, and approved by many of the leading men in the Province, that he is strongly confirmed in the belief that it possesses many recommendations. Moreover, the fact cannot be overlooked that the Memorialists of Red River virtually give the preference to the system alluded to in selecting its advocate to represent them in pressing upon the Government the importance and necessity of opening up avenues of communication through the country.

These remarks seem necessary on account of the feature of novelty possessed by the "Territorial Road system" herein recommended, and which feature is without doubt, a very strong objection to any scheme involving similar weighty interests. The system now brought before the notice of the Government is untried, and therefore its advocate ought to be prepared to demonstrate its merits. This the writer respectfully submits is accomplished by the testimony of such authorities as must command the utmost confidence.*

In the article appended to this on a proposed Territorial Road system in connection with the colonization and settlement of Central British North America, it is submitted that a Great Railway communication across the continent, entirely through British territory; should at once be initiated by laying down what has been designated, for the purpose of distinction, a "Territorial Road Line." On this line which, in fact, should be the best engineering location for a Railway from the settlements of Canada along the general line of the Fertile Belt to British Columbia, it is proposed that a broad "road opening" should be formed through the wooded districts, an Electric Telegraph erected throughout, and such bridging and other rudimentary works done as would enable the line to be used as a Post-road.

It is not claimed that the initiatory works at first contemplated are free from difficulties; it is, undoubtedly, a great mistake, either to disguise those that are known, or to ignore such as might reasonably be anticipated. We know that formidable obstacles exist to the west of the Saskatchewan district, as well as to the east of the Valley of Lake Winnipeg, whilst more than half the length of the probable route through the latter division of the country, viz: that section between Lake Nipissing and Fort William, is, perhaps, as little known as many of the remotest corners of Rupert's Land. Even in the long extent of flat prairie country in the interior, although the establishment of a Post-road could easily be done in almost any required direction, the construction of a Railway would involve heavy bridging over many of the streams and eroded valleys, and therefore considerable care should be exercised in the location of a line through this as well as the wooded divisions of the country.

* See Appendix.

LAKE SUPERIOR TO RED RIVER.

The section of the route between the navigable waters of Lake Superior and the Red River settlement is the first to demand particular attention. The opening of an easy means of communication on this section will at once supply a want greatly felt by the Memorialists, and provide an inlet to the vast areas of arable land, which, without proper means of access, must forever lie waste.

The physical character of the country between Lake Superior and Red River is thus described by Mr. Dawson: "In its general aspect it is a hilly and broken country, intersected by rapid rivers and wide-spread lakes. The mountains, however, do not rise to any great elevation, except on the immediate borders of Lake Superior, and there are several fine alluvial valleys, the most extensive of which is that of Rainy River, which has been so often referred to in previous reports. The lakes and rivers present long reaches of navigable water, the principal of which, extending from Fort Frances to the western extremity of Lac Plat, is 158 miles in length. Dense forests cover the whole of this region, and the most valuable kinds of wood are seen in various places, and in considerable quantities. Elm is to be found on Rainy River, and white pine of a fair size and good quality abounds on the borders of the streams which rush down the steep declivity of the eastern slope to Lake Superior; but it is still more abundant on the western slope, on the waters which flow towards Rainy Lake. On the Saguinaga River, and on the Seine and Maligne, there are extensive forests of red and white pine. Occasional white pine appears, too, in the beautiful valley of Rainy River, and on the islands in the Lake of the Woods; but on proceeding westward they become more rare, and on nearing Lake Winnipeg disappear altogether. When the pine forests in the neighborhood of Rainy Lake are considered in connection with the fertile region to the westward of Red River, where there is but little wood fit for economic purposes, and regarded in reference to what may be the future wants of that extensive district, they assume an importance not to be overlooked in estimating the resources of this part of the country."

Three canoe routes from Lake Superior to Red River have already been surveyed and reported on to the Canadian Government; two of which were constantly used many years ago by the old North-West and the Hudson's Bay Fur Companies. One route follows the boundary line between British America and the United States, and is known as the "Pigeon River Route." The other is called the "Kaministiquia Route," and follows, in part, the river of that name. Another route by way of Dog Lake, Savanne Portage, Mille Lacs, and the river Seine to Rainy Lake, was selected by Mr. Simon Dawson as the best, and recommended by him in his able report to the Canadian Government.

Of these three routes the least objectionable in many respects is undoubtedly the one last mentioned; a long section of it is removed to a considerable distance from the international boundary, and with some modifications of Mr. Dawson's plan, it could be advantageously used in connexion with, and partly in advance of, a Great Territorial Road stretching through the country.

A Territorial Road Line from the city of Ottawa or some other point in Canada, where a convenient connection may be had with the existing Railway system, to Fort Garry, in the Red River Settlement, would (so far as our knowledge of the country enables us to judge) touch Lake Superior at Nipigon Bay, where, according to Bayfield, ample harbor accommodation is found, running westerly, and deflecting a little to the South of an air line, it would touch Dog Lake, and Savanne Portage, it would keep to the North of Lac des Mille Lacs, and strike the river Seine at Little Falls; thence it would skirt the waters of the Seine to a point northerly from the navigable waters of that river on Rainy Lake level, at the foot of the twelve portages; thence it would cross to Rat Portage, and continuing westerly towards Fort Garry, touch the northwesterly limits of Lac Plat. Thus following the general direction of the canoe route recommended by Mr. Dawson, and substituting sections of a Territorial Road where the navigation is much broken, we might secure a land and water communication of the following character:—

	Miles.	
	Land.	Water.
Nipigon Bay to Dog Lake, (Territorial Road).....	40	.....
Dog Lake and River, (Steamboat Navigation).....		35
Portage to Savanne River, (Territorial Road).....	5	.....
Savanne River and Lac des Mille Lacs to Little Falls, (Steamboat Navigation).....		65
Little Falls to Rainy Lake level, (Territorial Road 30 miles) }	60	.....
do do (Branch Road 30 miles.) }		
River Seine and Rainy Lake, (Steamboat Navigation).....		50
Portage at Fort Frances, (300 yards).....		.....
Rainy River and Lake of the Woods, (Steamboat Navigation).....		153
Lac Plat to Fort Garry, (Territorial Road).....	92	.....
Total.....	197	308

We could thus secure by the construction of 197 miles of road, and two dams, one at the outlet of Dog Lake, the other at Little Falls, to render the waters above them navigable for steamboats, a stage and steamboat connection from Lake Superior to Red River. This arrangement would possess the great advantage that it would avoid the broken navigation of the Seine from Little Falls to the twelve portages, a distance of about 60 miles, which can be only rendered navigable for small boats, by constructing a series of dams, measuring, in the aggregate, 130 feet in height, and involving an equal number of portages of a total length of nearly seven and a half miles. It would, at the same time, confine the expenditure chiefly to the line of a continuous Territorial Road, 167 miles of which would be available whenever it became necessary to open a wholly land route through the country, and then it would only be necessary to construct 258 additional miles in order to complete the road from Lake Superior to Red River. In the above proposition it may be observed that Mr. Dawson's recommendations are adopted in the main between Dog Lake and Lake Winnipeg, the only difference being the proposal of a road 60 miles in length to avoid the difficulties of the river Seine from Little Falls to the foot of the twelve portages, east of Dog Lake; instead of constructing a road to Fort William, it is proposed to make it to the equally good harbor on Nipigon Bay, in view of a direct land communication with Canada available at all seasons of the year. A Territorial Road constructed on the line proposed would not approach the United States boundary at any point nearer than 50 miles, an advantage which, in a military sense, must be considered of great importance, in view of a permanent Railway communication being made on the same line at some future period.

The following modification of the above plan would, at a comparatively small additional expense, very greatly simplify the character of the communication to Red River. Instead of using the navigation of Dog Lake and River by constructing a dam at the outlet, the road from Nipigon Bay to Dog Lake might be continued to Savanne River. The only obstruction to the free navigation of Rainy Lake and Lake of the Woods might be removed by the construction of a brace of wooden locks at Fort Frances. By this arrangement the communication from Lake Superior to Red River would, by the opening of three separate pieces of the Great Territorial Road, the construction of one set of locks, and a single dam, be reduced to the following :—

	Miles.	
	Land.	Water.
Nipigon Bay to Savanne Portage, (Territorial Road).....	80	.....
Savanne River, Mille Lacs to Little Falls, (Steamboat Navigation).....		65
Little Falls to Rainy Lake level, at 12 Portages, (Territorial Road, 30 m.) }	60	.....
Do do (Branch Road, 30 m.) }		
River Seine, Rainy Lake, and Lake of the Woods to Lac Plat, (Steamboat Navigation.).....		208
Lac Plat to Red River, (Territorial Road).....	92	.....
Total.....	232	273

A communication as above proposed would give two long steamboat reaches of 65 and 208 miles respectively, with an intermediate link of road 60 miles in length. There would also be two terminal sections of road; one 80 miles long, adjoining Lake Superior; the other 92 miles long, adjoining Red River. The establishment necessary to carry on traffic by this plan would be limited to two or more small steamboats, and a sufficient number of horses and waggons on each of the three sections of road above given. The cost of construction would be confined chiefly to the line of the permanent land route, and there would only remain to be built 53 miles from Savanne Portage to Little Falls, and 170 miles from river Seine to Lac Plat, or a total distance of 223 miles, in order to complete a Territorial Road from Nipigon Harbor, on Lake Superior, to Fort Garry, on the Red River.

Such are some of the plans by which a communication may be opened between the lake region of Canada and the inland settlements at Red River. They are designed to meet a present want, at a moderate expenditure, without losing sight of the ultimate establishment of a great line of Road from Canada to British Columbia. The opening of an easy communication from Red River to Lake Superior has been more particularly referred to for the reason that it is viewed as a necessary work which cannot, without prejudice to the best interests of this section of the Colonial Empire, be much longer postponed.

As American enterprise has already opened up a line of transport to the Red River settlement, it may be well now to enquire how far the route proposed to be opened up through British territory may be able to compete with its American rival.

Taking, in both cases, Toronto as the starting point, and Fort Garry the point of destination, we have the following distances, observing that the lengths of Railways are obtained from the several companies' published statements, and the other distances when not to be had from better authority, are measured on the map, and allowances made for windings of rivers, and other intricacies of navigation. The figures are, therefore, in some cases, only approximate, although sufficiently near for the present purpose. Table No. 1 gives the distances by the most direct and continuous railway route from Toronto by way of Chicago to La Crosse, on the Mississippi, the extreme north-westerly limit of the American railway system, thence by steamer to St. Paul, by stage to Georgetown, and by steamer on the Red River to Fort Garry.

TABLE No. 1.—Toronto to Fort Garry by Chicago.

	Miles.			
	Rail.	Water.	Stage.	Total.
Toronto to Chicago.....	514	.....	.....	514
Chicago to Prairie La Crosse.....	296	.....	.....	296
Prairie La Crosse to St. Paul.....	.....	208	.....	208
St. Paul to Georgetown.....	.....	.....	290	290
Georgetown to Fort Garry.....	.....	480	.....	480
Totals	810	688	290	1788

Table No. 2 presents the distance by the route from Toronto, by Collingwood, to Nipigon Harbour, Lake Superior; thence by the stage and steamboat communication proposed to be opened up to Fort Garry, in the Red River Settlement:—

TABLE No. 2.—Toronto to Fort Garry by Lake Superior.

	Miles.			
	Rail.	Water.	Stage.	Total.
Toronto to Collingwood.....	95	.....	.....	95
Collingwood to Nipigon Harbour.....	.....	450	.....	450
Nipigon to Savanne Portage.....	.....	.....	80	80
Savanne Portage to Little Falls.....	.....	65	.....	65
Little Falls to 12 Portages.....	.....	.....	60	60
12 Portages to Lac Plat.....	.....	208	.....	208
Lac Plat to Fort Garry.....	.....	.....	92	92
Totals	95	723	232	1050

Comparison between the Chicago and Lake Superior routes :—

	Total Distance—Miles.			
	Rail.	Water.	Stage.	Total.
Toronto to Fort Garry by Detroit, Chicago, La Crosse and St. Paul.....	810	688	290	1788
Toronto to Fort Garry by Collingwood, Nipigon Harbour, Savanne Portage, Rainy Lake, and Lake of the Woods.....	95	723	232	1050
Difference.....	715	35	58	738

The last table gives the total distances, by railway, steamboat and stage, on each route. By this it appears that although the route by Chicago and St. Paul has 35 miles less steamboat communication, it has at the same time 715 miles more railway, and 58 miles more stage road than the route by Lake Superior. Tables Nos. 1 and 2 will also show that St. Paul is 63 miles farther from Toronto by Chicago, than Fort Garry is from Collingwood, by the route proposed to be opened up.

