CANAL COMMISSION.

LETTER

To the Honorable the Secretary of State from the Canal Commissioners, respecting the Improvement of the Inland Navigation of the Dominion of Canada.

Honorable J. C. Aikins, &c.
Secretary of State of Canada.

OTTAWA, 24th February, 1871.

"SIR,—We have the honor to lay the following information before His Excellency the Governor General in the performance of the duties imposed on us under the Royal Commission, dated 16th November, 1870, viz:—

"To institute and make a thorough enquiry as to the best means of affording such "access to the Sea-board as may best be calculated to attract a large and yearly increasing "share of the trade of the North Western portion of North America through Canadian "waters, as well as a thorough and comprehensive improvement of the Canal System of "our said Dominion, on such a scale and of such a character as would best tend to afford ample "facilities for the expansion and due development of its growing trade and commerce; "and in such enquiry to consider the whole subject, in all its bearings, as well in a commercial as in an engineering point of view, with the object of obtaining such reliable "information thereupon as may furnish the necessary *data* on which to base a plan for the "improvement of the Canal System of our said Dominion, of a comprehensive character, "and such as will enable Canada to compete successfully for the transit trade of the great "Western Country, and especially to enquire into the public works and improvements "hereinafter enumerated, that is to say;

"1st. *The Welland Canal* and the enlargement thereof.
"2nd. *The St. Lawrence Canals* and the enlargement thereof.
"3rd. *The deepening* of the *Channels* through the *Rapids* of the *River St Lawrence.*
"4th. *The deepening* of the said *River* in its most *shallow parts*, between the *Cities* of "*Montreal* and *Quebec.*
"5th. *The Rideau Canal* and its improvement and the development of trade through the "same.
"6th. *The construction* of a *Canal* at the Sault de Ste Marie, between *Lakes Superior* "and *Huron.*
"7th. *The construction* of a *Canal* between the *St Lawrence* at *Caughnawaga* and *Lake* "*Champlain.*
"8th. *The improvement* of the *River Richelieu* and *Lake Champlain* line of *Canals.*
"9th. *The completion* of the *Montreal* and *Lake Huron* system of navigation *via* the "*Ottawa* and *French Rivers.*
"10th. *The construction* of the *Georgian Bay Canal* to connect the *Georgian Bay* with "*Lake Ontario.*
"11th. *The construction* of a *Canal* in the *Township* of *Murray* through the *neck* of land "lying between *Lake Ontario* and the *Bay* of *Quinté* and—

"12. *The construction* of a *Canal* through the *Isthmus dividing* the *Bay* of *Fundy* from "the *Gulf* of *St. Lawrence* at *Bay Verte*,

"And also to enquire as to which of the said several works and improvements hereinbe- "fore mentioned and referred to ought, in the judgement of our said Commissioners, "to be made and constructed for the purpose aforesaid; and in what order they "respectively should be proceeded with; and of what dimensions and depths they "should be constructed; and the probable costs of the construction of such several "works and improvements respectively."

We met at Ottawa on the 25th of the same month, and organized by electing Hugh Allan, Esquire, as our Chairman, and proceeded forthwith to the earnest consideration of the various important subjects to which our attention was directed.

Having learned that surveys were in progress under the direction of the Public Works' Department for the enlargement of the Welland Canal, as well as for the proposed Bay Verte Canal, across the Isthmus separating the Northumberland Straits from the Bay of Fundy, we called upon the Chief Engineer of the Department to state when his reports on these two works would be completed, and were distinctly informed by that officer that it would not be possible for him to have them ready until near the close of the ensuing session of Parliament, and the same statement was repeated to us at our second meeting on the 19th January last.

We regret having to state that, under the circumstances, the necessary information upon all the engineering points of the enquiry respecting these two very important works cannot be laid before us in sufficient time to enable us fully to comply with our instructions, and it therefore becomes necessary to defer making a report until the results of these surveys are available.

At this stage of the inquiry, however, certain information of an important character, bearing both on the engineering and commercial aspects of the inquiry, has been obtained, sufficient to enable us to arrive at satisfactory conclusions as to the actual requirements of the trade, and to warrant us in recommending the course of action to be taken respecting the several proposed works and enlargements enumerated in our instructions, as well as to suggest the order in which they should be proceeded with. All this we think it proper thus early to lay before the Government.

In order to elicit information from all parts of the Dominion, as well as from parties in the United States, directly interested in our trade, a circular letter and list of questions relating to our Canal System was prepared, and upwards of 2,400 copies were despatched without loss of time. Copies were sent to every Board of Trade and Chamber of Commerce in Canada, to the Boards of Trade in the principal Cities of the neighboring States, to every Senator and Member of Parliament, to the Mayor of every city and town, to every newspaper published throughout the Dominion, to every leading newspaper in the neighboring States, and to all the principal merchants and other individuals throughout the Dominion, who were supposed to possess any special knowledge of this subject.

Circular letters were also addressed to the Collectors of Customs at all the principal ports on the inland lakes, both in Canada and the United States, for returns of the available draught of water in their respective ports.

The appeal thus made was very generally responded to. A great deal of practical knowledge was brought to bear upon the subject; and many of the replies evince an extended acquaintance with the operation and requirements of that great and annually increasing trade of which the St. Lawrence is the natural outlet.

In the interval between our first and second meetings, replies were received from the Boards of Trade at Halifax, N. S., St. John, N. B., Quebec, Ottawa, Kingston, Belleville, Toronto, Hamilton, London, Stratford, Guelph, Windsor, in Canada; and Chicago, Milwaukee, Detroit, Toledo, and Oswego, in the United States,—from Corn Associations at Montreal and Toronto—from Corporate Towns and Public Meetings, and from sixty-four individuals—in all eighty-seven. The reply from the Montreal Board of Trade did not come in until the 3rd Feb. inst.

These replies, when categorically given, were all condensed and arranged by our

Secretary's directions under their several appropriate heads, so as to show at a glance, both for purposes of contrast and comparison, the facts, opinions and recommendations, contained in the numerous and lengthy communications laid before us. Where not so given, the remarks, if deemed important, are added at the end of the questions relating to each work. These abstracts contain such a mass of valuable information relating to the commercial aspect of the enquiry, that we consider it proper to submit them with this letter for the information of the Government. (Appendix A.)

Tables showing the actual depth of water in the principal Harbors on the Inland Lakes, compiled from official returns, are also appended. (Appendix B.)

Tables of distances by water, on ten different routes between Inland Lake ports and Atlantic sea ports, compiled by the Secretary from the best and latest authorities, are likewise appended. (Appendix C.)

These abstracts and tables, together with the various Surveys, Maps, Plans, Reports, Estimates and documents, relating to the Canal System of the Dominion, and to the projected works and enlargements enumerated in the accompanying list, were laid before us at our second meeting in Ottawa on the 18th January last. (Appendix D.)

We now propose to give a very brief historical sketch of the several canals to which our attention has been directed, describing their inception, and the progress and changes in them from time to time to adapt them to the ever-increasing demands of the trade. Then will follow a statement of our views upon the commercial aspect of the question, and the decision and recommendation respecting the works required for the further enlargement and extension of the Canal System of the Dominion, and the order in which they should be undertaken and proceeded with; and finally, the engineering features, showing the effect of the proposed improvements upon existing works, and their probable cost.

HISTORICAL SKETCH OF THE CANALS OF CANADA.

Of the great arteries of this Continent none surpasses the St. Lawrence in the length of its navigation, the volume of its waters, or the fertility of the vast area of country of which it forms the highway of communication with the Atlantic Ocean. Following it, not from its remote sources, but from Fond du Lac, at the head of Lake Superior, to the Straits of Belle Isle, the entire distance is 2,392 statute miles. In its course from Lake Superior to the sea, its volume is swelled by the waters of the great Lakes, and smaller expansions, as well as by numerous tributaries of no insignificant size or importance. Between Lakes Superior and Huron, it is known as the Ste. Marie, between Huron and St. Clair, as the St. Clair; between St. Clair and Erie as the Detroit; between Erie and Ontario as the Niagara.

Below Quebec, the breadth of this magnificent river increases until it is about one hundred miles at its junction with the waters of the Gulf.

The importance of the St. Lawrence navigation has always been fully appreciated by the people of Canada, and large sums of public money have been wisely devoted toward the improvement of its facilities, not merely for internal and local, but for the ever increasing commerce of the Basin of the Great Lakes. Not only has the channel of the river been deepened and otherwise improved, but an expensive system of canals constructed to overcome the natural obstructions, and connect the Lakes with tide water. Steamers and ships of large tonnage can now proceed directly from the Ocean to Quebec and Montreal, a distance of 986 miles. From Montreal, however, to Lake Erie, the capacity of the vessels is limited to the size of the canals, of which we propose now to give a brief historical and statistical sketch, before proceeding to state the conclusions at which we have arrived from the facts before us, and to shew the immense interests connected with the important question which has been submitted to the consideration of the Commissioners.

The Canals of Canada, now in operation, have been constructed for the purpose of improving the following routes of navigation:—

First—The St. Lawrence navigation;
Second—The Montreal and Kingston, by way of the Ottawa and Rideau Canals;
Third—The Richelieu and Lake Champlain;
Fourth—The Bras D'Or Lake (in Cape Breton) and the Ocean.

THE ST. LAWRENCE ROUTE.

First in importance is the St. Lawrence system of Canals, which commences at Montreal, and ends at the foot of Lake Erie. On this route the works are known as the Lachine, the Beauharnois, the Cornwall, the Farren's Point, the Rapide Plat, the Galops, and the Welland, and have a total length of 71 miles, with a total lockage of 553 feet, through 54 locks.

Lachine Canal.

Above the city of Montreal, now the head of the Ocean navigation of the St. Lawrence, are the rapids of St. Louis, perhaps better known as the Lachine Rapids; and in order to surmount this natural obstacle the present Lachine Canal was suggested soon after the conquest of Canada, and in fact its necessity was earnestly urged before the passage of the Constitutional Act, in 1791. No practical steps, however, were taken toward the construction of the Canal till the year 1815, when the Legislature passed a Bill appropriating £25,000 in aid of its construction, at the recommendation of the then Governor General, Sir George Prevost. At that time its necessity in a military point of view was obvious to the military authorities; and, no doubt, the work would have been immediately commenced after the passage of the Act, had not peace ensued. Not until the year 1819 did the project again come before the public, and then the Act of 1815 was repealed and another passed for the incorporation of a Joint Stock Company, with a capital of

$600,000, in $200 shares. This scheme also proved abortive, for, on the 26th of May, 1821, a Bill was passed through the House repealing the Act of Incorporation, and authorising the Government to construct the Montreal and Lachine Canal as a Government work. Commissioners were immediately appointed to superintend and carry out the project, and on the 17th July, of the same year, the ground was broken at Lachine.

The British Government contributed £10,000 sterling, or $50,000, towards the accomplishment of the work, on the condition that all military stores should pass free, and the Province paid the remaining expenditure on the Canal, the whole cost of which, to the end of 1826, amounted to $438,404 15.

The Canal was opened for the passage of vessels in 1825. It was 28 feet at the bottom, 48 feet at the water-line, with 4½ feet depth of water; with seven locks 100 × 20 feet, built substantially of stone.

The Canal, as first constructed, was very soon found to be inadequate to the requirements of commerce, especially of Upper Canada. When the project of uniting the Canadas became the great question of the day, Lt.-Colonel Phillpotts, acting under the instructions of the Earl of Durham, reported in favor of an improved Canal navigation, with locks throughout of the same dimensions as had been adopted for the Cornwall Canal, viz.: 200 feet in length by 55 in breadth, and 9 feet of water on the sills. Colonel Phillpotts also proposed a new line for the Lachine Canal, and estimated the total cost of the suggested improvements at $1,579,720. After mature deliberation, however, as to the exigencies of the Lake trade, then in its infancy, it was decided to retain the old location of the Canal, and to enlarge it to 200 feet by 45 feet for the locks, with 9 feet of water on the sills; a width of canal 80 feet at bottom, and 120 feet at water surface, the length remaining as before 8½ miles. During the alteration, navigation was not discontinued, for the new locks were constructed by the side of the old ones.

In 1844, in the course of the progress of the improvements, it was decided, at the earnest solicitation of the mercantile community of Montreal, to deepen locks 1 and 2 to 16 feet of water on the sills, so as to admit the largest sea-going vessels then trading to Montreal, into the first basin of the Canal. In the spring of 1848, the works were sufficiently enlarged to admit the passage of craft. It was not, however, till the month of May, 1862, that the Canal was excavated to its full width, a very expensive undertaking, as the cutting is through the silurian lime stone for some distance inland.

The present Canal is of the following dimensions:—

Length	8½ miles.
No. of Locks	5
Dimensions of Locks	200 × 45 feet.
Total rise of Lockage	44¾ feet.
Depth of water on sills—	
At 2 locks	16 „
At 3 „	9 „
Breadth of Canal at bottom	80 „
„ „ water surface	120 „

The whole cost of this work up to July 1st, 1867, was $2,537,532 80. (Public Works' Report for 1867).

Beauharnois Canal.

The Beauharnois Canal was the inevitable sequence of the Lachine, and the improvement of inland navigation, and was built to overcome the rapids called the "Cascades," "Cedar," and "Coteau," occupying altogether a distance of 7 miles, and to afford safe navigation between Lakes St. Louis and St. Francis.

In the early period of Canadian trade, the most sanguine commercial minds hardly appreciated the progress it would make before half a century had passed away. Four short canals gave facilities to boats carrying 30 barrels of flour for passing from Lake St. Francis into Lake St. Louis. Several minor improvements were made in this part of the St. Lawrence navigation, according as the exigencies of business demanded, but by the

year 1833, the question became of such pressing importance that the Government of Lower Canada appointed Commissioners to consider all matters relating to the navigation of the St. Lawrence, between Lachine and Cornwall. Mr. Mills, the Engineer of the Commissioners, submitted several plans, based on the dimensions adopted for the Cornwall Canal, and his report was referred to a special Committee of the House, who approved of it, and recommended a grant of $960,000 towards carrying out its recommendations, which proposed, as the best plan, short Canals at the three rapids, and using the river between them.

This Report, however, fell still-born, and was followed by others, from Mr. A. Stevenson, in 1834, and Messrs. Stevenson & Baird in 1835, to equally little purpose. In 1839, Colonel Phillpotts, before referred to, recommended a Canal on the north side of the river, for military reasons, though he acknowledged at the same time that it was probable one on the south side would cost less.

The first decisive action on the part of the Legislature, subsequent to the foregoing reports, we find recorded in the memorandum submitted by the Board of Works in 1841, after the Union of the two Provinces, and this was the recommendation that the sum of $1,023,600 be devoted to the construction of a Canal to avoid the three rapids, after the design made by Mr. Mills, in 1834, for three short Sections of Canal on the north side of the river.

In the winter of February, 1842, the Chief Engineer of the Board of Works reported in favor of a Canal on the south shore, chiefly on the grounds that it would be shorter, above and independent of all water courses, uninfluenced by the Ottawa waters, and consequently navigated two or three weeks longer every season than the one proposed on the north shore. The question, as to the best route for the Canal, then became a matter of earnest discussion before a Committee of Parliament, but it was not until the summer of 1842, that the contracts were entered into for construction, nearly on the route proposed by Mr. Stevenson in 1834.

By the close of navigation in 1845, the Canal was opened, but it was then found that its upper entrance was imperfect, its channel crooked, and not sufficiently deep in dry weather and impeded by cross currents; other difficulties also presented themselves, and in the course of years, up to a very recent date, dams, regulating weirs and dykes have been erected at large expense to the country in order to give the requisite facilities to the trade passing through the Canal. Much difference of opinion existed at the time of the inception of the Work, and has continued down to the present day with respect to the best route of the Canal—many persons contending that for Military reasons it should have been located on the north side—others arguing that its natural position is where it is now situated,—but the Commissioners have no intention of going into this question. (Appendix A.)

The following are the dimensions of this work at the present time:—

Length	11¼	miles
No. of Locks	9	
Dimensions of Locks	200 feet	× 45
Total rise of Lockage	82½	"
Depth of Water on Sills	9	"
Breadth of Canal at bottom	80	"
" " Water surface	120	

Total cost to 1st July 1867, $1,611,424 11

Cornwall Canal.

The next Canal which comes in natural order is that which extends from the town of Cornwall to the Village of Dickinson's Landing, on the North shore of the river, to overcome the obstructions known as the Long Sault Rapids. (App. A.) From the sketches already given of the other Canals, it will be seen that this work was actually the first in the series constructed on the present scale, and that its dimensions was the standard for the

others. As far back as the year 1817, the Governor of Upper Canada, in his speech at the opening of the Legislature, called the serious attention of Parliament to the important question of the navigation below Prescott. In 1818, a Joint Commission was appointed by the Government of Lower and Upper Canada, and reported in favor of improvement between Montreal and Lachine, between the head of Lake St Louis and Lake St. Francis, and also at the rapids above Lake St. Francis. They recommended the construction of Canals, of a limited capacity—not more than four feet deep—but no definite legislative action took place on the subject until December 1826, when a Report was laid before Parliament by the Governor, shewing the length of the proposed Canals between Lakes Ontario and St. Francis, and their probable cost. The question, however, remained in abeyance until 1832, when the House of Assembly of Upper Canada passed measures appropriating the sum of $280,000 for the improvement of the navigation of the St. Lawrence, so as to admit vessels drawing 9 feet water, and recommending the immediate commencement of such improvements between Cornwall and the head of the Long Sault Rapids. One of the stipulations of the Act was the completion of the Cornwall Canal before any of the other proposed works, leading to Lake Ontario, should be undertaken. In 1833, a Commission was appointed for the purpose of carrying out the provisions of the Act, and Mr. Benjamin Wright was employed as engineer with authority from the Government of Lower Canada to make the survey of the lower Canals, on a scale commensurate in all respects with those of the Upper Province.

Public Works' Report 1867, page 18.

Without going into unnecessary details, it will be sufficient to mention that the Engineers determined on Locks 55 feet wide, 200 feet long between the gates, with 9 feet depth of water on the mitre sill; Canal 100 feet wide at bottom, to admit the passage of steam boats; these would allow the passage of vessels 175 to 180 feet long. That, for the improvement proposed at the four several places above the Long Sault, where vessels would only use the Canals when going up, and run the rapids when going down, the breadth of the Canals should be only 50 feet at bottom.

The suggestions of the Engineers were adopted by the Legislature, and Commissioners were subsequently appointed to superintend the works. The services of Messrs. Wright and Mills were engaged as Engineers, as well as those of Captain Cole, R. E. and Messrs. Geddes and Fleming. In 1834 the work was put under contract, and the first sod cut with considerable ceremony by the late Sir John Beverly Robinson.

The rebellion, as well as financial causes, retarded the completion of the work for some years. The passage of the first steamer, in December, 1842, through the locks, was the occasion of some ceremony, but it was not until the month of June, 1843, that the work was formally opened.

Since the completion of the Works, several improvements have been authorized for the purpose of increasing the depth of water, and giving other facilities to vessels passing through the Canal. At the present time, the Canal is of the following dimensions:—

Length	11½ Statute Miles
No. of Locks	7
Dimensions	200 feet × 55 feet
Total rise of Lockage	46 „
Depth of water on Sills	9 „
Breadth of Canal at bottom	100 „
„ „ water surface	150 „
Cost to July 1st, 1867,	$1,932,152 69

The Williamsburg Canals.