We may extend the comparison to another American route, which although giving about 100 miles greater steamboat distance than the Chicago route, has nearly 200 miles less railway to be passed over. The route referred to passes over the Railway from Detroit to Grand Haven, thence across Lake Michigan to Milwaukee, thence to La Crosse, St. Paul, Georgetown, and Fort Garry. Although this is without exception the shortest, if not the speediest existing route, the following will clearly show that the one proposed to be opened up through British territory, will compare most favourably with it. As it seems unnecessary to repeat the intermediate distances, the total length of each mode of conveyance on each route is only given :—

	Miles.			
	Rail.	Water.	Stage.	Total
From Toronto by Detroit, Grand Haven, Milwaukee, La Crosse, St. Paul, and Georgetown, to Fort Garry.....	618	788	290	1696
From Toronto to Nipigon Harbour, and by proposed Territorial Road and Steamboat communication to Fort Garry.....	95	723	232	1050
In favor of proposed route.....	523	65	58	646

It may be noted that although the Railway by Chicago is generally considered the most direct route to any point beyond St. Paul's, the route by Grand Haven and Milwaukee is much the shortest line open for travel ; the whole distance to Red River by this route being 1696 miles, against 1788 miles by way of Chicago. Notwithstanding the circumstance that the Grand Haven and Milwaukee route is nearly 100 miles shorter than the route commonly used, and is in fact the shortest American route capable of being used, the above comparison between it and the one proposed over British territory, shows that the latter has the advantage in every particular. The steamboat distance is 65 miles shorter ; the total length of stage road is 58 miles shorter ; the length of railway to be passed over is 523 miles less ; and the total distance is 646 miles shorter by the British route than by the other. To obtain these very palpable advantages it is only necessary to construct in all 232 miles of common stage road, build one dam and one set of small wooden locks. By executing these works, we substitute a communication of about 1050 miles in length through British territory, for one about 1696 miles long, and chiefly through a foreign land.

The British route has one additional feature, which in view of securing at an early day a paying traffic for a railway west from Lake Superior may be of considerable importance. By this route the distance to the northerly portions of Minnesota and Dacotah is

shorter than by any other. It does not therefore appear too absurd to anticipate that part of the future traffic of these States may feed a well opened line of communication on the route proposed.

A TELEGRAPH AND ROAD FROM CANADA TO BRITISH COLUMBIA.

With regard to the establishment of an Electric Telegraph and Post Road, from Canada through the Red River district to British Columbia, a few words may be added. Assuming that the reasoning of the writer in another place in favour of developing the resources of new districts, by the adoption of a comprehensive road system, is correct; it seems quite certain that the application of the principles laid down for opening up, by means of territorial roads, the leading highways of a new country, if applied to the development of the vacant districts in the interior of British North America, would result in most important advantages. A territorial road is understood to be the precursor of a railway; its establishment is recommended in every case where prospective traffic may possibly render steam power, as a means of conveyance, profitable or necessary; and this is considered essentially one of these cases. If the building of a railway be at the present time inexpedient, who will venture to say, in view of the forty millions of fertile acres stretching in a wide band across the central plains to the rich auriferous valleys of the Rocky Mountains, and in view of the sudden impulse which the gold discoveries must give to properly directed emigration and colonization, that a railway will not follow in the path of a simple road across the continent before another generation has passed away? The late prosperous Republic was until lately fed by a living stream of population from the densely inhabited countries of the old world. That stream is, however, interrupted by the unfortunate difficulties of our neighbours. May not this stream, by opening a proper inlet, be diverted into a new channel, and may not the whole of British America benefit thereby? If a portion of the immigration, which has hitherto swelled the ranks of the American Republic, could be led to our own prairies by a route which would make them as near and as accessible as those on the Mississippi, a Post Road and a Telegraph through the country would meet with abundant employment; a demand would soon be created for an improved means of communication, and, on some sections, railway service would speedily be called into requisition.

By opening up a territorial road and erecting a line of telegraph across the country, steam and electricity, the great civilizers of the present century, would obtain a foothold on the wide, dreary, and as yet uncultivated wastes in the far interior; and although it might be said that the seeds only of the former would be sown, the latter would bear immediate fruit; time and labor would develop the former, while the latter would stimulate these agencies in their work. For many reasons it is thought that an electric telegraph ought to be erected along the precise line of the intended railway, at the earliest possible moment; in addition to its value in a military and commercial aspect, as an instantaneous means of communication between the two oceans, it would aid greatly in the work of colonization; it would enable points, isolated in other respects, to express their wants and wishes,—settlements springing into existence a hundred or a thousand miles distant, would always be aware of each other's progress, and be made acquainted with important events as they transpire; and thus the pioneer, although for a time remote from civilization and its accessories, would at least feel less secluded by being within instantaneous hearing of them.

It is part of the plan proposed that the territorial road should be constructed and improved from a rude beginning through gradual stages, in harmony with the progress of the country, to the highest degree of perfection required by traffic. It is thought that both the development of the road and the settlement of the country would in this way be much enhanced,—road work and settlement keeping pace with each other to the mutual benefit of both; and in this connection it appears possible to adopt a system for disposing of the vacant lands, more inviting to settlers when properly understood, and certainly more advantageous to the country at large, than "The Free Homestead Law" of our neighbors. While any person over a certain age, by that law, may secure in the United States an unoccupied lot of land in the remote west, on payment of fees amounting in all to about \$15, and on cultivating the land for a period of five years,—there is no provision whatever made for making the land accessible; the settlers must find their way in and out

as best they can: the question and cost of opening roads and bridging streams is left entirely with the pioneer cultivators, and in consequence, necessarily becomes a great drawback to general progress, as is always the case when the opening of roads is left to individual fancy and exertion. It is believed that a better plan would be to give any one a farm lot, who, in return, would expend a certain number of days' labor under authorized direction on the leading thoroughfares. Suppose, for example, the lands were laid out in lots of one hundred acres each, and that to secure a patent it were required of each occupant to give ten days' labor in each year for a period of ten years. Labor is the capital of an industrious, poor man; he has this to invest and nothing else; with it, however, he would thus be enabled, not simply to secure a homestead, but one made valuable by good roads.

A concentration of labor in this way, year by year, on a "Territorial Road Line" previously established, would in course of time prepare it for a railway track, while the occupation and cultivation of the land would prepare the country for railway service. This, it is true, would be a slow process, but one, nevertheless, which could not fail to prove certain in its results; as the planting of an acorn in due time produces a gigantic oak, so in the manner indicated the expenditure of a small capital in the first place, with a systematic direction of industry afterwards, would cause a great national highway to be developed by a natural and unfailing process.

Were such a scheme as that proposed once adopted, and a comparatively small sum expended on the construction of a simple, even a rude, waggon road, and on the erection of an electric telegraph on the best railway line within British territory, there would be no fear, it is confidently believed, of the final result. The rude waggon road would be the embryo of a great arterial steam communication from ocean to ocean; it would mark out the back bone of a country covering no less than sixty degrees of longitude, and which, in the providence of events, may become an important power on this continent,—whilst the telegraph would at once resemble the spinal cord of a national nervous system which must yet ramify in many directions throughout this great division of the Colonial Empire.

In concluding these remarks the writer has only to express his confident hope and belief that the time is at hand when measures will be taken to release the people of Red River from their present isolated and unsatisfactory condition,—that they will no longer be left as castaways and allowed to drift imperceptibly, yet inevitably, from their own political horizon. The nation to which they cling and appeal for aid is too mindful of its subjects not to help them out of actual danger; there are already signs of succor for these hardy pioneers; recent conferences between high Imperial and Provincial authorities betoken favorable results. The reference to "the North-west" in the speech of His Excellency the Governor General of Canada, at the opening of the present Session of the Legislature foreshadows coming measures,—the immediate future seems pregnant with good,—may this be the dawning of bright days for that nucleus of a vast population which, it requires little foresight to perceive, must yet be spread out on the plains of Central British North America.

APPENDIX.

R E M A R K S

ON A PROPOSED

TERRITORIAL ROAD SYSTEM,

IN CONNECTION WITH THE COLONIZATION AND SETTLEMENT OF

CENTRAL BRITISH NORTH AMERICA.

By SANDFORD FLEMING, Civil Engineer.

A period of about 18 years' professional experience in this Colony, spent chiefly in the location and construction of Roads and Railways, has afforded the writer opportunities of observation and reflection on the important subject of opening up ways of inter-communication. He has been led thereby to consider the origin and progress of the different existing lines of transport throughout the Province, with the view of devising some comprehensive Road system adaptable to the opening up of new territories without involving heavy expenditure, and at the same time providing for the most rapid development of the necessary lines of traffic which may eventually be called for by the progress of the country.

It is not presumed that a plan has been formed in every respect faultless, but it is hoped that by directing special attention to the subject, a scheme may be matured which whilst avoiding the difficulties which have arisen through the absence of a pre-arranged system heretofore, may have the effect of extending to yet unsettled districts, the advantages of the most perfect means of communication at the earliest possible moment, at the least possible outlay, and thus result in great public good.

It may be remarked that although this article is prepared with especial reference to the colonization of the unoccupied habitable districts of British North America, the importance of the question is not confined to that country,—a comprehensive Road system such as that in view would be adaptable to other divisions of the Colonial Empire. In Australia and Africa, vast fields in the interior yet remain to be opened up; also in India, where the means of communication are so imperfect that the full benefit of the industry of that country is neither realized by its inhabitants nor by the Empire at large. Thus showing that however feeble its advocate may be, and however imperfect the scheme submitted may appear, the question at least, is of sufficient importance to occupy a share of the attention of Public men.

About eight years ago the writer first publicly directed attention to the discordant and unsatisfactory character of the system hitherto practised in establishing lines of inland commercial intercourse, and he then suggested the leading features of the Territorial Road Scheme, pointing out some of the advantages thereof.* Last year he prepared for

* Prospectus of a scheme for extending the Northern Railway from Collingwood to Owen Sound. April 4th 1855.

publication an article on the subject embracing such observations as then appeared necessary to elucidate the necessity of a change, as well as the character of the change proposed, but as only a few copies of that article were issued, and as it goes over the whole field of enquiry in a concise form, he may be pardoned for reproducing it in the sequel.

Although the writer has long been convinced of the policy of reducing the location and construction of roads in a new country to some well arranged system, he can now with confidence recommend the principles laid down, supported as they now are by the testimony of many of the highest professional and other authorities in the Province. The letters which follow and which have been kindly favored by some of our leading railway Managers and Engineers adduce most valuable data in support of the Road system proposed.

Letter from Frederick Cumberland, Esq., Managing Director, Northern Railway of Canada.

NORTHERN RAILWAY OF CANADA,
TORONTO, 2nd December, 1862.

MY DEAR SIR,—I have read with some care your article suggestive of a new system for laying out Colonization and Settlement roads.

Nothing certainly could be more absurd than the old system of road allowances and concession lines so far at least as they were intended to supply leading highways or arteries of Districts; for under it those highways were arbitrarily located and established upon a mere geometrical basis, without reference to the economical principles which should govern in such cases.

As far as I know, you are the first to direct attention to this anomaly, and to suggest practical corrective to it.

There can be no possible doubt that the rapid development of a settlement and the interests of the settlers are greatly dependent on facilities of outlet,—that such facilities are greatly diminished and postponed by blind adherence to a geometrical location,—that such a location must oftentimes be subsequently abandoned by reason of its unfitness and in favor of new and more suitable lines—and that the result in such cases is primary damage to the settlement and ultimate heavy and unnecessary charges upon it.

All this it seems to me, your proposed system would correct, whilst it would secure the great additional advantage of so locating the leading lines as to constitute them the pioneers of Railways and thus give a double value to all outlay from the outset.

I note your reference to Mr. Roy's report relative to the location of Yonge Street, which certainly illustrates in a very marked manner the original error to which I am referring, as well as the extravagant cost at which it has been (only partially) corrected. Evidently a chance location, it has been projected 42 miles northward with rigid geometrical accuracy, and without any regard to its own natural difficulties, or to the tempting facilities its immediate neighborhood would have afforded. Had this great north road been established under your proposed system, it would have been carried to the westward of its present line (most probably in the very location now occupied by the Northern Railway,) with easier grades, less bridging, through better lands, and at far less cost—to the manifest advantage of the earliest settlers, and to the relief of their successors from the burthen of improvements which notwithstanding their great cost and extent have still left it what it must always be, an inefficient highway. Had this been done, too, the lateral roads, based upon the best locations, would now have been feeders to the Railway, but as it is they are of little or no value.

With the detailed reasoning of your article I generally concur, and it seems to me that the practical value of your suggestions is so palpable that could they attract the attention of the government authorities charged with the opening of new Territory, we should very soon see them applied.

I am my dear sir, sincerely yours,
FRED. CUMBERLAND.

S. FLEMING, Esq., C. E.,

Letter from Geo. Lowe Reid, Esq., Chief Engineer to the Great Western Railway of Canada.

GREAT WESTERN RAILWAY, ENGINEER'S DEPARTMENT,
HAMILTON, 17th December, 1862.

SANDFORD FLEMING, ESQ., C. E.,
Toronto.

MY DEAR SIR,—I duly received your letter of the 1st instant, and the accompanying pamphlet, containing your paper entitled, "Practical observations on the construction of a continuous line of railway from Canada to the Pacific Ocean," &c.

At your request I hasten to give you briefly my views on the general merits of your scheme.

In the opening chapters of your paper, you pass in review the numerous advantages which would result from the opening up of a permanently reliable line of communication between Canada and our Pacific possessions. You admit that at the present day such a road or railway would be commercially unproductive, but you adduce very strong arguments to prove that the element of *time* alone is required to bring the work to maturity as a self-sustaining highway.

Your scheme of construction and gradual development is founded upon the analogy of our existing Canadian roads, in respect of which you point out that we have, *first*, our road allowances as blocked out on the original surveys, and subsequently graded in a rough manner, when settlements are formed around them; and *secondly* come our plank gravel or macadamized roads in the more thickly populated districts when the necessity for improved means of inter-communication arises; which again are followed, *thirdly*, by railways, when the wealth and commercial requirements of the country demand a still more perfect mode of transit than any system of mere *roadway* has yet been able to supply.

In connection with this subject of roads as laid out on our own township surveys, you show very forcibly that the original rectangular lines of road allowances are, as a general rule, inapplicable for the more important classes of plank and gravel roads, and that the routes selected for our Provincial railways have been again distinct from either, thus entailing the loss of much of the labour and expense expended on these roads whose future progress is so seriously checked by the railway system.

To obviate these constantly recurring evils, your plan is to keep the subordinate roads of the townships along your main highway, entirely subsidiary to the future line of railway, which is designed eventually to traverse that district, and that, although this trunk line will only be a mere rough earth-road for several years, its future development into a completely appointed railway is never to be lost sight of, and that consequently its route must be well and carefully selected, and its location governed by every consideration, as well of engineering requirements, as of future commercial advantages.

I have no hesitation in saying that your scheme and general views on this subject appear to me to be deserving of a large share of consideration on the part of our Government, when they come to decide upon the means to be adopted for opening up our great western possessions, or when the period arrives for throwing open new blocks of townships for future immigrants.

Regarding your scheme—as a whole—for the gradual development of roads into railways, and for the subordination of all mere township or county roads to some well-matured main artery of communication, I repeat that it must commend itself to all those who have had much experience either in actually opening up new settlements, or in laying out lines of new roads or railways, or in superintending those public departments whose office it is to control the expenditures upon these works, or to govern their location on commercial or military grounds.

My own eleven years' experience as a Civil Engineer in this Province, (which I believe is shorter than your own) during which time I have had charge of the construction of about 360 miles of railway, has revealed to me many of the defects inherent in the present system of surveying township blocks which, although probably unavoidable in the first settlement of a new colony, need not by any means be unceasingly repeated in

the survey of new territories which at irregular intervals of time are being added to the older districts.

I am, my dear Sir,
Yours very truly,
GEO. LOWE REID.

Letter from J. Lewis Grant, Esq., (late) Superintendent Northern Railway of Canada.

TORONTO, 30th December, 1862.

SANDFORD FLEMING, Esq., C. E.,
Chief Engineer, Northern Railway of Canada,

SIR,—Your letter, accompanied by a pamphlet containing practical observations on the construction of a continuous line of railway from Canada to the Pacific Ocean, &c., is received.

In reply I beg to state that I have given the subject such consideration as my limited time will allow, and although the scheme is one of great magnitude, and the ideas therein contained new, and somewhat novel in their character, still I consider the general plan well conceived, and could it be adopted in detail, I have reason to believe, would greatly expedite the opening up and settlement of a new country, and rapidly augment both its population and wealth. Your views upon a general plan for the early introduction of the telegraph line, surveying and laying out of lands, roads and railways, although presenting new features, I considered to be formed upon sound principles, and are well worthy of the careful consideration of those holding the future destinies of a territory so rich in natural advantages as that of the great North-west. Your suggestions relative to railway construction, operation and maintenance, wherein are mentioned advantages too often ignored or lost sight of, namely, alignment, least possible gradients to overcome, and most direct routes between the sources of trade, could all be adopted and made available, and would be of incalculable and lasting benefit to the undertaking.

The policy of reserving belts of timber for shelter from storms is one which I quite approve of. My experience upon railways in the United States and Canada has convinced me that in winter when severe snow-storms have prevailed, through wooded portions of the line, comparatively little difficulty has been felt, owing to the snows falling evenly and lightly upon the ground, and hence easily removed by the usual appliances prepared for that purpose, while along the open country huge drifts accumulate, often so compact as to be even shovelled with great difficulty. This reservation, although attaching to the railways a large area of land, would contribute in this manner greatly to its success; both in sheltering it during winter and by affording constant supplies of material for its repairs, and fuel at the least possible cost. The most prominent objections to this plan would be the monotonous character of the line to travellers, and the hiding or shutting out (as it were) the view of the railway from the inhabitants.

Your experience during the construction and working of the Northern line for the past ten years must have impressed you with the value of a reduction of public and private road crossings to the least possible number. Your plan for this service is a capital one, and must commend itself to every practical mind. It is but true to say that your observations cover a vast field for operations, and that you or myself can scarcely hope to see the benefits arising from so grand a scheme in our day. I fully believe, however, that could it be carried into practical effect, a lasting benefit would accrue to those who will come after us, and who would, no doubt, award just praise to its originator.

I have the honor to be, Sir,
Yours respectfully,
J. LEWIS GRANT,
Superintendent, Northern Railway.

Letter from Alfred Brunel, Esq., Civil Engineer.

TORONTO, January 17th, 1863.

MY DEAR SIR,—I have read with great satisfaction your pamphlet on the subject of opening up new districts by the location of Territorial Roads with a view to future railway service.

Your scheme has my hearty approval, and, speaking after an experience of nearly a quarter of a century in this Province, I have no hesitation in saying that had your suggestions been made and acted upon in the early survey of our lands, the country would have been immensely benefitted thereby.

We have only to notice the location of our existing lines of communication of all classes to be convinced of the expediency of adopting some comprehensive road system in the opening up of new lands. In the recent establishment of our railways it was necessary, in most cases, to carry them at a distance from towns and villages in search of a practicable alignment, or to approach such points at great cost. Had our old lines of communication been laid out on the principles now for the first time suggested by you, our railways would have passed immediately through established centres of business, could have been constructed at a cost commensurate with our means, and would now be paying a fair dividend to the stockholders.

From another point of view I look upon your suggestions as most valuable. By adopting them in the colonization and settlement of our new territories, we should certainly promote the more easy and perfect drainage of the lands as they are brought under cultivation; and no one who has seen how much *agriculture*—our all important interest—now suffers from imperfect drainage, can for a moment doubt the great importance of the facilities which your system would afford.

I am quite satisfied that the proposal to leave a belt of woodland on either side of the road would in practice produce the result you indicate, and prevent heavy snow-drifts; and although this will require a wide location, no exception can be taken on that score when the road passes through unceded lands.

Your details for avoiding frequent road crossings are admirable, and well calculated to obviate the annoyance and danger to which our railways are now in no small degree exposed.

I am convinced that yours is the only plan on which we can extend our railway and telegraph line into our unsettled territories, and thereby establish connections with our sister Provinces, without incurring an enormous debt. It carries with it the germ of settlement and commerce, and therefore of a success independent of those delusive traffic estimates that have led so many to ruin. *It aims at no more than the economical development of the country.*

You may meet with objections from those who are wedded to established routine, but I am sure that no impartial man can deny the superiority of the Territorial road system which you propose.

On the whole, I am fully persuaded that by adopting your suggestions in opening up communications through the vacant districts of British North America, the Government would promote the settlement of the country in the most desirable and practical manner. Settlements would be induced along the line, which, while increasing the resources of the country, are necessary for the preservation of the telegraph lines which it is a part of your plan at once to construct on the great leading highway. And the railway, when the progress of the country warrants its adoption, will not only find a causeway ready to receive it, but a population and local traffic, without which it could not be successfully worked.

We may thus secure the basis of a commercial highway from the Atlantic to the Pacific, through British territory, not only the most complete, but the most surely within our reach.

I remain, my dear Sir,

Yours most sincerely,

A. BRUNEL,
Civil Engineer, &c.

SANDFORD FLEMING, Esq.,
Civil Engineer, &c.,
Toronto.

The above testimony from gentlemen well and favorably known throughout the Province, must be accepted as specially valuable; and although it seems scarcely necessary to adduce any further evidence at the present time in support of the proposed Territorial Road System, it may in elucidation of the necessity of some future guiding policy, be well to cite one or two prominent examples of unavailing expenditure, as well as absolute loss to the Province, from want of pre-arrangement and system in the establishment of our existing lines of inter-communication; and it may also be satisfactory to refer to the objections which have been brought against the adoption of the system proposed.

Before the introduction of railways in the Province, commercial intercourse was carried on, in those sections remote from navigable waters, by means of improved common roads, constructed at considerable cost, either by the Government or by private enterprise. On reference to the public accounts, it is found that the Province expended, prior to 1850, on the roads which run side by side with the Great Western Railway and its branches, about \$1,215,000. These roads are now almost entirely unproductive, and except for short local travel they have fallen into disuse. It is clear, therefore, that had the Great Western Railway been foreseen, the above expenditure might either have been avoided or economized. Again, through the same section of country (although this is rather delicate ground to touch), the various railway arrangements do not appear to have been wisely ordered. In a district measuring about 230 miles in length, we find three leading lines running in a direction generally parallel, and at an average distance apart of little less than 15 miles. These several railway lines, viz., the Great Western, the Buffalo and Lake Huron, and the Grand Trunk, with their branches, measure a total length of 812 miles; and there can be no doubt that the whole traffic of this total mileage could easily have been accommodated by half that length of railway properly located. Had the system now recommended been in force when this part of Canada was first settled, and had a Territorial line been laid down in the leading direction of traffic, and had this line, with one or two main branches, been opened up and improved by the expenditure of the \$1,215,000 laid out by the Government on the roads referred to, which are now rendered useless as Provincial works by the subsequent introduction of railways,—the Territorial lines would have at once constituted an important means of communication, and by additional expenditure of capital would have formed a main trunk line of railway, with lateral offshoots, capable of serving the purposes of transport, equally as well as the several independent existing lines. Whilst the lesser length of railway could have been operated and maintained in efficient order at a greatly diminished cost, and thus resulting in a corresponding reduction in the cost of transport, the total outlay on construction would have been very much diminished. The capital expended on the 812 miles of railway exceeds \$44,000,000. It would be a very high estimate to allow one half of that amount for the cost of the other arrangement under any circumstances; thus showing that a saving might have been effected in this section of Canada of many millions of dollars, had the lines of communication been in some measure pre-considered and pre-determined.

There is no difficulty in pointing out cases similar, in many respects, to the one above given, and illustrative of the extreme importance of establishing, upon correct principles, the lines of future traffic in districts yet to be opened up. Through every section of Canada, and, perhaps, in every country, examples are not uncommon; but to confine our attention to familiar cases, the various ways of communication which have been opened up to the country back of Cobourg and Port Hope, may be cited. The country referred to, now designated the counties of Peterborough and Victoria was, until recently, termed the Colborne District, and before 1841 it formed the rear section of the Newcastle District. In the Public Accounts, a sum exceeding \$520,000 is charged against the Newcastle District for improving its inland waters, constructing a gravel road to Rice Lake, and erecting bridges. Since that expenditure was incurred, a gravel road has been completed from Port Hope to Peterboro', and a plank and gravel road from Cobourg toward the same point. Then came the Railway era, and with it the two rival railways from Port Hope and Cobourg, respectively. These various works have cost, from first to last, a gross sum of over \$3,000,000. They were all undertaken with the same main object in view, viz: to open up the interior of the District, and accommodate its increasing traffic. Now what is their condition at the present time? The inland navigation is virtually abandoned, the substantial locks between Rice Lake and Peterboro' have not been opened since the railways went first into operation,

some six or seven years since. The gravel roads, although of an excellent character, are scarcely used, certainly not as leading lines of transport from the inland counties. The Cobourg railway originally imperfectly built, is in such a condition as to be incapable of doing business, has not been worked since 1861, and may not again be put in operation; in fact, the only communication really in use for the main purpose intended, is the single line of railway running northerly from Port Hope to the towns of Peterboro' and Lindsay, and the capital expended on all the other works may now be considered almost entirely unproductive.

Had, in this case as well as in others, a foreknowledge of the ultimate introduction of railways obtained, much unnecessary outlay might have been saved, and interference with established centres of business been spared. Had the opening up of the inland townships of the old Newcastle District been commenced by providing from the first for one main line of railway on the best engineering location from Lake Ontario into the interior, Cobourg and Port Hope would, in all probability, have long since merged into one important town, or perhaps they never would have had a separate existence. At least two-thirds of the capital actually sunk might have been saved, or it might have been employed in extending the railway line through the great hardwood tract lying northerly from Peterboro', and in this service it would have been sufficient to open up an important line, half-way to Lake Superior; whereas the existing railway only reaches some 30 miles inland, and it is virtually all that now represents the outlay of an enormous capital, the interest on which is nearly equal to \$200,000 per annum.

These statements may serve to show the expediency of adopting some system such as that advocated. They are made, not for the purpose of exposing to view mistakes which, probably, with the best intentions, have been committed in connection with important undertakings, but rather that similar errors may, as far as possible, be avoided hereafter. To neglect the lessons which the history of these past undertakings teaches, would be to entail on the future population of yet vacant districts, burdens and disappointments which they need not be called upon to carry.