We have now come to that series of Canals known as the Williamsburg, viz:—The Farran's Point, Rapide Plat, and Galops Canals. Appendix A.

The Farran's Point Canal extends from the foot to the head of the rapids in that

locality, on the north side of the River, and is only used, as a rule, by vessels coming up the river.

Before the question of the Cornwall Canal was mooted, the construction of the work had been discussed, and some surveys made of the place; but it was not until four years after the Union between Upper and Lower Canada, that the work was actually commenced. The Canal was completed for traffic by October, 1847.

The Rapide Plat Canal, the second of the series, extends on the North shore from Morrisburg to the head of the swift current, and has been rendered necessary by the Rapids from which it takes its name. Several Reports were made respecting this work previous to the Union, but it was not until 1843 that the necessary surveys were made.

The works were commenced in the Spring of the ensuing year.

The Galops Canal was constructed to avoid the Rapids at Point aux Iroquois, Point Cardinal, and the Galops, and is also on the North side of the St. Lawrence. Mr. Benjamin Wright, as early as 1833, recommended the construction of Canals to avoid these obstructions, and Colonel Phillpotts subsequently approved of his plan which was not, however, carried out. In 1843, the Board of Works of the United Provinces prepared a design which was adopted and carried immediately into effect. This design was the construction of a Canal three miles long to avoid the Iroquois Rapids, the use of the waters of the St. Lawrence for a distance of 2⅜ miles, and then the construction of another Canal from the foot of the Galops Canal Rapids, 2¼ miles long. Both these Canals were opened to the public in September of 1847; but it was soon seen that the Iroquois Canal had not a sufficient depth of water for vessels ascending, and it was therefore found necessary to connect that work with the Galops.

The Junction Canal, the name of the central section for a time, was finally completed in 1856, and the three works are now known under the one designation of the Galops Canal.

The following are the dimensions of the Williamsburgh series:—

Farran's Point.

Length of Canal	¾ mile.
No. of Locks	1
Dimensions	200 feet × 45 feet.
Total rise of Lockage	4 „
Depth of water on Sills	9 „
Breadth of Canal at bottom	50 „
„ water surface	90 „

The Rapide Flat.

Length of Canal	4 miles.
Number of Locks	2
Dimensions	200 × 45 feet
Total rise of Lockage	11½ feet
Depth of water on Sills	9 „
Breadth of Canal at bottom	50 „
Breadth at surface of water	90 „

The Galops.

Length of Canal	7⅝ miles.
Number of Locks	3
Dimensions of locks	200 × 45 feet.
Total rise of lockage	15¾ „
Depth of water on sills	9 „
Breadth of Canal at bottom	50 „
„ „ at surface of water	90 „

Total cost of these works to July 1st, 1867, was $1,320,655 54.

The Welland Canal.

After leaving the "Galops" we have to travel a distance of 226 miles, partly by the river, but chiefly by Lake Ontario, and then we come to, perhaps, the most important part of our Canal System—the Welland Canal, which connects Lake Ontario with Lake Erie, by carrying the navigation around the famous rapids and falls of the Niagara River. (Appendix A.) The early history of this work shows what difficulties attended its commencement, and it is obvious that, had not the public men of Canada become in time fully alive to the importance of the interests involved in its construction, the Welland would not have been built as soon as it was. It would be impossible within the limits proposed for this sketch to give anything like a full history of the obstacles that impeded for years the successful accomplishment of this all-important outlet for the trade of the Western Country.

As early as the month of February, 1816, a joint Committee of both Houses of the Parliament of Upper Canada reported on this and other works connected with inland navigation, and Colonel Nichol subsequently introduced a bill to appropriate money for a complete survey of the best route of water communication between Lakes Erie and Ontario as well as between Lake Ontario and Montreal. No decisive action, however, resulted from this step, and we do not again hear of the project until two years later, when a Committee of the House reported favorably on a petition from the people of Niagara (old Newark), and suggested the formation of a Committee to carry out the work. In 1821 a Commission was appointed to consider the subject of Inland Navigation, and it reported in 1823 in favor of constructing the Welland of such dimensions as would accommodate the class of vessels then navigating the lakes. The result of this report was the incorporation of a private company, on the petition of W. H. Merritt and others, in 1824, under the title of the Welland Canal Company, who proposed to establish the necessary communication by means of a Canal and Railway. They intended running up the natural waters of the Welland River, and to pass across the township of Thorold, tunnelling through the high ridge of land about a mile and a half, and then proceeding directly by a Canal to the brow of the high land; then a railway was to descend the high land, and connect by means of another Canal with the navigable waters of Twelve Mile Creek, so as to afford the required egress to Lake Ontario. The Canal portion was to be of capacity sufficient to accomodate boats of not less than 40 tons burden.

Public meetings were called, surveys made, and other steps taken to excite public opinion in favor of the undertaking; but it will show how little interest was taken, when we mention the fact, stated in an official document, that at the ceremony of breaking the ground, on the 30th November 1824, not half a dozen gentlemen of capital or influence in the district attended. By 1825, the former scheme was considered objectionable, and a new one adopted for the admission of schooners and sloops. It was determined to have the entrance at the mouth of the twelve mile creek or Port Dalhousie, and the upper terminus at the Welland River, from whence the supply of water for the Canal was to be drawn. It was also contemplated, at an early day, to establish a communication between the Welland River and Lake Erie, so as to avoid the impediments to navigation below Fort Erie. It was proposed to have wooden locks 110 feet in length by 22 feet in breadth, the cross section with 26 feet at bottom and 58 feet at the surface of the water, except through the deep cut, which was to be only 15 feet wide at bottom, for two miles the depth of water was to be 8 feet.

In the Summer of 1825, the Company set to work to carry out their project, with an ostensible capital of $800,000, and their history henceforth was one of financial embarrassmen

In 1826 they obtained a loan of $100,000 for three years from the Upper Canadian Government, and a promise of a contribution of one-ninth of the estimated cost from the Imperial Government, on certain conditions—the locks to be 22 feet wide, and all property of that Government to pass free. In 1827, the Government of Upper Canada took stock in the undertaking, to the amount of $200,000, and the Government of Lower Canada to

the extent of $100,000. The Imperial authorities gave a grant of 13,000 acres of land, in the vicinity of the Canal, and subsequently gave a loan of $200,000 for ten years, at 4 per cent. interest. In 1828, a slide of earth occurred in the excavation of the Deep Cut, and added greatly to the embarrassments of the Company, for it obliged them to abandon the Welland River as a feeder. The Company finally adopted the Grand River as a new feeder, and carried on the works with considerable energy, for water was let into the Canal in the fall of 1829, and in the month of November, exactly five years after the time the works had been commenced, two Schooners, one of 85 tons burden, the other of smaller size, ascended the Canal from Lake Ontario, to the Welland River. Then the Company, having accomplished so much, thought it an opportune time to seek further aid from the Government, for the purpose of carrying out the work to completion. They prayed the Legislature to grant $100,000, and to allow them to increase the Capital Stock to $1,200,000; and after considerable discussion, the vote in favor of the project was carried by very narrow majorities. Subsequently, the Company proposed to extend the main line of Canal over the Welland River to Port Colborne (Gravelly Bay), by enlarging about five miles of the feeder, and excavating a new Canal for the remaining distance to the Bay.

In 1851, the Government approved of this project, and granted a loan of $200,000 for the completion of the work, which was immediately commenced, and completed in 1833. At this time, the Canal occupied nearly the same site as the present one, but the locks were of small dimensions, and exclusively of wood.

No works of importance were constructed on this Canal until after the union of the two Provinces. In 1837, the Government took the step of converting all its loans up to that time, into stock, and was authorized to subscribe $980,000 new. The capital stock of the Company was declared to be $1,195,200, and the Directors were limited to an expenditure of $400,000 during the year. In 1839, an Act was passed in Parliament by a vote of 26 against 9, to authorize the Government to purchase all the private stock, so that the work should become public property, but no steps were taken, in consequence of financial difficulties, to carry out that design, until 1841, when the works were placed under the control of the Board of Works. The total expenditure by the Government on the Canal amounted at that time to $1,851,427 77, but as the work was inadequate to the requirements of the trade, it was decided to enlarge the Canal, but not to the full extent proposed by Colonel Phillpotts in 1839, viz.; Locks, 200 feet long by 55 feet broad. It was, however, determined to rebuild all the locks with stone, 120 × 24 feet, with 8½ feet of water on the sills, that the aqueduct should also be rebuilt with stone, that the feeder should be converted into a navigable Canal; that the harbors of Port Dalhousie and Port Colborne should be improved; that the first two locks at Port Dalhousie, and the one at Port Colborne should be 200 × 45 feet, with 9 feet of water on the sills; and finally, that the Port Maitland branch should be undertaken and completed, with an entrance Lock from Lake Erie, 200 × 45 feet, with 9 feet depth. Henceforth, the progress in the improvement of the works was systematically and successfully conducted, until the Canal reached its present condition, of which the following statistics will afford a general idea:—

	Main line from Lake Ontario to Lake Erie	Welland River Branches.	Grand River Feeder.	Port Maitland Branch.
Length of Canal	27 miles and 1,099 feet	Port Robinson Cut to Welland R., 2,622 feet. Welland Canal to Welland River—no Lock at Aqueduct, 300 feet. Chippewa Cut to Niagara R., 1,020 feet.	21 miles	1¾ miles.
Pairs of Guard Gates	3			
Number of Locks	27 lift locks	1 at Aqueduct and 1 at Port Robinson, 2	2	1.
Dimensions of Locks	2 of 200×45 feet; 24 of 150×26½ „; 1 of 230×45 „	150×26½ feet	1 of 150×26½ feet; 1 of 200×45 „	185×45 feet.
Total Rise of Lockage	330 feet. 2×8=16 Grand R. level.		7 to 8 feet	8½ feet.
Total Lockage	346	From Welland Canal down to Welland River, 17 feet		
Depth of Water on Sills	10½	9 feet 10 in.	10½ feet	11 feet.
Total Cost to 1st July, 1867	$7,638,239 83.			

Burlington Bay Canal.

Another work which may be considered to form a part of the St. Lawrence navigation, is the Burlington Bay Canal, which enables vessels to reach the City of Hamilton from the Lake. It is simply an open cut across a sand bar at the entrance of Burlington Bay; it is half a mile long, with an average breadth of 138 feet between piers, and is navigable for vessels drawing 12 feet of water. On the 19th March, 1823, a Bill was passed in the Legislature of Upper Canada, authorizing the construction of this work, which was completed by 1832. After the Union, the work was enlarged and otherwise improved. The amount expended on it altogether, was $432,684 40.

The Canadian system of Canals connecting the Lakes with the St. Lawrence, ends with the Welland. At Sault Ste. Marie, however, the Americans have constructed a Canal a mile and one-seventeenth in length, with locks capable of allowing the passage of vessels of 2,000 tons. In this way the trade of Lake Superior finds its outlet to Buffalo and other ports on Lake Erie. The Americans have also improved the navigation through Lake George and over the St. Clair Flats. To this subject, however, we shall refer at greater length elsewhere.

THE OTTAWA AND RIDEAU ROUTE.

We shall next refer to the second part of the Canal System of Canada, viz., the works between Ottawa and Montreal, and between Ottawa and Kingston, which may now be considered as feeders to the trade of the St. Lawrence.

In the Annual Reports of the Department of Public Works the line of navigation which these Canals facilitate is given as the "Montreal and Kingston *via* Ottawa and Rideau Canals." The Canals are called the "Ste. Anne," or rather the "Ste. Anne Lock," the "Carillon," the "Chûte à Blondeau," the "Grenville," and the "Rideau," and have a united length of 142⅞ miles, inclusive of the Lachine.

The Ste. Anne Lock was constructed for the purpose of enabling vessels to pass the rapids of the same name, situated at the junction of the Ottawa with the St. Lawrence. The work was recommended by the Legislature of Lower Canada, as far back as 1831, and reported upon by Colonel Duvernet, R.E., but various causes contributed to prevent the commencement of the work until the 18th May, 1840, by the Board of Works. By the end of June, 1843, boats were able to pass through the Canal, and the work was completed finally in the Autumn of the same year. Since that year, various improvements have been made in the work, and now the Canal has the following dimensions:—

Length	$\frac{1}{8}$ mile.
Number of Locks	1
Dimensions	190 × 54 feet.
Total rise of Lockage	3
Depth of Water on sills	6 at low water. 7 at ordinary high water.
Cost to July 1st, 1867	$134,456 51

Next in order come the Ordnance or Military Canals, known as the Carillon, the Chûte à Blondeau, the Grenville, and the Rideau. The Carillon is distant 27 miles from Ste. Anne, and was constructed on the north side of the Ottawa River, to avoid the "Carillon" rapids. It was projected in 1819, and subsequently completed under the direction of the "Royal Staff Corps," and at the expense of the British Government. Its dimensions are now:—

Length	$2\frac{1}{8}$ miles	
Number of Locks	3	two rising. one falling.
Dimensions Lift Lock No. 1	128 × $32\frac{1}{2}$	feet.
" " No. 2	$126\frac{1}{2}$ × $32\frac{1}{2}$	"
" Guard Lock No. 3	$126\frac{1}{2}$ × $32\frac{3}{4}$	"
Total Lockage	$34\frac{3}{4}$	$21\frac{3}{4}$ upwards. 13 downwards.
Depth of Water on the Sills	$6\frac{1}{2}$	feet.
Breadth of Canal at Bottom	30	"
" " at Surface	50	"
Cost to July 1st, 1867, of "Carillon," "Grenville" and "Chûte à Blondeau"	$63,053 64	

The Chûte à Blondeau lies on the north side of the river, four miles above Carillon, and is constructed through solid rock to avoid the rapids from which it takes its name. It was also designed at the same time as the Carillon, by the Royal Staff Corps, and may be described as follows:—

Length of Canal	$\frac{1}{8}$	Mile.
Number of Locks	1	
Dimensions	$130\frac{5}{6}$ × $32\frac{5}{6}$	feet at upper end.
"	$36\frac{1}{3}$	" at lower end.
Total rise of Lockage	$3\frac{3}{4}$	feet.
Depth of water on Sills	6	"
Breadth of Canal at Bottom	30	"
Breadth of Canal at Surface	30	"

The Grenville follows the Chûte à Blondeau, $1\frac{3}{8}$ miles further up, and lies also on the north side of the river, with the object of surmounting the rapids known as the Long Sault. Its history is that of the two previously mentioned works. So far as the records

go to show, the Grenville was the last work completed; but the first passage through all of them was not made until the latter part of April 1834, when the steamer *St. Andrew's* passed through them.

The proportions of the Grenville Canal are as follows:—

Length of Canal			5¾ miles.
Number of Locks			7
Dimensions of Locks—			
Lift Lock No. 5	Combined		130⅔ × 32½ feet.
„ „ 6			128⅓ × 32 „
„ „ 7			128⅓ × 31⅔ „
„ „ 8	„		128 × 32⅓ „
„ „ 9			107⅔ × 19 „
„ „ 10			106⅔ × 19¼ „
Guard Lock No. 11			107 5/12 × 19 1/12 „
Total rise of Lockage			45¾ „
Depth of water on sills			5 „
Breadth of Canal at bottom			20 to 30 feet.
„ „ surface of water			25 to 60 „

The Rideau Canal extends from Ottawa City to Kingston, and makes the Rideau and Cataraqui navigation available for craft of a certain depth of water, for a distance of 126¼ miles.

The necessity for the construction of such works was seen during the war of 1812, and in the year 1815, Captain Jebb, of the Royal Engineers, was sent by the military authorities to examine into the practicability of finding a satisfactory route. This gentleman reported favorably on the project, but no decisive action was then taken in reference to it by the Imperial Government. In 1824 they offered a loan of $340,566 67 towards the construction of the Canal, and Mr. Clowes was thereupon instructed by the Upper Canadian Commissioners, appointed previously on the question of Inland Navigation, to make a survey of the proposed work.

He submitted three plans, and in 1825, the Committee to whom his Report was submitted, recommended the adoption of the one with 5 feet of water. The Government of Upper Canada, however, on full consideration, declined to construct the work, as they believed that the improvement of the St. Lawrence navigation was best calculated to promote the commercial interests of the country, and that the accomplishment of the work should devolve on the Imperial Government, if it was necessary chiefly for military reasons.

Accordingly the Imperial Government sent out a Commission of Royal Engineers to report on the work, and subsequently determined to construct it. In the autumn of 1826, Colonel By, R.E., arrived from England, and immediately commenced the construction of the works, Sir John Franklin laying the foundation stone. The works were completed in the spring of 1832, and the steamer *Pumper* passed through from Bytown to Kingston.

Length of Canal		126¼ miles.
Number of Locks 47	From Ottawa to Kingston 33 ascend,	
	14 descend.	
Total Lockage, 446¼ feet	282¼ rise	High water.
	164 fall	
Dimensions of Locks 134 × 33 feet.		
Depth of water on Sills	5 feet navigable depth.	
	4½ „ through Canal.	
Breadth of Canal at bottom	60 feet in earth.	
	54 „ rock.	
„ „ at surface of water	80 „ earth.	
Cost to 1st July, 1867		$4,064,764 47.

RICHELIEU CANALS.

The third series in the Canal System of Canada is that which has been constructed to connect the St. Lawrence with Hudson River *via* the Richelieu and Lake Champlain. (App. A). The Richelieu river is situated 46 miles below Montreal, and 114 miles above Quebec. The obstructions to its navigation are removed by a Canal at St. Ours, 14 miles from its mouth, and by another, 32 miles further up, known as the Chambly Canal. The route is thence free from difficulties for the remainder of the river Richelieu and Lake Champlain, at the head of which the Americans have a Canal properly called the Whitehall Canal; by means of this and a small portion of the Erie Canal, boats are enabled to reach the Hudson at Albany, 311 miles from Montreal.

The Chambly Canal was suggested, like most of the Canadian Canals, after the experiences of the American war of 1812.

In 1818, the Parliament of Lower Canada passed a Bill, granting to a Company the right of constructing a Canal to avoid the Chambly Rapids, and otherwise improve the navigation of the Richelieu. The Company made the necessary surveys and published a report in reference to the best plan of constructing the works, but several years passed away and nothing was done to carry out the provisions of the Act. Accordingly the Legislature passed another Act appropriating $200,000 for the construction of the works, and providing for the appointment of Commissioners to commence the undertaking after the completion of the Lachine Canal. Still the project made no progress until 1830, when the Commissioners ordered the dredging of the bed of the river; this work was continued throughout that and the following year, and finally in March, 1835, Mr. Hopkins was appointed Engineer of the Chambly Canal. He altered the original design, with the approval of the Commissioners, who entered into contracts for the construction of the works, and also applied to Parliament for additional assistance. The Legislature thereupon made an appropriation of $38,000, but the Bill did not receive the Royal assent.

The Chambly Canal lies on the west side of the Richelieu, extending from Chambly Basin up to St. John, twelve miles. On the appointment of the Commissioners just referred to, in 1829, they ordered the necessary surveys to be made, and two years later the work was regularly placed under contract for the gross sum of $184,872, but the contractors were obliged to suspend on account of having taken the work at too low a rate. Considerable progress, however, had been made in the construction of the Canal, and when the state of affairs had been reported to the Legislature, a Bill was passed through the Houses, in 1835-'36, granting the requisite funds, but it also failed to receive the Royal assent. During the ensuing year the want of funds continued to be the difficulty, and it was not until 1841 that the work was taken energetically in hand by the Board of Works.