In the first of the foregoing letters, the lines of communication running northerly from Toronto are referred to, and a few words may here be added. Yonge street, a road 40 miles in length, was, before the introduction of the Northern Railway, the great thoroughfare from Toronto to the northern townships, and to Lake Huron. It was, originally, a random exploration line, run as straight as could readily be done by the Surveyor's compass, in a right-angled direction from Lake Ontario. This line was carried directly over hills, ravines or other hindrances, without reference to the gradients of any possible road, or the cost of constructing one. It, however, came to be used as a "trail" through the forest, and subsequently, as the settlements advanced, as a common earth-road. It was afterwards graded at a heavy cost by the Government, and converted into a macadamized road. At the time the latter works were undertaken, Mr. Roy, civil engineer, pointed out in a report that the true line for a great north road was not on the adopted position of Yonge street; but that the immediate neighborhood afforded a location for a good road, which, while avoiding the natural difficulties of the other line, would allow the improvements to be made at a comparatively small expense. Mr. Roy's recommendations were, however, unheeded; the difficulties on Yonge street were encountered, and at a great cost partially removed, but the heavy gradients spoken of by that gentleman, as unavoidable on the wrong location, will always remain. When the Northern Railway became to be established, it was an object to approach the numerous towns and villages which had sprung up along the line of Yonge street, not only to accommodate their inhabitants, but increase its revenue. It was, however, impossible to attain this object, except in one or two cases, and then at great cost. For 25 miles out of Toronto, the railway keeps at an average distance of about four miles from the half-dozen villages on Yonge street, and singular enough as Mr. Cumberland points out, it occupies almost the identical location which Mr. Roy suggested for the macadamized road. About 30 miles north of Toronto, the physical features of the country allow the railway to be drawn towards Yonge street, but at a cost in increased mileage which, perhaps, more than neutralizes other advantages. Had the original leading road from Toronto northerly to Lake Huron, been located on the principle of a Territorial line, the towns and villages, which we find on Yonge street, would have sprung up along its supposed route, and they would now of course all be conveniently situated to the railway; whilst the latter, instead of being lengthened out to 95 miles, in order to serve local interests, might have

been situated in the most advantageous position, with a total length of 75 miles. In this case also it is apparent that a very great saving would have been effected in the original expenditure, besides which the cost of maintaining and operating twenty additional miles of railway for all time to come, would have been obviated.

One reason why the establishment of our ways of communication have been accompanied by so many, and as it now appears, palpable blunders, is because the Railway System in this and other countries has been an "after-thought." In the British Islands up to a recent period, the great roads of *Telford* and *McAdam* ramifying throughout the whole country, were considered complete as a system of communication. The introduction of railways could not fail to clash with established interests, and by reason of the superior excellencies of the intruding system, to render works previously established at great cost of secondary importance and in some instances of little or no actual value. In this Province the same intrusion of a new system of communication has been carried out, although to a more limited extent than in the mother country, and in some degree the losses and misarrangements referred to may be attributed to this cause; but the advantages of the Railway System as the most perfect means of transport and speedy communication are now so fully known and appreciated, that it cannot wisely be ignored in the future. If it has hitherto been an "after-thought" it need no longer be one; the most perfect means of intercourse ought to be the first consideration in any measures that may hereafter be taken to open up a new country.

Railways are not only the most perfect of roads, but they are also the most costly, and although they have unfortunately in too many instances proved *too costly*, this cannot detract from the inherent merits of a means of communication the most perfect yet successfully attempted. In order to diffuse the benefits of railway service as widely as possible, by extending these works to new fields, it will be necessary to consider every means which may possibly effect a diminution in their cost. In this connexion the economy of first laying down a Territorial Road and converting it *not too speedily* into a Railway may be noted, as there are some features connected with this system of gradual construction which have an important bearing, not only on the establishment generally of lines of steam communication through new districts, but particularly on the project of connecting Canada with the Atlantic Provinces by an Intercolonial Railway. Suppose, by way of illustrating in a few words the point now referred to, that a line of railway 1,000 miles in length is to be constructed through an unsettled or only partially settled country; it is not viewed as an investment for capital, but purely as a National undertaking, and its cost has to be paid out of the Public Treasury. Two plans, Nos. 1 and 2, are presented. By plan No. 1, a capital of \$50,000,000 has to be raised by a loan say at 6 per cent., and the work carried out in an expeditious manner in the usual way. Plan No. 2 is the one herein recommended, and to simplify the comparison it is pre-determined to expend annually a sum exactly equal to the interest on \$50,000,000, or say \$3,000,000. In either case it is evident that the amount last mentioned has annually to be raised, and let us say by direct taxation. In carrying into execution plan No. 1, the rapid outlay of so much capital would, without doubt, have a wonderful effect in stimulating industry, enterprise, and speculation; there would undoubtedly for a time be an appearance of great and unusual prosperity; prices of labour and material would in consequence be inflated beyond their average value, and in a corresponding proportion the cost of the undertaking would be enhanced.

The effect of plan No. 2 would be somewhat different; the work in this case would be proceeded with systematically and gradually, year by year. *It would give steady and desirable employment to those who might be induced to take up their abode permanently along the route*, affording them an opportunity to earn the means of subsistence until they could sustain themselves by farming operations. The tendency to raise prices above a fair average would not be nearly so great as in the case of plan No. 1, while the growing commerce of the country could not fail to be benefitted by a circulation of capital, expended gradually year by year. Moreover, a suspension of the outlay on the completion of the works would be less felt, as the reaction would be comparatively small, and consequently the financial condition of the country could not be disturbed to such an injurious degree. It would be rather difficult to estimate the difference between prices of work in the two cases, but without doubt it would be very material. To allow from 25 to 33 per cent. in favor of plan No. 2 could not, it is thought, be very far astray; and with this difference it is clear that the

whole cost of the undertaking would be about \$36,000,000 against \$50,000,000 if executed under plan No. 1; and hence, with an expenditure of \$3,000,000 a year, the work would be completed in 12 years. It is only necessary now to draw a comparison of results after the lapse of that period. In either case the sum of \$3,000,000 would have been raised by taxation and paid away by the country, and assuming that the traffic receipts of the undertaking would then be sufficient to meet operating expenses, whichever plan had been adopted, No. 2 would leave it free from debt and the country relieved from farther taxation, while under plan No. 1 the borrowed capital of \$50,000,000 would still remain unpaid. Were the receipts insufficient to pay working expenses, the comparison would be even more unfavorable as against No. 1 plan, inasmuch as arrears of operating losses would have accumulated since the first opening of the line, thus greatly increasing the burdens on the country,—while with the other plan the charge for operating losses would only begin when taxation for construction ceased, and even this might be postponed, if thought expedient, by delaying the final completion of the undertaking until it was clear that the traffic of the country had become sufficient to render the work perfectly self-sustaining.

The hypothetical case above presented illustrates very plainly some of the advantages claimed for a gradual system of road development; and it will readily be observed that had it been possible to have adopted some such system in the establishment of our Railways in Canada, they might almost by this time have been entirely completed on the simple interest of their actual cost, and thus have left them free from debt and in a position to perform their functions in a more satisfactory manner than they can now be expected to do. Of course a change of system is not now possible, but if the principles advocated be correct, there appears no good reason why they should not be considered as applicable prospectively. As a general rule, it has hitherto been held impossible to construct great public works advantageously in any but an expeditious manner; hence important and most desirable undertakings have been again and again postponed for the reason that a known paucity of traffic would not justify that enormous outlay of capital which appears to be inseparable from a rapid system of construction.

The Intercolonial Railway may be referred to as a project of this class; having been under consideration for a very lengthened period, and its construction frequently postponed for the reasons above given. This project has now been before the public for nearly thirty years. So long ago as 1835, surveys were made by the Royal Engineers; again, in 1844 and in 1848, surveys were made under instructions from Her Majesty's Government; in 1845 and '46, private companies were projected in England, with the view of carrying out the undertaking. At various times the Legislatures of Canada, New Brunswick, and Nova Scotia have passed resolutions in its support. In 1851, most important negotiations were entered into between the Imperial and Provincial Governments, and at intervals during the long period referred to, it has formed the subject of despatches between the Colonial Office and the Governors of the Provinces. The subject has again been revived, but notwithstanding its extreme political importance, it does not yet appear certain that the work will proceed, and it is feared by many that the actual commencement of operations will again be postponed for an indefinite period.

Rather than indefinitely postpone the advantages of a steam connection between Canada and the Atlantic Provinces by attempting to secure as heretofore the precipitate construction of nothing less than a fully appointed Railway, would it not be more prudent to satisfy ourselves with a scheme which promises at first a road of a less perfect character, and leaves the Railway and its sources of traffic to be built up by a gradual process? This policy not only appears to be that most likely to secure the desired object within a reasonably short period, but it seems most in harmony with the gradual development of a country from a wild and unoccupied condition, and equally in keeping with the state of the Public Finances.

A Territorial Road laid down on the railway route most approved of by the Imperial authorities, could, in a short time, be made serviceable for the purpose of opening the country for settlement, and in due time a fixed annual expenditure would accomplish the construction of a good gravel or macadamized road, fit for any kind of travel. All the culverts and bridges should be constructed in a substantial and permanent manner, in view of the purpose ultimately intended to be served by them, and the grading should be done with the same intention. By this means the most essential portion of a railway

would be secured in an easy and gradual manner, while at the same time the work, in its preliminary stages, would afford access to and egress from the country. We would thus have that portion, and almost the only portion of a railway which is *not perishable*, substantially constructed. At any future time, when it seemed expedient, that part which is permanent only in name, "the permanent way," could be added; and in a case of extreme emergency, should unfortunately one arise, it would be quite possible, with the energy always called forth on such occasions, to lay the rails on the prepared road-bed in a very few weeks.

Every practical railway man will readily understand the allusion above made to that portion of a railway which is *not perishable*, as they well know how marvellously soon the cross-ties or sleepers, and the iron become unfit for duty—the former through natural decay, and the latter through ordinary wear and tear—necessitating an entire renewal of what is called the "permanent way" every eight or ten years. Then the locomotives and the cars of all descriptions require heavy repairs, the cost of which in a single year is probably not less than one-eighth of the whole cost of rolling stock and machinery. Stations, fences, cattle-guards, and road-crossings likewise, are not free from deterioration; and although the outlay required to keep these latter in repair is not nearly so great as that needed for the other services mentioned, yet it always helps to swell the total amount of annual cost of maintenance. It may farther be remarked that a reduced traffic, such as must be expected for many years on lines in new districts, does not diminish, in a corresponding degree, wear and tear; the rolling stock and rails will wear out even if the trains drawn over the road carry extremely light, unprofitable loads, whilst the cross-ties, the fences, cattle-guards, and crossings will decay, whether the railway be used or not. On the other hand, the works under the road-bed are not, to any appreciable extent, affected by time or traffic; when once properly constructed and consolidated, culverts, bridges, and cuttings may be considered, if not absolutely, at least humanly speaking, imperishable.

These suggestions are not made in opposition to the early completion an Intercolonial Railway, yet they appear to present an alternative plan of construction which may with advantage be adopted, if negotiations already commenced should not prove successful. By the alternative plan we would be certain to secure at a comparatively small outlay, and in a very short time, a great military highway acknowledged by competent authorities to be in many respects (although not in all) not inferior to a railway; we would secure a road for ordinary traffic, possessing railway grades and railway curves, admirably adapted for the purposes of colonization, and in every respect fitted for the development of that traffic which alone can satisfactorily keep up a line of steam communication. These remarks may be considered somewhat digressive, but as they are intended to exemplify the advantages of the road system proposed, by applying it to a particular and well known case, they may on that account be excused.

It may be well now to allude briefly to the main objections brought against the Territorial Road system. The cost of ascertaining beforehand the capabilities of a new country, of laying down upon correct principles the leading highways, with a view to future traffic, in addition to the simple subdivision of the land into farm lots, would undoubtedly be greater than the cost of such surveys as have hitherto been required; when, however, a broad view is taken of the subject, when it is considered that the grand object is not simply to dispose of the surplus population of our own, or immigrants from other lands, but to convert a primeval wilderness into a prosperous appendage to the Empire, then it must be apparent that a general pre-arrangement of essential details ought to be instituted.

No one would undertake to erect a costly building, or any other important work, without first considering and arranging the several parts, so that they would best fulfil the main purpose of the structure, and harmonize as a whole; at least equal care and forethought ought to be exercised in proceeding to colonize a new territory, and as the opening of highways is the first step towards civilization, whilst their progress to perfection is of the highest interest, indicating as it does the degree of civilization reached, it is obvious that the roads of a country should receive the earliest consideration. It is clear therefore, that any expense connected with the exploration and survey of a country in advance of

settlement, and in view of preparing a system of leading arteries through it, would be more than compensated by the advantages resulting therefrom.

The other objections to the Territorial Road system proposed are so unimportant, that they need not now be alluded to.

The explanatory observations referred to in the foregoing, may now be submitted.

THE OPENING OF A HIGHWAY FROM CANADA TO THE PACIFIC OCEAN, ON BRITISH TERRITORY CONSIDERED.

A TERRITORIAL ROAD SYSTEM, SUGGESTED.

The following is taken from a letter prepared by the writer for publication in April, 1862:—

A communication for commerce between the western and eastern shores of North America, through the great basins of the St. Lawrence, the Saskatchewan, and the Columbia, has for nearly two centuries been a dream of the enthusiast. So far back as 1679 Robert Cavalier de la Sale formed to himself the magnificent scheme of opening a way to China and Japan through the Lake Regions of Canada; and curious enough, the rapids and village of Lachine, near Montreal, took their names, either in honor or in derision of La Sale's project, when he set out on his grand enterprise. About fifty years later Charles Marquis de Beauharnois, Governor of New France, projected an attempt to communicate with the Pacific, and in pursuance of which Pierre Gauthier de Varennes set out in 1731 and was the first to reach the Rocky Mountains.