The Canal was opened two years later, but the work was found to be in a very unsatisfactory condition, and at last, in 1858, it had to be renewed to a large extent.

At present the Chambly Canal may be summarized as follows:—

Length of Canal	12 miles.
Number of Locks	9
Guard Lock No. 1, at St. John	122 × 23½ feet.
Lift " " 2, "	124 × 23½ "
" " " 3, 4, 5, 6	118 × 23 to 23 $\frac{7}{12}$ feet.
Total rise of Lockage	74 feet.
Depth of water on Sills	7 "
Breadth of Canal at bottom	36 "
" " surface	60 "
Cost to July 1st, 1867	$634,711 76.

The Saint Ours Lock and Dam was commenced in 1844 under the Board of Works, and was completed in 1849. The dimensions are as follows:—

Length of Canal	⅛ mile.
Number of Locks	1
Dimensions of Lock	200 × 45 feet.
Total rise of Lockage	5 feet.
Depth of water on Sills	7 „ at low water.
Cost to 1st July, 1867	$121,537 65.

ST. PETER'S CANAL.

The only Canal in actual operation in the Maritime Provinces is that which connects the Bras D'Or Lake of Cape Breton with the ocean. (App. A.) The width of the Isthmus separating the sea from the lake, which is a noble sheet of water, abounding in fish, and surrounded by a country rich in mineral and agricultural resources, is only half a mile. The project of canalling it was mooted at an early date by the representatives of Cape Breton in the Legislature of Nova Scotia. In 1821, a survey was made by Mr. Francis Hall, and other surveys by Mr. C. W. Fairbanks, and Captain Barry in subsequent years. The design of the latter, for a Canal 22 feet wide at bottom, and 13 feet deep, was adopted, and the work commenced on September 7th, 1854, and continued until 1858, when Mr. Laurie, then Chief Engineer of the Province, made an unfavorable report as to the probable remunerative results of the work, and suggested a marine railway as the best means of accommodating the trade of the locality. The works were then suspended for some time, but the Cape Breton representatives continued urging the necessity of the undertaking, and the construction of the Canal was resumed in 1864. The St. Peter's Canal was among the public works handed over to the Dominion, in 1867, since when the work has been completed, and is now 2,400 feet long, with a breadth of 26 feet at bottom, with one tidal lock, 26 × 122 feet, and four pairs of gates. The depth of water in sills, at lowest water, is 13 feet—the extreme rise and fall of tide in St. Peter's Bay, being about 9 feet. Cost previous to Union was $160,811 95, and up to 30th June, 1870—$142,225 78, or a total of $302,037 53 to that date in N. S. currency.

Projected Canals.

Besides Canals in operation, several others have been projected of recent years, with the avowed object of affording greater facilities for the trade of Canada. (App. A.)

Prominent among these schemes is what is generally known as the Toronto and Georgian Bay Canal. The distance between its southern terminus, in Humber Bay, of Lake Ontario, and its northern terminus, in Georgian Bay, of Lake Huron, is 100 miles, of which 24 are deep water navigation, through Lake Simcoe, which is to be the summit level and feeder. Nearly twenty years ago Mr. Kivas Tully made the first exploration of the line of the proposed Canal, and of late years the project has been energetically advocated by gentlemen in Toronto and elsewhere, incorporated as the "Huron and Ontario Ship Canal Company."

Another scheme is that for the construction of a branch Canal from the town of Niagara to connect with the Welland at Thorold. Mr. Walter Shanly reported favorably on the project in 1854, and during the last Session of the Legislature, a Bill was passed for the incorporation of the Ontario and Erie Ship Canal Company, from the waters of Niagara River, at or near Fort George, in Niagara, thence to Thorold, and thence to the waters of Lake Erie, at or near Port Colborne, or the Niagara, at or near Chippewa; locks to be the size of the Cornwall Canal. The capital, $8,000,000, in shares of $100, with power to borrow to the extent of unpaid capital. The work to be commenced within two years, and finished within five.

The Murray Canal was advocated as far back as 1797, when a resolution was formally adopted by the Lt.-Governor in Council for the reservation of 3,000 acres of land in favor of the construction of the work. The necessity of the work has, since then, been frequently brought before the Legislature, and surveys of the route were made. As

late as July, 1866, a Committee of the House of Assembly of Canada authorized another survey, which was made.

The Caughnawaga Canal is another scheme which has been earnestly advocated for some time past. It was first prominently brought before the public by Messrs. John Young, L. H. Holton, and other merchants of Montreal, in 1847, and in answer to their petition, the then Governor General, Lord Elgin instructed Mr. J. B. Mills, C. E., to make a survey. In 1848, this gentleman reported in favor of a Canal having the upper terminus at St. John, and the St. Lawrence terminus near the village of Caughnawaga, immediately opposite Lachine, about 8 miles above Montreal. In 1852, the Commissioner of Public Works strongly urged the construction of this Canal, and subsequently other surveys were made and reported upon, but no Government action was ever taken on the subject. Other gentlemen, especially the Hon. John Young, however, kept the scheme prominently before the public, and in the last Session of Parliament a Bill was passed, incorporating a number of gentlemen into a Company to build the Caughnawaga Ship Canal, from Lake St. Louis in the St. Lawrence, to Lake Champlain on the Richelieu, with power to use and enlarge the Chambly Canal, with consent of the Government, who may, however, at any time assume the whole work—the locks not to be of less size than those on the Beauharnois Canal. The Capital Stock $3,000,000, with power to increase to $4,000,000, in shares of $100. The Canal to be completed within five years, or Charter forfeited.

One of the most important schemes, which have been brought before the public of late years, is undoubtedly the Ottawa Canal, to connect Montreal with Lake Huron, *via* the Ottawa River, Lake Nipissing, and French River. The route was examined by two Engineers, first in 1857, and afterwards in 1859, and their reports are found in full in the reports of the Department of Public Works. The subject has been frequently before Parliament, but no definite steps ever taken to carry out the project.

Another Canal, which has come prominently before the public of late years, is what is generally called the Bay Verte Canal, to connect the waters of the Gulf of St. Lawrence, at Bay Verte, with those of the Bay of Fundy, at Cumberland Basin, by cutting across the Isthmus of Chignecto, uniting Nova Scotia with New Brunswick. In 1825, a survey of the route was made by Mr. F. Hall, at the instance of the Lieutenant-Governor of New Brunswick. At a later date, Mr. Thomas Telford, C. E., revised the report of Mr. Hall, and suggested a Canal with a depth of 14 feet, with a view of accommodating the large trade that must accrue especially with Quebec, Montreal, and the Upper Lakes. In 1843, Captain Crawley made another survey—Canada paying a portion of the expense. A survey of the line is now in progress at the instance of the Dominion Government.

COMMERCIAL ASPECT OF THE QUESTION.

In order to appreciate to the fullest extent the importance of the question of Canal enlargement and extension, it is necessary to consider the natural position of the St. Lawrence and its relations to the vast area of country, which extends from the Appalachian or Alleghany Range on the East, to the Rocky Mountains, on the Western or Pacific side of this continent. The resources of that section of Territory to which the St. Lawrence and the Great Lakes are tributary, and form the natural communication with the Ocean, are most varied and have been developed of late years to an extent without parallel in the history of commercial enterprise. On the plains and slopes, and in the valleys lying contiguous to the great artery, of which the Canals form the connecting links, are raised corn, wheat and other agricultural products in such abundance, that it is frequently found imposible to dispose of them to advantage.

Timber and minerals abound to an unlimited extent, either in the immediate vicinity of the River and Lakes, or that of the streams which pay them tribute. The climate of this fertile region is not like that of the South, enervating and sometimes fraught with pestilent vapours, but is bracing and healthy to the highest degree. It is a region eminently adapted for the use of man, and the development of his best enterprise and industry.

It is in what is generally called "The Basin of the Lakes" that we see the most remarkable material progress.

Within the past thirty years cities and towns have arisen with striking rapidity—new States have been marked out and taken their place among the most prosperous of the oldest communities of the continent.

The history of the Province of Ontario and of the States of Illinois, Michigan, Minnesota and other sections of the North Western Country, illustrates the spirit of the commercial enterprise of the present day.

A few facts, derived from official and authentic sources, will shew very clearly the progress of the country to which the St. Lawrence forms the outlet.

In the year 1841, just thirty years ago, the gross value of the trade of the lakes was estimated at $65,000,000; ten years later it had more than quadrupled, for it was put down in 1851 at $300,000,000, employing 74,000, tons of steam, and 138,000 tons of sailing vessels, whilst at the present time the aggregate value of this same commerce cannot be less than $700,000,000. The tonnage of the lakes in 1851 was, as already stated, not above 212,000, whereas in 1862, it had risen to 450,000 tons, of which about 80,000 tons was Canadian—so far as can be gathered from the imperfect available statistics of lake trade. In 1866 the tonnage was put at 547,267, valued at $17,537,440 in American currency. We have no returns for 1870 at hand, but we find that the City of Buffalo alone in 1869, owned 131 steam vessels and 127 sail, with a grand tonnage of 91,328 tons.

Andrews on Colonial and Lake Trade

To illustrate the growth of the country watered by the St. Lawrence and the Lakes, we refer to the rise of its principal commercial emporiums. Chief among these is Chicago; its population twenty years ago was not 30,000, whereas in 1860, it had risen to 110,000, and in 1870 to 299,000 souls. Milwaukee had a population of 20,000 in 1850, and of 72,000 in 1870. Cleveland increased in a still greater ratio, for its population rose from 17,000 in 1850, to 92,000 in 1870. Buffalo and Oswego also exemplify very forcibly the influence of the great commerce of the West.

The total population of the grain-growing States, viz: Ohio, Michigan, Indiana, Illinois, Missouri, Iowa, Wisconsin, Minnesota and Kansas, in the year 1840, was not

above 3,000,000 of souls, whereas the last Census of the United States, taken in 1870, shews that it had increased to over 12,000,000. The aggregate production of the same States in grain, was as follows :—

		1850.	1860.	1869.
Wheat	Bush.	43,842,038	89,293,603	166,100,000
Corn	"	222,208,502	392,289,631	556,050,000
Oats	"	42,328,731	62,738,901	146,200,000
Rye	"	739,567	3,997,001	4,802,000
Barley	"	831,517	4,865,761	8,755,000
Swine	No.	8,536,182	11,039,332	19,100,000

Nor has the commercial progress of the Province of Ontario, lying contiguous to the lakes, been less striking than that of the American States. Forty years ago it held a very humble position in the list of the industrial communities of this Continent. In 1811 the population of Upper Canada, or Ontario, was only 77,000, whereas it had risen to 952,000 in 1851, and to 1,396,091 in 1861, whilst assuming that the same rate of increase has continued as between 1851 and 1861, it cannot be less than 2,137,000, at the present time. Its agricultural progress has not been surpassed by the rival communities on the opposite side of the lakes. Those who may have the time or inclination to investigate the subject, will find that it is not an exaggeration to say that the increase of Ontario in the chief staples of food, especially wheat, has been equal to that of the majority of the grain growing States, and greater than that of some—the State of Ohio for instance. In 1851 Ontario raised over 12,000,000 bushels of wheat; in 1861 the production had increased to nearly 25,000,000. The only State of the Union that exceeded this percentage of increase in wheat was Iowa, whose production increased seven times within the same period.

The average yield of wheat per acre, for the past twenty years, has been greater than that of any of the North Western States. The yield of barley is also greater, the soil and climate being admirably adapted for the growth of this article, for which there is a large demand in the United States,—that Country having imported from Ontario 5,295,131 bushels in 1869, against 3,691,608 in 1868.

The progress of the capital of Ontario is another illustration of the wealth of the country, on which its prosperity depends. Between 1840 and 1850, its population increased ninety-five per cent.—a greater ratio than that of St. Louis or Cincinnati, and other older Western cities. Montreal also affords another striking example of progress and prosperity, as the commercial entrepot on the St. Lawrence between the lakes and the sea. Its population in 1852 was only 62,000, whereas in 1861 it had risen to 101,602, and is probably 125,000 at the present time. But the statistics of its trade best exemplify its rapid growth. We find that in 1861, the number of ocean steamers carrying its commerce was only 40, of an aggregate tonnage of 51,298 tons, whilst in 1869 they had increased to 117, with a tonnage of 117,965 tons. In 1860 the number of ocean sailing vessels entering the port was 222, with an aggregate tonnage of 76,174, while they had increased in 1869 to 440, with a total tonnage of 141,898. The figures of its lake craft engaged in the inland trade are equally satisfactory. In 1862 the number of these vessels was 4,875, with a tonnage of 523,991, and in 1869, 5,866, with 721,324 tons.

The commerce of this fertile and progressive country (illustrated at some length in the appendices) depends on several routes of communication. Nature has intended the St. Lawrence to be the great commercial highway of the

Appendix E et seq.

West, and if it has not fulfilled its destiny to the extent it should have done, it is because the enterprise of man has endeavored to divert its trade into other and artificial channels. The St. Lawrence runs through British Territory, whereas the great bulk of population and commerce is on the American side of the River and Lakes.

To control the entire traffic of the Great West has been the great object of the State of New York for many years past, and certainly its enterprising people have succeeded to a considerable extent in achieving their purpose, and thereby adding to the prosperity of New York and other Atlantic cities. The Erie Canal, with which must be ever associated the name of De Witt Clinton, is a monument of the liberality and enterprise of the Americans, though it is confidently asserted that it has great difficulty in keeping pace with the progress of the commerce of the West.

The Mississippi, it is true, is another natural artery for the commerce of the West, but it runs into regions unsuitable for the carriage of the chief products of that section, and it is out of the line of direct communication with Europe, and may, therefore, not be considered so formidable a competitor as the Erie Canal for the Commerce which we are chiefly considering.

If it were possible to put a stop to the commerce of the West, and for its people to have no desire to increase their wealth, or add to their comforts, then would the Erie Canal suffice, even at its present dimensions. But when we consider the actual facts before us, we see the commerce of a splendid region, yet in the infancy of its development, retarded only because the inevitable march of progress has been more rapid than human enterprise.

If we take the figures of the Eastward movement by the Erie Canal *via* Buffalo, for nine years, we find the following results :—

	Total Tonnage.
1862	1,980,982
1863	1,692,651
1864	1,402,859
1865	1,307,507
1866	1,600,300
1867	1,418,451
1868	1,476,298
1869	1,281,706

Or if we take the figures of the Eastward movement of flour and grain for the past five years, we find that there has been a considerable reduction, the decrease being steady ever since 1865, amounting to 71 per cent. since 1854. It is true that a considerable tonnage has passed, *via* Oswego, through the Welland Canal, during the same period. Nevertheless, the fact remains that the Erie Canal would seem to have reached its full capacity for the business which it was intended to do. For instance, the total tonnage, *via* Buffalo and Oswego, during the years already given, was as follows :—

	Total Tonnage.
1862	5,598,783
1863	5,557,692
1864	4,852,941
1865	4,729,654
1866	5,775,220
1867	5,688,325
1868	6,442,225
1869	5,862,080

The Railways, it is true, have relieved the Canal of a very considerable traffic; and

it appears that from 1860 to 1869, the whole amount carried on the two chief railroads of the State was, in round numbers,

7,780,000,000 tons, moved one mile.

While that of the Canals was

9,470,000,000 tons, moved one mile.

In other words, the aggregate freight moved since 1860, on the Canals, during average seasons of 7½ months, has been about 24 per cent. more than that moved on the New York Central and Erie Railways during seasons of twelve months.

On the other hand, the statistics of the production of the grain-growing States, since 1860, shew a large and steady increase. The shipments from Chicago of flour and grain, reduced to bushels, amounted to only 1,830,968 in 1850; the quantity in 1860 had risen to 31,108,759; and in 1869 to 56,759,515. The same rapid increase is shewn by reference to the trade statistics of Milwaukee and Toledo, which come next in order after Chicago, as receiving ports of the produce of grain-growing States.

Or we may illustrate the cereal crop movement at the principal lake ports, by reference to the receipts of flour and grain, at Chicago, Milwaukee, Toledo, Detroit, and Cleveland, from August 1st, 1868, to July 31st, 1869, inclusive, and for the corresponding periods of 1866–7 and 1867–8:—

	1866–7.	1867–8.	1868–9.
Flour reduced to Wheat, bushels.....	18,344,285	20,177,435	26,881,705
Total Grain.....	69,814,055	85,883,572	94,933,545
Grand Totals—bushels.....	88,158,340	106,061,007	121,815,250

The inadequacy of the facilities afforded by American enterprize and energy for the transit of the products of the West has been asserted for some time by those who are especially interested in having cheap routes of communication with the principal markets of the world. On the 14th of February, 1863, Commissioners were appointed by the State of Illinois, to confer with the Canadian authorities on the question of transit, and in their memorial they used these emphatic words:—"For several years past, a lamentable "waste of crops already harvested has occurred, in consequence of the inability of the "Railways and Canals leading to the seaboard to take off the excess. The North-West "seems already to have arrived at a point of production beyond any possible capacity for "transportation which can be provided, *except by the great natural outlets.* It has, for "two successive years, crowded the Canals and Railways with more than one hundred "millions of bushels of grain, besides immense quantities of other provisions and vast "numbers of cattle and hogs. This increasing volume of business cannot be maintained "without recourse to the natural outlet of the lakes * * * *" The St. Lawrence furnishes "for the country bordering upon the lakes a natural outlet to the sea." These words illustrate the natural aspirations of the West, and might be supplemented by other extracts, equally forcible.

The question now arises, how far the people of Canada, who are the possessors of the St. Lawrence, have shown their estimation of the priceless heritage entrusted to them? The history of the improvement of the navigation of the St. Lawrence is one which Canadians need not be ashamed to read. The Canal system, even in its present condition, is an illustration of bold design and liberal execution. The question of defence, no doubt, was an all important element in the inception of these enterprizes, whilst the British

Government controlled all our affairs; but in the course of time, as the country became older, and commerce increased—very slowly, it is true, for some time—the necessity of stimulating the growth of the country west of Montreal, by improving the route of communications became more evident to the public men and merchants of Canada. We have already seen that when the Imperial authorities, as far back as 1825, endeavored to induce the Upper Canadian Government to undertake the construction of the Rideau Canal, they declined, under the conviction that the true policy, in a commercial point of view, was to improve the direct route of the St. Lawrence navigation. Immediately after the Union, when the population of the two Provinces was not much more than a million of souls altogether, and the total amount of the revenue was only about $1,488,000, the Legislature of Canada appropriated no less a sum than two millions of dollars for the improvement of the Canals, and formally adopted the policy of improving the navigation of the St. Lawrence, in accordance with the then commercial requirements of the country. The results of this wise policy have been eminently satisfactory, measured by direct and indirect advantages to the growing resources of the country.