Of late years the project has been brought prominently before the public in England and in Canada by many writers, amongst others, Lieut. Millington Henry Synge, R.E., in 1848; Major Robert Carmichael-Smyth, and a Mr. Wilson of the Hudson's Bay service, in 1849; Allan Macdonell, Esq., in 1850, and Captain Thomas Blakiston, R.A., in 1859. Each laid their views before the public, and warmly advocated the importance of opening up the interior of British North America by a highway from ocean to ocean.

In 1858 the Provincial Legislature of Canada incorporated a joint stock company for the purpose of opening up the interior and trading therein. This body, entitled "The North-West Transportation Navigation and Railway Company," was granted most extensive powers; besides trading in furs, tallow, buffalo meat, hides, fish-oil, and other articles of commerce, the company was empowered to improve and render navigable the various channels of water communication; to construct links of roads, tramways, and railways, between navigable lakes and rivers, so as to provide facilities for transport from the shores of Lake Superior to Fraser's River. They had likewise the right to own and employ vessels of all kinds "upon Lakes Huron and Superior, and upon all the waters, lakes and rivers lying to the northward and to the westward of the latter, thereby offering to their energy and their enterprise a new and vast field for commercial adventure." The directing board of this company was the same year fully organised, it embraced some of the leading names connected with Canada, but from some cause it has as yet made little progress in the objects contemplated.

From the above brief sketch of the history of the project of establishing a highway from Canada across the continent it appears that it has from the earliest settlement of the country bordering on the Atlantic, been considered a magnificent scheme for the extension of commerce and civilization; the Palliser expedition across the Rocky Mountains, as well as the Red River, the Assiniboine and Saskatchewan expeditions, show that it has very lately received the attention of the Imperial and the Colonial Governments; the recent discovery of gold on both slopes of the Rocky Mountains, gives it much additional interest, and lastly, the difficulties between the United States and Imperial Governments, for the present happily set aside, have not failed to show its vast importance as an engine of military defence.

It seems likely, then, that although the means of transport for nearly 2,000 miles are as yet scarcely better than they were when La Sale attempted to traverse the continent almost two centuries ago, the time is rapidly approaching when a highway across the continent will no longer by any one be viewed as visionary.

Before proceeding to consider the construction of the work practically, it will be necessary to discuss its character, and profitable to view its magnitude.

ITS CHARACTER.

A CONTINUOUS LINE OF RAILWAY ADVOCATED.

The early French projectors appear to have had the idea of opening a water communication to the Pacific through the lakes and rivers of Canada and the interior. Nearly all the recent writers on the subject have proposed in different ways to improve and render navigable the natural lines of water communication. I am not aware, however, that any of the latter, by reason of their knowledge of the great Rocky Mountain barrier, have contemplated a route wholly by water; they have generally advocated a mixed system, employing the water channels as far as possible, and connecting them by intermediate links of roads or of railways. On the other hand, Captain Blackiston appears to be much in favor of a land route, for the present, at least from the north shore of Lake Superior to Red River, by the North end of Lake of the Woods, at some distance inland from the international boundary line; and Major Carmichael Smyth in 1849 boldly urged the construction of a "British Colonial Railway" to connect *without break* Halifax on the Atlantic with the mouth of Fraser's River on the Pacific.

All the schemes proposed may be reduced to two kinds, viz.: partly water and partly land; and wholly land routes; the former may possess the advantage in point of cheapness in construction, but certainly not in regard to efficiency. By using the lakes and rivers as far as navigable or capable of being made so, and by constructing connecting links of roads or railways where necessary to complete the chain, it is more than likely that a line of communication could be formed from ocean to ocean at less cost than could a continuous land route;—a mixed land and water route would, however, be always open to the following objections: it would to a great extent, confine colonization to the banks of rivers and lakes where the soil is not invariably most suitable for cultivation. It would involve many transshipments, and be liable to frequent interruptions. It would necessarily be considerably longer than a direct land route, and, as a means of transport for "through traffic," would be slow and tedious,—it would too, and this objection is insuperable, be only available for any kind of traffic during less than six months in the year.* It is well known that serious delays frequently arise on canal navigation before the season terminates towards the close of navigation by reason of the press of business. The longer the route the greater would be these difficulties; merchants at either end, unwilling to run the risk of having goods arrested in the interior for half a year, would in consequence be debarred from sending consignments across the country for some considerable time before the water channels were completely closed, and hence it is believed that a partly land and water route would not be really serviceable for "through traffic" over five months in the year. The local traffic of the interior would likewise be suspended for long periods, and at such times the country and its inhabitants would be as much isolated as they are now. In a military view alone this objection would prove fatal to any permanent route of an amphibious character; and it is probably on this ground, together with the fact that the water lines pass for a considerable way along the international boundary, that the two military gentlemen last named have extended their advocacy to a line of communication wholly by land through the interior.

A railway communication on the other hand would be the shortest practicable line that the physical features of the country would admit,—it would have no transshipments between tide water on the two oceans,—it would in most instances be carried through the heart of the country at some distance from lakes and rivers, and would thus open valuable tracts of land for colonization which could not be reached by navigable waters; when it touched or intersected water channels, these would form natural branches to it, and be available to their fullest extent in laying open the land along their banks for settlement. It would, as an essential and independent part of its equipment, be provided with an electric telegraph; the telegraph, as on other lines, would be available for purposes beyond the immediate requirements of the railway, and without doubt great benefits would result from

* The navigation of the lakes and rivers on the line of route are closed from the middle of November to the 1st of June.—BLACKISTON.

the possession of this instantaneous means of communication.* The railway would throughout the year be open to transport "through" as well as "local" merchandise and passengers, and would, taken with the telegraph, in a military aspect, be available at all times and seasons, and would undoubtedly prove an important as well as a permanent measure of defence to the country.

It is not, however, to be supposed that the operating of a railway through this extensive country would be entirely free from difficulties; the permanent supply of fuel would be a question of no little moment, the intense frosts and the snow drifts of a long winter would have to be contended with. The latter is found in operating Canadian as well as other railways in a like northern latitude, to be a cause of not unfrequent interruptions to the regular running of trains, besides often the necessity of a heavy outlay. The drifting of snow, like all operations of nature, is however, governed by certain laws, and it is possible on a correct knowledge of them to adopt measures in the general design of railways and their appliances which may certainly diminish if they do not entirely remove the evil effects of the agency referred to. These questions will be more particularly noticed in their proper place.

Taking all things into consideration, and, notwithstanding the difficulties last mentioned, it seems as clear as a demonstration that a continuous line of railway, with its electric telegraph, extending across the continent, is much to be preferred to a mixed system of navigation and railway combined; and therefore in the following observations it will be understood that a line of railway is the character of highway ultimately in view. It is true that in preparing the country for railway service the natural water channels as far as they go may be advantageously employed, but it would evidently be unwise to incur much expenditure on any route other than that best calculated to accommodate the permanent wants of the country and highest interests of the Colonial Empire.

ITS MAGNITUDE.

COST AND MAINTENANCE OF A RAILWAY AND TELEGRAPH LINE.

Having determined the character of the means of communication most desirable to be established, it may be well now to glance at the comparative dimensions of the proposed work, and to consider the cost of its construction as well as the annual expense of maintaining it for ever afterwards.

Measuring on the map along the general route of the proposed line from the mouth of Fraser's River, through one of the best passes yet discovered in the Rocky Mountains, along the general direction of "The Fertile Belt," keeping south of the North Saskatchewan, crossing the Red River near the Settlement, bridging the Winnipeg River at the north end of the Lake of the Woods, striking through the country to the most northerly bend of the shore of Lake Superior, thence in a direct line to a crossing on the French River west of Lake Nipissing, and from this point connecting with the existing railway system of Canada, either at the Town of Barrie, or at Peterboro, or at the City of Ottawa; the distance thus measured will be found to be in round numbers about 2000 miles, and although a railway between the two oceans on British territory cannot be considered perfect without the completion of the road between Halifax and the most easterly extension of the Grand Trunk in Lower Canada, yet as there is some prospect of this section being made independently, it does not appear necessary to embrace its length in the present consideration.

That a just conception may be formed of the real magnitude of the project under discussion, and the means necessary to its attainment, attention may for a moment be drawn to a few leading details. The construction of 2000 miles of railway measured by the

* A telegraph would be much more expensive in the first place, and almost impossible to maintain on any line across the country other than a railway or other travelled land route, if carried around lakes or through hundreds of miles of uncleared forest, the wires would constantly be broken by fallen timber, and the posts frequently destroyed by running fires, inconvenient interruptions might thus occur when the telegraph was most in need. On a railway it is part of the duty of the trackmen to look out for fallen trees, and a break is thus speedily repaired when it occurs: when the line is cleared to a sufficient width, interruptions from this cause are not frequent.

average standard of similar works existing in this country implies the performance of labourers' work sufficient to give employment to 10,000 men for five or six years,—it involves the delivery of 5,000,000 cross-ties or sleepers, and over 200,000 tons of iron rails for the "permanent way"—it comprises the erection of 60,000 poles hung with 1000 tons of wire for the Telegraph—it necessitates the creation of motive power equivalent to over 50,000 horses, which power would be concentrated in 400 locomotives—it involves the production of from 5000 to 6000 cars of all kinds, which, coupled with the locomotives, would make a single train over 30 miles in length—and lastly it implies a gross expenditure on construction and equipment, of not less than \$100,000,000.*

It will likewise serve as a salutary check on hasty conclusions to weigh before hand the cost of operating a truly gigantic establishment of the kind after its perfect completion; a few figures derived from actual results will show that the first construction of a railway through the interior of British North America is even a less formidable undertaking than that of keeping it afterwards open in the present condition of the country. For operating the line successfully, the fuel alone required in each year, and estimated as wood, would considerably exceed 200,000 cords—for keeping the road in repair a regiment of 2000 trackmen would constantly be employed in small gangs throughout its entire length; for the same purpose there would on an average be annually required 600,000 new cross-ties as well as nearly 30,000 tons of new or re-rolled iron rails—the annual repairs of Rolling Stock would not cost less than one million dollars—over 5000 employes of all kinds would constantly be under pay, and as these men would usually represent each a family, there would not be far short of 20,000 souls subsisting by the operation of the road. The aggregate amount of wages in each year after the road was in operation would swell out to nearly \$2,000,000, while the gross expenditure for operating and maintaining works would annually exceed \$8,000,000.

Again, if to this last sum be added the interest on first cost, it becomes evident that until the gross earnings of the railway in each year come up to the enormous sum of \$14,000,000, it could not pay interest on the capital invested.

ITS IMPORTANCE.

A GREAT NATIONAL WORK, A FIELD FOR LABOUR, AN ENGINE OF MILITARY DEFENCE

The above computations taken by themselves are more than sufficient to deter any one from casting a second thought on the subject of constructing a railway through the unpeopled wilds of British North America; but when we again reflect on the vast importance of this great national work the belief is forced upon us, that at some period, *let it be a remote one*, the undertaking will certainly be accomplished. While most authorities have very fully dwelt upon the commercial advantages to be attained by a speedy means of communication across the country—while they have shown its value as a connecting chain between British Columbia, the Gold Fields on the slopes of the Rocky Mountains, the Settlements at Red River, and the Atlantic Provinces, as well as a link of connection between China, India, even Australia, together with other Dependencies on the Pacific, and the Parent Land—while they have advocated it as the key to a new and almost boundless field for British capital, energy and enterprise—as a great instrument of colonization, opening up a territory of vast extent for the superabundant and rapidly increasing population of the European States, and in this respect involving the future and permanent interests of civilization—yet it has not been the good fortune of the writer to peruse any article in which this undertaking is viewed as a most important measure of defence; as a work which may at some period save many millions sterling in carrying on a war; which may, if it does not prevent a war, save the Colonial Empire from dismemberment.

In times of Peace we are apt to overlook the importance of being able to concentrate troops and munitions of war at any given point on our extended frontier, but the recent difficulties between the British and American governments, could not fail to illustrate the

* Major Carmichael-Smyth estimated the cost of building a line of railway from Halifax to the Pacific at £150,000,000 sterling, equal to over \$700,000,000, but then he computed the expenditure as on English railways, where more money has been wasted in preliminary expenses and lavished on architectural monuments at Stations than would suffice to build an equal length of road in this or any new country.

military value of the several Canadian railways as well as the isolated and defenceless condition of the far interior. Had war not fortunately been avoided, it is difficult to see how that vast and prospectively most valuable territory between the Lake District and the Rocky Mountains could have been protected from invasion and permanent occupation, and we are forced to the conclusion that until a highway is formed the interior of our country is indefensible. The Romans paid particular attention to the construction of roads through the distant Provinces of the Empire, and while the construction of these roads was one of the grand causes of civilization introduced into barbarous States, the great leading principle which actuated the builders of them, was that of maintaining their military supremacy; the first efforts of that people were directed to piercing new acquisitions to the Empire with good roads, and these roads wherever practicable were connected in unbroken lines with the seat of government at Rome. The remains of these roads are still to be traced in various ramifications through Europe, and so substantially were they constructed that they have for fifteen centuries perpetuated the power and foresight of their originators.

In modern time, Napoleon, one of the greatest, if not the greatest military authority, announced the maxim that the highest effort of the military tactician was to concentrate a given number of men at a given place, at a given time. It requires no argument to prove that the Railway and the Electric Telegraph are the most perfect means for concentration of military power that could possibly be desired, and we can easily perceive with what comparative ease forces could be brought to bear through the instrumentality of these agents, on any point threatened with invasion.