Of the Canals of Canada, none has been so successful, in a commercial sense, as the Welland. Forming, as it does, the connecting link between the Upper Lakes and Lake Ontario, it has necessarily drawn to it a considerable share of the Western trade, seeking the cheapest and most expeditious means of transit to its destination. By this Canal, the productions of Canadian Territory on Lakes Superior, Huron and Erie, must find their way to the larger cities of Canada by Lake Ontario, or by the side of the St. Lawrence. It affords the shippers of Chicago, Milwaukee, Toledo, and other Western cities, the means of sending their surplus produce to New York, *via* Oswego, or to Montreal, for transhipment to Europe, *via* the St. Lawrence. No Canal is more advantageously situated to control Western trade, and if its success in the future is not equal to what it has been in the past, it will be because the people of the Dominion are indifferent to the interests involved in its improvement.

Within twenty years the trade of the Welland Canal has nearly doubled; for, while the total tonnage of vessels and property (up and down), was only 820,000 in 1849, it had risen to nearly 2,500,000 in 1869, or some 400,000 tons more than the aggregate tonnage of the St. Lawrence Canals during the same year. The revenue from tolls was only $113,968 in 1849, but it was nearly $230,000 in 1869. When these returns are analysed, we find that the great proportion of tolls is collected on American tonnage. Take the three last years for instance:—

	1868.	1869.	1870.
American Vessels.....	$16,954 24	$17,386 90	$18,937 10
Canadian Vessels	10,664 63	11,044 02	11,828 33
Difference.....	$6,290 61	$6,342 88	$7,108 77

Another striking fact in these returns is the superiority in size of the American tonnage, though the greater number of vessels is Canadian.

		1868.	1869.	1870.
American Vessels.....	No...	2,932	2,791	2,884
	Ton..	692,169	719,432	765,543
Canadian Vessels.....	No...	3,225	3,278	3,856
	Ton..	548,197	548,019	591,574

It is also equally noteworthy that the American steamers passing through the Welland, though less in number than the Canadian steamers, are of a larger class—in fact, of the largest capacity of the Canal. For instance, the number of American steamers going through in 1870 was only 878, whilst those belonging to Canada amounted to 1,199; but the tonnage of the former was, in the aggregate, more

than double that of the latter. These facts will be more striking when the tonnage of the vessels in the trade of the Upper Lakes is considered.

But is the Welland itself equal to the present requirements of commerce? No one, who considers its career for the past twenty years, can doubt that it has played an important part in the commerce of the West, and that its usefulness has not been at any time exaggerated by its promoters and advocates. At the same time, there can be no doubt that, as in the case of the Erie Canal, it has not equalled the requirements of the growing commerce dependent on the facilities it affords for speedy and cheap transit. In 1857, the tonnage of vessels passing through it was 1,148,771, and, in 1869, only 118,680 tons more, while, in 1867, the amount was actually less. The greatest number of vessels ever passing through it was eight years ago, in 1862, when the total amount of tonnage was 1,476,842. Last year, the tonnage of the vessels amounted to 1,357,117 tons, which was above that of the two previous years. But taking the following statistics of the total tonnage of vessels and property (up and down) for a number of years, it will be seen that the business of the Canal has comparatively stood still, although it certainly affords the best and most convenient avenue of communication :—

1860	2,182,593	tons.
1861	2,348,155	,,
1862	2,495,774	,,
1863	2,637,479	,,
1864	2,479,559	,,
1865	2,003,883	,,
1866	2,057,532	,,
1867	1,927,198	,,
1868	2,402,187	,,
1869	2,402,201	,,

The fact is, that whilst the Welland has held its own, and is still the most profitable of the Canadian Canals, the trade of the Upper Lakes, or rather the character of the tonnage conveying that trade, has been undergoing a marked change. Of course, the energetic efforts of the Buffalo interest to concentrate the great bulk of the Western business at that city, for shipment *via* Erie Canal, have much to do with the stationary business of the Welland. Last season the lowering of the tolls on the Erie 50 per cent. gave Buffalo the advantage over Oswego of over one cent per bushel, as compared with the rate of previous years, and necessarily brought more business to the former entrepot of Western commerce. Still the Welland, shortening as it does the Canal route to New York, could, even with the present tolls of the Erie, satisfactorily compete for the transit of Western produce *via* Kingston or Oswego, were it equal in size to the demands of the shipping interest. During the past thirty years the vessels engaged in the lake trade have not merely increased in number to a very great extent, but have also altered as to their style. In 1839, the twenty-five largest steamers on the lakes had an average of 449 tons burden, the largest being 800 tons. In 1851, the average of the twenty-five largest fell short of 1,000 tons, and the average of the whole steam fleet, consisting of 157 steamers and propellers, was 437 tons. Of late years paddle steamers have gone comparatively into disuse, propellers and tugs taking their place. Taking the years of which we have reliable statistics we find that the total tonnage of paddle steamers fell from 69,150 to 41,870, while the tonnage of the propellers increased from 61,550 to 75,287 between 1860 and 1866. Tugs are also enumerated, for the first time, in the same year, the number being 234, and the total tonnage, 23,678. If we analyse the shipping statistics of Buffalo, we notice that in 1869 she owned 11 screw steamers of about 1,100 tons and four over 1,400, the largest being 1,470; 20 between 800 and 1,000; 19 between 600 and 800; or 54 out of the whole number of 58 screw steamers beyond the capacity of the Welland. The total number of steam vessels was 131, divided as follows :—

Screw Steamers	58
Tugs	59
Steam Yachts	11
Side Wheel Steamers	3

It is also noteworthy that out of the 33 barks 29 have a tonnage ranging between 420 and 830. Reference to the shipping statistics of other Upper Lake ports, will also establish the fact that the propellers are not only increasing in number, but in size; and whilst that is the case, Buffalo has virtually the control of the bulk of the Western traffic.

Experience proves that the largest class of vessels, especially steam, now plying on the lakes, carry property at the cheapest rates. The larger class of vessels, both sail and steam, carrying from 20 to 35,000 bushels of grain, are increasing year by year, and must entirely obtain, according as the artificial channels of communication are improved. A very general opinion prevails that steam, that is the screw vessel, must prevail in the end over sail on the lakes, for it has all the advantage in respect to rates of Insurance, expedition, safety and competition with railways, all important elements in the transportation of the bulky produce of the West. As respects the changing character of the lake vessels, the Sault St. Marie Canal of itself would give us a sufficient illustration, if we had no other facts before us. It has been constructed and enlarged with regard to the increasing requirements of the lake trade, and points out to us the necessity of improving our own communication with the Upper Lakes so as to divert the trade, as far as possible, from Buffalo, and bring it by the cheapest and most expeditious route to the sea-board, namely the St. Lawrence. At present, according to the Oswego Board of Trade, three-fourths of the tonnage of the lakes cannot pass the Welland Canal—a fact of itself quite sufficient to show why its traffic does not increase.

Other merchandize besides wheat would find its way by the Welland, were it enlarged and deepened with a view to the commerce above it. For instance, a large amount of lumber, probably 15,000,000 feet on the average, is manufactured now every year on Georgian Bay by Americans and shipped *via* Collingwood, Northern R. R. to Toronto, and thence by lake to Oswego, for transportation by the Erie Canal. The Copper and Iron Trade of Lake Superior is also worth competing for. The total amount of Iron produced in the Lake Superior District having risen to 672,241 tons in 1869, against 7,000 in 1856, while the copper product increased to 15,285 tons in 1869, as compared with 3,500 tons in 1858. Hitherto this branch of industry has been crippled on account of the want of cheap transit. Is it not more than probable that the improvement of the Welland will attract this business to Oswego rather than to Buffalo?

The first step, therefore, in the improvement of the Inland Navigation of the Dominion is the enlargement of the Welland Canal, the great link of commercial intercourse, not only with the prosperous Western Country of the United States—whose progress we have seen, is already so great; but with that vast territory belonging to the Dominion, which must ere long be peopled by thousands, and teem like the Western States, with the evidence of an irrepressible industry and activity. On improving the Welland, we take the step pointed out to us by the unerring finger of Progress. The commercial interests of Canada demand it, if our country is to keep pace with the enterprize and energy of the communities to which the St. Lawrence is tributary.

The Welland Canal must be considered as that link which is indispensable to the complete development of the St. Lawrence navigation. Our great object should be to seek the control, as much as possible, of the Western traffic and take it to tide water.

In the nature of things, this commerce must always find its way to market by the following routes—leaving the Mississippi out of the calculation altogether for the reasons before given—First by the several lines of Railway connecting the lakes with the sea-board—Secondly by the following water communications, *via* Buffalo and the Erie Canal, *via* the Welland and Oswego, or *via* the Welland and the St. Lawrence. Even

under existing circumstances, a considerable share of business is enjoyed by Kingston, as much as could be expected in view of the facilities afforded there, in comparison with those given at Oswego. At present there is very little difference between the average cost of carrying grain from Chicago to Kingston or Oswego.

The Board of Trade of Kingston admit that, when freights are brisk, the rate to Oswego is quoted often ½ per cent. less in consequence of vessels going thither being sure of despatch, and return freights, but as a rule the rates are about the same. Both Kingston and Oswego must be benefitted the moment the Welland is enlarged, so as to admit propellers and sailing craft of the size that are obtaining on the lakes; for then it is admitted on all sides that there would be an immediate reduction of freight, ranging from 2 to 4 cents a bushel on grain on account of the larger, and consequently cheaper class of vessel that can engage in the trade. In the year 1858, the receipts of wheat and corn at Kingston, during the season of navigation, were:—

58 cargoes in British vessels.....	839,948	bushels.
46 „ „ American „	641,011	„
Total.....	1,480,959	„

A single Forwarding Company gives the receipts from the United States during 1870, as follows:—

79 cargoes in British vessels..	1,127,987	bushels.
111 „ „ American „	1,892,875	„
Total.....	3,020,862	„

So far as can be ascertained the total quantity of grain received at Kingston from United States' ports last year, amounted to a little over 6,000,000 bushels; of which the largest proportion was carried in American vessels.