True, we are again at peace with our neighbours to the south, and perhaps likely to remain in that happy state for a considerable time, but possibly not always; some good authority has laid down as a maxim, that to maintain peace, a nation must be well prepared for an opposite condition of things, and therefore we must see the value of the railway route to bind the several North American Colonies of Britain together. But it is not alone as a work of defence that the British Pacific Railway would be serviceable in a military sense; it cannot be forgotten that within a very few years back British troops had to be transported with the greatest possible rapidity to India and again to China. Such exigencies may at any time occur again, either in the same lands or at other points in the same hemisphere, and it must be of the utmost importance to the Imperial Government to possess the means of carrying military forces more rapidly by a route over entirely British soil, than by any other route along which they may come in contact with antagonistic nations.

I have already overstepped the limits of space which these preliminary remarks should have occupied, but I cannot proceed to the more practical part of the subject without first alluding to the efforts which for more than half a century have been made by the Imperial Government to discover a means of communication by water between the Northern Atlantic and the Northern Pacific Oceans. Although the persevering and sometimes heroic attempts to find a north-west passage have resulted in no direct advantage, beyond a trifling contribution to science and geographical knowledge, yet they are undoubted evidence of the high commercial and military value which the British Government has long placed upon the possession of a means of communication between the two oceans in the northern hemisphere; and while the expenditure of a sum considerably over a million pounds sterling has only proved that a passage through the Arctic Seas cannot be established, the very impracticability of the passage which the outlay of so much treasure as well as the loss of so many valuable lives has demonstrated, must without doubt add immensely to the importance of the only practicable route across the continent, on British soil.

SCHEME OF CONSTRUCTION.

THE COMPLETION OF THE RAILWAY A WORK OF TIME.

The idea of constructing upwards of 2,000 miles of railway in the manner which has characterized the establishment of similar undertakings heretofore, through a country almost uninhabited except by scattered bands of wandering Indians, may well be viewed as a commercial absurdity. It has been shown that the maintaining and operating of a railway of this extent, after its perfect completion, would cost not less than eight million dollars

per annum, and that its traffic would have to yield in gross receipts fourteen millions of dollars every year to enable the work to pay interest on the capital invested.

Could it be satisfactorily shown that these receipts might even be approached, the work would undoubtedly be a legitimate investment for private capital, and we might fairly expect to see it undertaken by private enterprise; but at present no such inducement can be held out; however important the line would be in many respects, the business of the country traversed could not for many years yield more than a fractional part of the revenue required to keep it open, and the traffic from ocean to ocean could not be expected even by the most sanguine to give constant and profitable employment to a force of four hundred locomotives, without which the road would scarcely pay.

It appears conclusive therefore that the immediate construction of a railway from Canada to the Pacific is in a financial sense impracticable, seeing that it would not at present pay; and however important it may be considered as a great national work, its successful operation as a commercial undertaking cannot take place until the country is better prepared for it.

It must not however be implied that the idea of establishing a continuous line of railway from ocean to ocean should even at the present time be set aside. It may be laid down as a maxim, that wherever traffic *can exist* sufficiently extensive in any section of country, to render the application of steam power profitable, through that section, a railway will sooner or later be constructed. The country between Canada and the Pacific is, according to reliable authority, in every respect capable of supporting a large industrial population* half as large perhaps even at a moderate computation as the population of the whole United States—the population of the whole United States sustains over 30,000 miles of railway, and therefore we may reasonably conclude that long before the interior of British America is fully occupied, a leading line of railway communication through it may be successfully operated and profitably sustained.

The question of opening up new territories for settlement by means of some comprehensive and economical road system engaged my attention a few years ago, when I had the honor to read two papers on the subject before the Canadian Institute, and I cannot but think that some of the conclusions then come to, apply with peculiar force to the subject under discussion. In one of these papers a retrospective view was taken of the process by which the Province of Canada had become habitable and inhabited, so far at least as lines of internal communication had been instrumental in producing these results; and an analytical examination of the existing road and railway systems was made, as well as an enquiry into the means employed to produce them. From these enquiries, instituted with the view of arranging some more perfect system of road development, for advantageous introduction into unoccupied districts, certain deductions were drawn, of which the following may at present be submitted.

In carrying railroads, the most perfect of all roads, into remote unsettled districts, two great difficulties have to be encountered at the outset:—First, their construction; secondly, their maintenance.

The former may be overcome by a process which strongly resembles a law or principle in mechanical science, by which we are taught that time is an element of equal importance to power in the performance of mechanical operations. The construction of a railway with all its parts is nothing more than a complex mechanical operation, whilst capital or money may be designated the force or power employed to bring about the desired result; a large expenditure of financial force is undoubtedly required to accomplish the object within a short period, but owing to the peculiar relation between power and time the employment of a small amount of force or capital would equally accomplish the same end in a longer period; both of these elements are indispensable, but they are not necessarily

* Assuming that only that portion of British America west of the Lake of the Woods and south of the main or North Saskatchewan River, is capable of being populated to no greater density than Russia, the least populous country in Europe, Norway and Sweden excepted, within these limits a population of 15,000,000 would be contained, (the density of the population of Russia is only about one-third that of the settled portion of the Canadas). The occupation of this portion of the country need not be considered a great encroachment on the territory from which the Hudson's Bay Fur Company derives its revenue; it would still leave 2,000,000 square miles, an area four times greater than that assumed to be populated; an area quite as extensive as Russia, and abundantly sufficient, it is presumed, for a hunting ground.

required in fixed proportions; if we use the maximum of the one we only need the minimum of the other,—if circumstances in any particular case will not justify a large expenditure of capital, then time may be extensively employed to accomplish the work in hand.

The second difficulty above referred to, viz.: that of maintaining a railway in a new district after its completion, although by far the most serious of the two, is one which fortunately can be removed by a particular solution of the first. It is obvious that to put a railway in a condition of being self-sustaining, the traffic of the country through which it passes must first be developed; for however important and promising the "through traffic" of any projected line may appear, experience has shown on nearly all railways that the "local" or "way traffic" is that upon which they must mainly depend for a revenue. The local traffic of a new territory can only be developed by the introduction of labor and inhabitants; this is a work of considerable time even under the most favorable circumstances, but until this be done it is useless to expect sufficient traffic, and without sufficient traffic the railway cannot maintain itself.

In applying the foregoing to the question of forming a railway connection between Canada and the Pacific, it would follow that whilst the completion of the work at the earliest period possible, would absorb an enormous amount of capital, and leave the line for many years without the means of earning sufficient to sustain itself, the gradual process of construction would draw upon capital only to a limited extent, and it would leave the railway finished when the traffic was sufficient to keep it in profitable operation.

The former course may fairly be rejected as incompatible with the first principles of economy, the latter being perhaps the only alternative, forces us to the conclusion that the gigantic work under consideration, to be constructed at all must be viewed as a work of time; and it remains for us to consider how the time at command can be most profitably employed to bring about the desired result.

THE ROAD SYSTEM OF CANADA,

CONSIDERED IN VIEW OF A COMPREHENSIVE PLAN FOR NEW TERRITORIES.

In pursuance of the object in view, it may be satisfactory and profitable to refer briefly to the leading characteristics which have marked the origin and improvement of the roads as well as the introduction of railroads in the settled portion of Canada.

The settled or partially settled portion of Canada embraces an area estimated at 35,000 square miles; its road system or means of inter-communication, exclusive of navigable channels, consists of nearly 2,100 miles of railway in full operation, of probably 3000 miles in the aggregate of improved roads, comprising those made of broken stone, gravel and plank, and in round numbers of 50,000 miles of what are termed road allowances; of the last it is estimated that considerably less than one-half the total length is cleared of the timber and so far improved as to be passable for waggons, the remainder being as yet uncleared and in part permanently impassable.

The road allowances demand some explanation; they are invariably one chain (66 feet) in width, and are left between the square or rectangular blocks of farm lots, into which the whole country has been subdivided for settlement; they are consequently in parallel lines, and in two sets, the one crossing the other at right angles, leaving blocks between of two or more farm lots of 200 acres each.

The aggregate area of these road allowances is extremely liberal, as it cannot be much less than 400,000 acres, but from the manner in which the allowances are laid out they cannot in all cases be employed for the purposes intended; they are, however, much used by the farmers in common for pasturing cattle. Where the country is level and free from lakes, rivers or other obstructions, the road allowances have been converted into good summer waggon-roads by the annual performance of statute labour, and they give ready access to the farm lots; where the country is hilly or broken on the other hand, great difficulty has been experienced in making them passable, and in many instances this is impossible, whilst in some cases, after a great deal of money and labour had been expended, the original road allowances have been abandoned for better locations.

As the settlement and trade of the country advanced a demand was made for a more improved class of highways on the leading lines of traffic; this led to the construction of

plank,* gravel, or broken stone roads through different parts of the country, and may be said to constitute the second stage in the development of the road system.

As the road allowances were left in the original surveys more to mark the limits between blocks of land than to accommodate the future commercial wants of the country, they did not long remain the only means of communication between one business point and another. Increasing traffic frequently called for roads with easier grades than those to be had on the original road allowances, and in cases where it sought an outlet diagonally across the country, it demanded a shorter line than the old rectangular zig-zag one; in this manner new and more perfect roads were constructed in various sections of the country.

The third and last stage in the establishment of lines of internal communication within the Province, was the formation of railways; these were first introduced about ten or twelve years ago when the increasing commercial wants of the country appeared to demand a greater degree of rapidity, safety and security of transport.

Although the location of railways through any district requires a higher degree of care and skill than that of gravel or other roads of like character, yet it is governed by precisely the same principles; and as the general direction of all lines is prescribed by the leading direction sought by traffic, we find that the various lines of railway have been constructed parallel, or at least in a parallel direction to the various stone or plank roads which have preceded them, although they are frequently found at some distance asunder: this is a peculiarity which cannot fail to have been observed by all those acquainted with the country.

From the above brief outline of the origin and history of the lines of commercial intercourse within the Province, it will be seen that three distinct classes of roads have at different times been constructed to meet the requirements of traffic. *First*, we have common earth roads on the original road allowances. *Second*, gravel, plank or broken stone roads in improved locations. *Third*, railways constructed quite independently of the other two—showing as a rule that three distinct works have been made, involving as many separate expenditures before the final object is attained. The only exception to this rule is where the second class has been made on the lines of the original road allowances, but this exception has perhaps been even more expensive to the country than when the rule has not been departed from.*

It may also be observed that the system adopted has in minor details unavoidably resulted in many permanent inconveniences to the trade of the country, which under other arrangements might have been obviated; as an illustration it may for the present be sufficient to allude to the inconvenient distances which nearly all the railway stations are from the towns and villages they are intended to accommodate. It may further be noticed that a degree of competition likewise obtains between the parallel lines of communication throughout the country, alike injurious to the interests of both. A stone road running

* The first plank road was built in Upper Canada in 1836.

* In a Report made by Thomas Roy, Esq., Civil Engineer, in 1841, to the Governor General of Canada, reference is made to the excessive cost of making good roads on the line of original allowances drawn straight through the country across ravines, over hills, through swamps and other hindrances. Amongst other cases where attempts have been made to construct improved roads on such lines as that alluded to, he instances the following: "The grants were made to macadamize Yonge Street Road from Toronto to Holland Landing, near Lake Simcoe. Now Yonge Street Road was so located that it was extremely difficult and expensive to form it into a tolerably good road. On that portion which has been already done nearly as much more has been expended in cutting hills, building bridges, &c., as in road-making; yet several of the inclinations are as steep as 1 in 14. That portion which remains to be done, is still more difficult, and it will be more expensive. Now, if previously to commencing the work an experienced Engineer had been instructed to examine the country and to lay out a road upon the best ground which he could find between Toronto and Holland Landing, he would have discovered that between 3 and 5 miles west of Yonge Street Road, a line of road could have been got from Toronto to the base of the Ridges, (about 25 miles,) without crossing one ravine, or meeting any difficulty except the hill to the north-west of Toronto; and farther, that the Ridges could have been crossed in that direction without involving any considerable difficulty. The result is that the same amount which has been expended in making about fourteen miles of a very indifferent road, would have made about thirty miles of excellent road, leaving no inclinations steeper than 1 in 40; a circumstance that would have produced a great saving in repairs, and in expense of animal strength."

parallel to a railway cannot fail to share with it the traffic of the locality, perhaps just sufficient to prevent the latter line from paying, while the former is deprived, by the more recent work, of the revenue it had a right to anticipate when originally constructed. True it may be said that the country benefits by the rivalry between parallel lines; this, however, is very questionable, as both roads cannot permanently continue to be maintained at a loss; they must either fall out of repair or the tolls must be raised to enable them to pay dividends. Could these stone or other improved roads, instead of being parallel to the railways, be extended as branches to them from the stations, it is apparent that then the country generally would derive greater advantages, while the different classes of communications, in performing their proper functions, would receive corresponding benefits to those they conferred.

It is not for a moment presumed that a re-arrangement of existing lines of traffic such as that suggested is now possible; but these remarks are offered with the view of showing some of the benefits which would result from a pre-arrangement of internal communication in a new country, such as I will take occasion to refer to shortly.

Before attempting to show how we may best profit by the experience obtained from the Canadian road system in any effort to colonize the interior of British North America, I will first allude to another point which doubtless has suggested itself to many others, and which I think is of some moment.

If we proceed to analyse that portion of a perfect railway upon which the trains are rapidly transported, we find that it consists essentially of the following parts: 1st, Two smooth, parallel and horizontal surfaces upon which the wheels of the carriages roll; these are formed by iron rails resting upon cross-ties and supported by chairs or other fixtures, the whole being termed "the permanent way" or "superstructure." 2nd, A layer of gravel or broken stone from fifteen to thirty inches in thickness immediately under and around the cross-ties, and technically called "the ballast." 3rd, An earthen surface uniformly even and properly ditched at the sides. This surface is termed "the formation level," and on it the ballast is placed, and thus proceeding downwards from the completed rail track we have:

- 1st. The Permanent way.
- 2nd. The Ballast.
- 3rd. The Formation level.

To those who have observed the successive stages of railway building, it will be clear that "The Formation Level" is not dissimilar, except in possessing easier grades and curves, to the best description of "common earth roads," and might readily be used for all the purposes for which the latter are employed. Again, when "the Formation Level" becomes coated with "Ballast," we have what is designated "the Road-bed," and which, without any portion of the "Superstructure," corresponds with the general construction of "Gravel" or "Stone roads." If, therefore, we invert the order above given, and likewise substitute new names, we have,

- 1st. *An Earth Road*, corresponding with the Formation Level.
- 2nd. *A Gravel or Stone Road*, corresponding with the Road-bed.
- 3rd. *A Railway*.

This is precisely the order in which the leading lines of communication have been formed in Canada, and although each work as a rule has been constructed independent of the other, and thus necessitated separate expenditures to accomplish one end, yet it does not appear a difficult matter to point out how the same object can be better attained in new territories to be settled, by a simpler and less costly system. Were the railway line first located, the common classes of roads which naturally precede it might first be made (on the railway location) and used until each in its turn merged into its successor; and by such a plan it is clear that considerable saving would result on the final establishment of the railway; there might be new earth works needed where the ground was broken by ravines and hills, as well as stronger bridges across rivers, but no outlay would be necessary for land, or for clearing and grubbing, at any place, and on level sections of the line, such as occur on all roads, the only additional expense would be that for the superstructure.

A ROAD SYSTEM FOR NEW TERRITORIES.

TOTALITY AIMED AT, AND PROVISION FOR FUTURE RAILWAYS ADVOCATED.

From the foregoing observations it must be obvious that the progress of new territories, as well as their future and permanent social and commercial wants, would be much influenced by a pre-arrangement of the various lines of internal communication; and it must be equally clear that to attain the highest degree of easy intercourse between every section at the least outlay of capital and labor, every road of whatever class should be considered as a portion of a whole system.

The system of construction proposed to be advocated is that of a gradually progressive character, similar to that already hinted at; and inasmuch as it would evidently be a misnomer to designate the various lines of roads in their rudimentary stages by the names they may ultimately be intended to bear, it is thought that the following terms for the three classes of lines will be convenient and sufficiently appropriate.

1st. *Territorial Roads*.—These trunk lines, intended to serve large districts, and which may in course of time be converted, stage by stage, into railways, as the settlement of the country advances and its traffic becomes developed. "Territorial Roads" to be invariably located with easy curves and on the most available ground for railway service.

2nd. *Colonization Roads*.—Those lines of secondary importance, to be opened in the first place for the better introduction of settlers, and which may without change in their direction be converted in course of time into good gravel or macadamized roads.

3rd. *Concession Roads*.—Those lines of least importance, designated simply to give access to farm lots from the leading lines last mentioned. Concession roads might be laid out generally across the colonization roads, and between the several blocks into which townships are usually sub-divided.

In pre-arranging a system of internal communications for a new territory, it would be necessary to take a prospective view of the character of the traffic which might exist when after a lapse of years the district becomes populated; in this we might be guided by drawing a comparison between the natural advantages of soil, climate, and position of the section of country to be colonized, with those of any similar section which has become occupied and to some extent developed. In this manner we could form some idea of the nature of the future commerce of the country, and consequently of all the classes of roads which would ultimately be required to accommodate it. The leading direction which traffic may seek, or the direction which in a national or political sense it may appear expedient to guide it, would prescribe the general direction of the main line of road through the territory, and the other consideration would determine its character. This is the first thing to be established, as upon it the direction and character of all minor lines mainly depend.

Assuming that the tract of country to be colonized is such as to justify us in the belief that in due time a railway may be constructed through it, the first step would be to lay out a "Territorial road" between the more important points in the general direction of traffic previously determined. The territorial road ought to be located with the utmost care, and in all that relates to curvatures and levels, the best railway location in an *engineering aspect alone*, which the country traversed could afford. In this respect there would doubtless be less than usual difficulty, as there would be neither right of way obstacles to guard against nor local interests to serve, and consequently no undue influences to twist or warp the intended line out of the most advantageous location. The main artery of traffic for the future service of the country might thus be determined upon under most favorable circumstances.

It would next be necessary to select at proper intervals the most suitable points for stations and villages, and from these as diverging points, "Colonization Roads" might then be laid out to the right and left with as much care as the location of gravel or macadamized roads generally require. These colonization roads thus laid out and adapted to the peculiar features of the locality, avoiding steep hills, ravines, lakes, or unnecessary river crossings, might form centre or governing lines upon which the townships may be projected; these townships to be sub-divided in the usual way into blocks of farm lots with concession roads between, drawn so as to unite with the colonization roads.

The above is a simple skeleton outline of a road system which it is thought might with advantage be introduced into unoccupied fields; and although it may be unwise to

complicate it with too many details, still there is one additional point which seems too important to be passed over. I have already alluded to the difficulty experienced in operating railways where the road is liable to be blocked up with snow-drifts;* and I may now refer to the extreme necessity of making some provision for the permanent and convenient supply of timber for fuel and general repairs.† As a preventive against the former, and as an ample provision for the latter, I would suggest that a belt of woodland along the territorial line of sufficient breadth should be reserved for shelter and the purposes above mentioned. The belt of wood-land to be at all effective against the worst effects of snow should be of a considerable width, sufficient in fact to shelter the line of road and arrest the snow-drifts beyond the limits of the line of traffic. In open sections of the country it might, in view of the same end, be advisable to encourage the growth of timber on reserves to be left for the purpose along the line of road. The uniformly even falls of snow would of course always occur, but on railways these are easily overcome by light snow ploughs attached to the front of the engines, and they seldom interfere with the regular running of trains.

These continuous timber reserves along the sides of the territorial road, whilst the would greatly lessen the difficulty of operating a railway along the same line in winter,* as well as provide a permanent supply of wood for fuel and general repairs, they would, moreover, result in several incidental advantages favorable to the construction and maintenance of the future railway as well as to the safety of the public.

As all the roads in every section of the country along the line of the intended railway would connect through the "Colonization Roads" directly with the stations, the traffic would naturally centre at these points, and at these points *only* would railway crossings by public roads be required. Again, there would be no private or "farm crossings" needed, as the farm lots being laid out subsequent to the location of the road, would of course be wholly either on one side of it or the other, besides being separated from the road by the timber reserve. The advantages resulting from these arrangements would be threefold,

* It has been pretty well established that the most efficient preventive of snow-drifts is to prevent the woods along each side of the rail-track beyond the line of fences. Trains are seldom detained by snow evenly fallen through wooded parts of the country, as it scarcely ever falls so deep "between trains" as to offer any inconvenience. The detention to trains from snow always occurs in the open country where the woods have been cleared away and no obstruction is presented to the formation of snow-drifts on certain exposed positions.

† In districts where no coal exists and in consequence wood is employed as fuel, and more especially in those sections of the country where the absence of navigable water channels renders it a more expensive system of land transport necessary, it would seem good policy to husband the growing timber for future wants. Already in some parts of the United States the difficulty and expense of procuring fuel for railways and for other purposes is beginning to be felt; in Canada the railways alone consume not far short of 300,000 cords every year, thus involving the annual destruction of more timber than is generally obtained from an area of six thousand acres, and in all countries in a northern latitude, beyond the convenient reach of coal fields, the conservation of sufficient areas of timbered lands must become of increasing political importance. To ascertain the extent of woodland sufficient to yield a permanent supply for a given rate of consumption, the writer a few years ago initiated the following steps. A piece of average timbered hard wood land was selected, a rectangular-portion was staked off, within the limited area each tree was separately examined, the length and circumference of the trunk and main branches as well as the thickness of the rings of annual growth of each were ascertained, and upon this data was calculated the quantity of solid wood annually produced by the process of vegetation. The result gave about 60 cubic feet of solid timber to the acre, and allowing for the interstices between each stick as usually piled, this may be considered equal to about three-quarters of a cord; consequently to yield a perpetual supply there ought to be one and a third acres of timber land reserved for each cord of wood required annually.

Taking the above as correct and assuming that a railway with ordinary traffic consumes annually 150 cords of wood for every mile of road operated, it follows that 200 acres should be reserved for the growth of fuel for every mile of railway. In like manner it can be shown that cross-ties or sleepers would require about 40 acres for every mile, and fencing as much as 24 acres for each mile of railway. It appears obvious, therefore, when we consider the many other purposes to which timber is applied in the maintenance of a railway and its rolling stock, that there ought to be about 300 acres per mile reserved for the growth of timber for all purposes. A belt extending a quarter of a mile beyond each side of the line of road would fully embrace the required area.

* The obstacle presented by snow-drifts is *the great difficulty* in the way of operating railways in winter in high latitudes. The cost of clearing away the drifted snow on some portions of the Canadian lines, in the winter of 1860-1861, was very great. The drifts invariably occurred where the adjacent country was cleared of its timber.

viz: in original construction, subsequent maintenance, and public safety. In original construction it is clear that no bridges, level crossings, cattle guards or gates would be required at any part of the line, other than at stations, to accommodate public roads, and at no place whatever would farm crossings be needed. In maintenance, corresponding advantages would result, as the repairs of these works, generally of a perishable nature would be for ever saved, and the constantly recurring damage from cattle straying on the track would be very greatly lessened. Public safety would undoubtedly be greatly promoted by any plan which would diminish the number of road crossings. In any country subdivided for settlement in a manner similar to Canada, before the railway lines are laid down we cannot avoid having the road crossings almost one in each mile, so that on every one hundred miles of railway we have probably in the aggregate over 5,000 lineal feet of track not only destitute of protection but exposed day and night to waggons, foot passengers, and cattle passing to and fro. Besides which the great number of cattle guards required is an important element of danger. These being made of timber beams are equivalent to small wooden bridges, and their great number swells out the total length to something very considerable. On all the railways in Canada the cattle guards it is estimated cannot measure less than 20,000 lineal feet of track, and are probably not much less dangerous than the same length of wooden bridges. In addition to the public road crossings above alluded to, there are a very great number of ordinary "farm crossings," which in point of safety to the public travelling by rail as well as to the property of the railway companies, are perhaps equally to be feared, for although they are protected by gates these are constantly liable to be left open, either through the design or negligence of farm servants.*

In the road system recommended for new districts, the railway whenever it came to be operated would be entirely freed from farm crossings, and the public road crossings would only occur at stations, where the danger of accident is always least, from the fact that the speed of trains is invariably reduced at these points.

Before proceeding to consider how the road system suggested would apply to the wide areas of unoccupied lands in the interior of British America in view of colonizing them, as well of ultimately establishing a leading line of railway from the settlements of Canada to the Pacific, I may observe that two principal objections present themselves to the system advocated.

The expense of making the surveys and laying out the land for settlement would undoubtedly be much greater than that required to lay out wild land in the usual manner; but then while the old plan is simply to divide the country into rectangular lots without any sufficient provision for future traffic or present access, the new plan has a double object in view; it has in addition to the purposes contemplated by the old system, that of making every part of the country accessible in the readiest way at the minimum expenditure, and with the greatest permanent advantages attainable. Another objection arises from the proposal to keep the territorial road lines wooded on both sides except where stations may occur, thus rendering the road less agreeable to travel on than if the cultivated country were allowed to be immediately adjacent. This is undoubtedly an objection, but I think that it cannot weigh much when the benefits to be expected ultimately from the preservation of the wood is fully considered.

* "One of the most fruitful sources of accident are the great number of crossings of street, highway, and farm roads at the level of grade. The total number of these is over eight thousand and there is an average of three to each mile of road in operation, and more than one public road or street-crossing to each mile. It is believed that nearly ten per cent. of all the accidents by which persons were killed or injured, is due to this cause.

"The expense of maintaining watchmen at many of these crossings, and the damage to the property of the companies by collisions caused by them, render them costly.

"The policy of reducing the number of those at grade, is generally concurred; and it is recommended that authority be given to change road-crossings which are at the level of grade, whenever it can be done without much detriment to the travel, so as to have two or more roads use one crossing; and, in all cases, where it can be done at a reasonable expense, to require them to be carried over or under the railroads."—*Report of the Board of Railroad Commissioners to the Legislature of the State of New York 1856.*

A HIGHWAY TO THE PACIFIC.

A PLAN OF GRADUAL DEVELOPMENT RECOMMENDED.

In the foregoing observations it has been my endeavor to show, as briefly as possible the following points:—

1st. That the project of a highway to the Pacific is as old as the first settlement of Canada, and that recent events show its increasing importance.

2nd. That a continuous line of Railway, with Electric Telegraph, is better calculated to meet the permanent wants of the Country and serve the interests of the Colonial Empire than any other means of communication between the two oceans.

3rd. That although the magnitude of a scheme for a Railway across the continent is very great yet the vast importance of the work in a commercial, military, and national view, would demand its construction were the resources of the country and the trade sufficiently developed.

4th. That the immediate completion of this work cannot be seriously entertained in the present condition of the country, the cost of maintenance without sufficient traffic being so very great, and that therefore, to be constructed at all, the Railway must be a work of time.

5th. That the Canadian Road and Railway system has illustrated the advantages which may be derived from the adoption of a comprehensive Road scheme in laying open new districts for settlement.

6th. That a scheme which embraces the ultimate completion of Railways and less perfect lines of communication by a progressive system of construction, possesses many features favorable to the first settlement as well as the future requirements of the traffic of new Territories.

7th. That the system proposed for the development of the highways of a new country by progressive stages corresponding with the progress made by the country itself in general advancement, is one peculiarly applicable to the case under discussion; and while it might be expedient, in the first instance, to employ some of the natural water channels as a means of introducing settlers and laborers along the line of road, until the latter became in some degree serviceable, it would not be advisable to incur any great expenditure on works beyond the limits of the great thoroughfare ultimately in view. That the first effort should be made to construct an Electric Telegraph along the precise line of the future Railway, that the Telegraph should be the precursor of other means of communication, beginning, it may be, with a Bridle Path or Indian Trail from post to post, and ending with a perfect line of Railway, when the traffic of the country, or the interests of the nation required the most rapid means of steam communication.

With these remarks I will now attempt to show how the work, in its different stages, may be proceeded with.

The first step required is the location of what has been designated a "Territorial Road" between all the more important or governing points on the line of route. Commencing at the Western Terminus, these points would probably be, the mouth of the Fraser River, or the best harbor on the Pacific coast north of the 49th parallel—the best pass which has been or may be discovered across the Rocky Mountains contiguous to a line which would run along the general direction of "the Fertile Belt"* of the interior—the most southerly bend of the North Saskatchewan River—the best crossing of Red River between its confluence with the Assiniboine and the southerly end of Lake Winnipeg—the best crossing of the River Winnipeg near the north end of the Lake of the Woods—the most northerly bend of the shore of Lake Superior—the best crossing of the French River between its junction with Lake Huron and Lake Nipissing—and lastly, the most desirable point of connection with the existing Railway system of Canada either at Ottawa, at Peterborough, or at Barrie, all of which points are directly connected with the Grand Trunk Railway by means of the branch lines running southerly to it. On the location of the "Territorial Road," which could only be done on a careful survey of the country, the next step would be the determination of Station points from whence to lay out Colonization Roads to the right and left, wherever the soil was favorable for settlement. Upon the Colonization Roads the townships would next be projected.

So soon as any section of the road was finally located, together with its branches, the introduction of settlers might commence. The road should be cleared through the wooded

districts to a width of two chains or 150 feet, in order chiefly to preserve the Telegraph, when erected, from being injured by trees falling. The clearing would at once give employment to settlers, and with subsequent work in improving the road, greatly aid them in paying for their land and in supporting their families until their farms produced sufficient crops. Throughout the open prairie country, which is more than one third of the whole distance, the trouble and expense of clearing would be avoided; but as the great natural obstacles which isolate the interior and prevent the possibility of establishing a continuous Telegraphic communication through the country are the wooded and broken districts at both extremities, it becomes indispensable to force a way of communication through them: this is doubtless a work of considerable labor and corresponding expenditure, but without it no satisfactory progress can be made. This preliminary step is especially requisite to the east of the Red River valley, so that settlers might obtain access to the central plains, and in view of the construction of a continuous line of Telegraph at an early day, to be followed by a waggon road as soon as circumstances would allow, the Territorial line should be cleared through the western division likewise.

The "Territorial Road" from the settlements of Canada to the valley of the Red River would pass through a country only partially explored and consequently but little known; it must be said, however, that what is known of it is not very favorable. More careful surveys, of a portion of the country recently made by the Canadian Government have shown that a large section formerly considered worthless is really fitted for settlement, and is now being rapidly occupied; and it is hoped from this circumstance that at least a portion of the land along those sections of the line yet unexplored is capable of being cultivated.

To begin at one end of the road and gradually extend the settlements northward and westward would, perhaps, be too tedious an operation in view of the importance of opening an early connection with the interior. It would, therefore, doubtless be advisable to begin at several intermediate points accessible by water from Lakes Huron and Superior, and proceed with simultaneous operations. On referring to the map it appears that such points exist at distances ranging from 50 to 90 miles apart, and from these as bases the clearing of the road could proceed in both directions at the same time, while settlements could be formed wherever the soil proved favorable. In due time the clearings, penetrating the forest to the right and left along the line of Road previously located, would pierce the country from one end to the other, and the same being accomplished in a similar manner in the western division, a continuous line of Electric Telegraph might then be constructed.

The extreme importance of the Telegraphic communication extending from colony to colony across the country, even during the earliest stages of settlement, is too apparent to need comment, and being constructed on the precise line of the intended waggon road and of the ultimate Railway, it would always be in the position where its services would be called into requisition.

While the Territorial line through the eastern division gradually became developed into a good waggon road by the labors of the settlers and such grants of money as its importance appeared to warrant, it is probable that the Canoe Routes from Lake Superior to Red River might by partial improvement be made serviceable for ingress and egress during summer to the interior; and with the object of promoting emigration to the central plain

* "There is a broad strip of fertile country, rich in water, wood and pasturage, drained by the North Saskatchewan and some of its affluents; and being a continuation of the fertile prairies of Red River, the eastern water-shed of the Assiniboine and Red Deer River, with the outlying patches called Touchwood Hills, File Hill, &c.

"It is a physical reality of the highest importance to the interests of British North America, that this continuous belt can be settled and cultivated from a few miles west of the Lake of the Woods, to the passes of the Rocky Mountains, and any line of communication, whether by waggon-road or railroad, passing through it, will eventually enjoy the great advantage of being fed by an agricultural population from one extremity to the other.

"No other part of the American Continent possesses an approach even to this singularly favorable disposition of soil and climate; which last feature, notwithstanding its rigour during the winter season, confers, on account of its humidity, inestimable value on British America, south of the 54th parallel.

"The natural resources lying within the limits of the Fertile Belt, or on its eastern borders, are themselves of great value as local elements of future wealth and prosperity; but in view of a communication across the continent, they acquire paramount importance."—*Narrative of the Canadian Exploring Expedition: H. Y. Hind.*

as well as to other points along the line of Road, it would probably be expedient to improve these routes by a limited outlay, but for the reasons already given I cannot help thinking that it would be the wisest policy to concentrate the chief expenditure on that line which must be sooner or later the leading highway through the country.

The expenditure of labor year by year on the Territorial line, as the country at the same time progressed in settlement, would gradually produce a regular stage road capable of being travelled with considerable rapidity; and which would serve all the purposes of transport from one point to another, until the increasing traffic was considered sufficient to maintain a line of steam communication. When that period arrived, comparatively little additional expenditure would be required to complete the line of railway, had proper care been exercised in locating the Territorial road in the first instance, and in constructing the work in its subsequent progressive stages. It is believed that probably not less than four-fifths of the whole length of the line might be ready for conversion into a railway, simply by laying the superstructure of cross-ties and rails on the surface of the macadamized or gravelled road-bed; at other points permanent bridging and reduction of grades would be called for.

I would rather refrain from expressing an opinion as to the amount and mode of expenditure on a work conducted as above suggested, as so little is known of several important sections of the line of route, and so much depends on other considerations of detail. I may, however, by way of illustrating one of a variety of methods by which the general design of the scheme might be carried out, submit the following, premising, that while it is intended that the chief part, if not the whole of the cost, up to a certain stage, should ultimately come out of land sales, it would be necessary for either the Imperial or Colonial Governments to appropriate, in advance, sufficient to defray preliminary expenses; and perhaps it would be advisable that all expenses should be borne in this way up to the completion of a continuous line of Telegraph, to connect the chain of little colonies which would spring up along the line of route. All these expenses might be made a charge against the general Territorial Revenue of the country benefitted, a revenue which would only begin to augment when the lands became easily accessible and were made productive by labor.

It has already been shown that the success of a railway to the Pacific would mainly depend on the possibility of introducing a sufficient number of inhabitants in the country to be traversed; if the population of the country is to govern the period when a railway should be set in operation, we may likewise take it as the basis of annual expenditure on the preliminary stages of the work. Suppose the average annual increase could be reckoned at 100,000 souls,* and that it be determined to expend annually on the works a sum equal to one dollar per head of the whole population in each respective year, the following results in the development of the undertaking might be obtained:—

1st. In from three to four years, besides the expense of surveys, a territorial road line might be located throughout; the wooded districts which extend over a length of more than 1400 miles, might be cleared to a width of two chains; and a continuous line of telegraph constructed from Canada to Fraser's River.

2nd. Within a further period of two years a road passable for wheeled vehicles might be formed along the whole line of route.*

3rd. Macadamized roads of the very best description might be completed, in addition to the foregoing, in the following order:—

* In the whole United States, which country resembles the one under discussion more closely than any other, there are about 1000 inhabitants to every mile of Railway in operation. It would scarcely be safe to estimate that a line through British America could be profitably sustained with a less proportion of inhabitants per mile of its length. The whole length will probably be found to be between 2000 and 2500 miles, and hence the population ought to be from two to two and a half millions. It would thus require 20 to 25 years, even with an annual increase of 100,000 to give the requisite number.

* This would be a common earthen road on the natural surface of the ground, unless where grading and ditching is required; it would be similar to the colonization roads so economically opened by the Canadian Government through the wild country between Lake Huron and the Ottawa, as well as in other districts. Within the last four or five years a total length of nearly 500 miles has been opened, at a cost of about \$250,000.

(1) From Lake Superior to Red River, a distance of 400 miles, in nine years from the present time.

(2) From the mouth of Fraser's River to the Rocky Mountains, a distance of 400 miles, in eleven years from the present time.

(3) From the settlements of Canada to Lake Superior, a distance of 650 miles, within fourteen years from the present time.

(4) From Red River to the Rocky Mountains, a distance of 800 miles, within seventeen years from the present time.

And thus by the comparatively trifling annual outlay of one dollar per head of the assumed gradually increasing population, we could secure in less than four years a line of telegraph, and in thirteen years more a substantially constructed Macadamized road throughout the whole length of the line. The next and final stage of progress would be, the completion of the Railway on the line thus, in a great measure, prepared for it; and in view of the traffic then created, as well as the comparative economy in construction, it might be undertaken in sections by private enterprise, or in such other way as might then appear most expedient.

I am not prepared to say that the foregoing is the best order of sequence in which the several sections and stages of the work should be constructed; it is simply presented for the purpose of showing what might be accomplished by a small annual expenditure. It is not at all unlikely that the peculiar nature of the traffic might warrant the conversion of some section of the route into a railway at an early period,—possibly that section between Lake Superior and Red River would be the first to require the change, which of course could be made without difficulty at any time, so soon as it appeared that the trade of the country was sufficient to maintain it. The order of sequence is not important, but it is an essential part of the system proposed for opening up this vast and roadless country, that every portion of the work done should form a component part of a perfect whole, and that whatever expenditure is made, whether it be one thousand or one hundred thousand dollars, should be laid out in the right place in accordance with a thoroughly digested and well matured plan; the great object in view being to obtain the maximum result of good from the minimum amount of outlay.

I can scarcely hope that the plan of gradual development herein advocated will satisfy the precipitate or the impatient,—those, in fact, who would urge the immediate construction of the road, regardless or ignorant of the cost and the burdens it might in consequence entail on the country—yet there are many who, remembering the tortoise in the fable, will perceive that a slow yet certain movement will accomplish the desired end with as much certainty and perhaps more satisfactorily than if the work was undertaken with the most sanguine hopes of speedy achievement. It is very doubtful, however, if any one will, on reflection, assert that there is really a choice of methods, that is to say, a fast and a slow one—the line of artificial highway proposed to be constructed extends over not less than forty-five degrees of longitude, equal to one eighth of the length of a circle of latitude passing entirely around the globe; the undertaking, therefore, becomes one of no ordinary magnitude, and when in connection with it, half a continent has to be redeemed in part at least, from a state of wild nature, some considerable length of time must necessarily be occupied in the process. Even if it should take a quarter of a century, it would be equal to an average construction of 100 miles of railway a year, as well as the annual introduction of 100,000 emigrants. And, after all, a quarter of a century is but a brief period in the history of a country—half that length of time has already elapsed since the railways of Canada were first commenced, and yet many are of opinion that it would have been better, in some respects, had only one-half the extent of existing lines been yet constructed.

As the character of the work is so colossal and the condition of the country such as to debar the idea of undertaking the construction of a Railway through it in the usual way and as an ordinary commercial enterprise, I am emboldened to think that such a scheme as I have endeavored to sketch, might form the basis of a system possessing many recommendations, and which it is confidently believed might be advantageously adopted in any attempt to establish a great leading highway through the vast unoccupied Territory between the settlements of Canada and British Columbia.

APPENDIX B—Giving a sketch of the foundation and subsequent history of the Red River Settlement with an outline of its present condition, was prepared to accompany this document, but it was not considered necessary to print it for the use of members of the Canadian Legislature.