These figures are significant, inasmuch as they show the growth of the grain forwarding business of Kingston during twelve years, and especially the disproportionate increase in Canadian bottoms. Who can doubt that the latter fact is owing in a large measure to the state of the Commercial relations between Canada and the United States.

The Welland is inestimably valuable to Canada, because it forms a part of the great route of water communication between the sea-board and the lakes.

At present this route has its only water rival in the Erie Canal, and all the efforts of the State of New York have long been directed to make the latter equal to the requirements of Western trade. Enterprise can do a great deal, but it cannot divert trade from its natural channels. Artificial routes like the Erie Canal may compete for a time with a natural line of communication like the St. Lawrence, but sooner or later they must fail. On this point the Western people have time and again spoken, but for the present let us see what an organ of the mercantile community of New York State says on a subject all important to it:—

"It would be folly to ignore the fact," says the report of the Buffalo Board of Trade for 1869, "*that a great increase has taken place in the trade of Canada with Europe* "*in breadstuffs.*

"The route *via* the St. Lawrence leads almost in a direct line from the grain-
" growing regions of the West to those nations of Europe, whose people are and will be
" the chief consumers of the grain exported from this country. By a liberal Canal policy
" we may arrest this diversion of Trade, and restore the traffic of very many important
" articles which seek other channels through lower rates of transportation. The observer
" of last year's statistics has doubtless noticed that *the trade of Chicago with the Dominion*

"*has largely increased both in imports and exports.* The Canadians hope to establish a "large direct foreign trade by way of the St. Lawrence, to and from the West, exporting "wheat by the vessels used in the trade, returning with iron, salt, hardware, glass, "crockery, carpets, drugs, dyes, &c., and the estimated value of such imports alone foot "up to $40,000,000. Would not a reduction of tolls on the Canal somewhat disarrange "this programme? Two plans are proposed for receiving the trade of the great West by "the Canadians. The one is, to enlarge the Canals around the rapids of the St. "Lawrence, and to increase the capacity of the Welland Canal to a degree whereby "vessels of large tonnage can pass direct to and from the Upper Lakes; the other "contemplates a Northern route, by improving the navigation of the Ottawa River, "which flows into the St. Lawrence at Montreal. The first route mentioned is the *most* "*feasible, least expensive, easier maintained, and can be made available longer during* "*the year.*"

Coming from such a source, these words are very significant; they lead us to infer that the New York interest is fully alive to the inferiority of the Erie route as compared with the St. Lawrence, and determined to make an energetic effort, sooner or later, to bring back to the artificial route that trade which is gradually being diverted from it. Canadians need not, however, have any fears of the future of their great natural line of navigation, whilst they are themselves fully awake to its importance and resolved upon availing themselves of the superior advantages given them by Nature.

Though the St. Lawrence route has never yet received anything like the amount of traffic which it should by virtue of its superior facilities; yet it is surprizing that it has even done as much as it has, when we consider the formidable nature of the opposition it has had to contend against. The trade that should naturally have sought it, just as the river seeks the sea, has been wooed away from it by the enterprizing communities, deeply interested in the prosperity of American Canals and Railways. The very want of a uniform system in its Canals, no doubt, has also operated to retard the development of the St. Lawrence navigation to a very large extent. Yet despite all the disadvantages under which it has labored, it has done an amount of business, which is of itself a guarantee of what might be accomplished under more auspicious circumstances.

Appendix C—sketch of locks.

By referring to the statistics of the commercial progress of Montreal, we can obtain a very accurate idea of the influence which the improvement of our Inland Navigation has already exercised on the commerce of Canada. We have already seen that the increase of ocean steam tonnage at that port was 51 per cent. in four years; the increase of sailing vessels, 38 per cent.; and the increase of river craft 16 per cent. during the same period.

In 1845 the quantity of flour and wheat (reduced to bushels of grain) received at Montreal was 2,786,315 bushels.

In 1855 the quantity was 2,799,372 bushels.

In 1865, the quantity had increased to the large figure, 6,558,754 bushels.

In 1869, the last year of which we have official figures, the quantity was still greater, 12,333,458 bushels.

The increase in shipments was equally as large in proportion, viz.:—

In 1855, 495,440 bushels.

In 1865, the quantity reached 3,972,943 bushels.

In 1869, the quantity was 11,425,667 bushels.

The increase in total receipts of 1869 over 1868 was 192, 567 barrels of flour, and 4,903,985 bushels of wheat, or reducing flour to wheat, of 5,866,820 bushels. The shipments of 1869 over 1868 increased 283,845 bushels of flour, and 4,460,109 bushels of wheat, or, reducing flour to wheat, of 5,877,534 bushels. The Buffalo Board of Trade might well say that "this was a remarkable diversion of commerce from our Canals."

Elsewhere we give various tabular statistics (Appendix G.) which clearly show the progress of this flour and grain trade to which we especially refer throughout, because it is that branch of trade which the improvement of our Inland Navigation particularly affects, and from which the Canals must always derive the principal part of their revenue.

Looking at the proportions carried by Canal and rail, we find that the Grand Trunk Railway has proved a very important competitor for the trade of the St. Lawrence. Flour appears to have found its way very largely by rail, but the corn and wheat and bulky products go by Canal. The competition between the Canal and railway appears, in fact, to have produced the same results as in the case of the New York Canals and Railways, viz. : that the Canal business of 7 months in excess of the 12 months' business of the railway. It must also be remembered in this case that the charges of a railway running alongside a perfect water communication must be lowered during the summer months to an extent which is probably not profitable.

Even under existing circumstances the freights from the West to Montreal are remarkably low compared with those from Chicago and other Western ports to New York, *via* Buffalo and Oswego. The Secretary of the Montreal Board of Trade gives figures which are incontrovertible on this point, and are verified by all the evidence gathered.

According to this statement, the average rate of freight per bushel of wheat from Chicago to New-York was as follows (American currency) during the following years :—

	Via Buffalo.	*Via Oswego.*
	cents.	cents.
1865	26¾	27½
1866	30½	31½
1867	22½	22½
1868	23	23
1869	23	23¼

In 1868 the average rate paid per bushel by propeller from Chicago to Montreal was 13c. in gold ; in 1869, the rate was still less, or about 12c.

The difference in time is so greatly in favor of the St. Lawrence (some ten or eleven days) that the trade is actually forced into its natural channel despite the obstructions arising from the want of an enlarged and uniform system of Canal communication, and the desperate attempt of the Erie Canal Managers to divert it to New York Even last year we have it recorded that the aggregate receipts of wheat at Montreal were actually one-third of the quantity carried from the West to New York city, another illustration of the superiority of a natural over a purely artificial route.

It only requires an energetic effort on the part of the Dominion to make the St. Lawrence the great highway between the Sea and the West to the very base of the Rocky Mountains.

Into our hands must come, sooner or later, the carriage of the great bulk of the produce required by Great Britain, who now chiefly receives her supply from Russia, Germany, the United States, Turkey, and the Danubian Principalities, Chili, and Egypt.

The following statement of the respective proportions brought into Great Britain since 1859, from Canada and the United States, will be interesting.

Years.	Flour and Wheat Reduced to Bushels.	Quantity and Proportion from the United States.	Ditto from British North America.
1860	59,438,262	17,388,233 or 29.03 per ct.	2,446,550 or 4.03 per ct.
1861	70,273,849	29,139,548 „ 41.05 „ „	6,324,005 „ 9.00 „ „
1862	93,412,469	40,628,161 „ 43.05 „ „	9,564,903 „ 10.02 „ „
1863	57,657,398	22,155,801 „ 38.04 „ „	5,969,949 „ 10.04 „ „
1864	53,829,446	18,811,205 „ 34.09 „ „	3,419,541 „ 7.00 „ „
1865	48,241,297	2,797,347 „ 5.08 „ „	986,451 „ 2.00 „ „
1866	54,827,134	1,840,961 „ 3.04 „ „	111,255 „ 0.02 „ „
1867	73,055,323	9,504,568 „ 13.00 „ „	1,558,677 „ 2.13 „ „
1868	68,144,617	12,792,993 „ 18.77 „ „	1,490,543 „ 2.19 „ „
1869	82,969,174	28,504,479 „ 34.35 „ „	6,340,153 „ 7.64 „ „

In case of enlargement, and the larger class of vessels, that will be able to go directly to Montreal, the difference in favor of the St. Lawrence navigation must be increased just in proportion to the facilities afforded and the ability to get return freights.

To understand the extent of decrease in freight that the improvement in navigation and in the craft employed on the Lakes and River has brought about, we should refer back to the Commercial statistics for the past forty or fifty years. In 1826, the cost of transportation from Montreal to Prescott, 119 miles was $16 per ton; thence to Niagara, $8 per ton, in 1854, the cost of taking a ton of iron from Quebec to Chicago was just $6.50, now it can be taken for $3.50 by water.

It must be admitted at once that, by enlarging the capacity of the St. Lawrence Canals, including the Welland, we must increase the proportion of Western produce shipped directly by the St. Lawrence.

When the propellers mostly in use in Western Waters can come directly to Montreal or Quebec, and there transfer their cargoes to the larger class of vessels, necessary for European traffic, or go on to Boston through the Gulf of St. Lawrence and the "Bay "Verte Canal" (which must shorten the route to Portland and Boston about five hundred miles) then freights of Western produce will be reduced to a minimum, and New York will acknowledge what it now fears, that the success of the Erie Canal is a thing of the past, and that the Western trade has followed the universal law which must obtain sooner or later everywhere—which no legislation can alter, no enterprize balk, that commerce always seeks the cheapest, safest, and most expeditious channels of communications with its markets.

It is an axiom in trade that the nearer you can bring the produce to its market without breaking bulk, the greater will be the saving in freight. As respects the competition of the rival routes between Chicago and New York *via* the Erie Canal, and Chicago and Montreal *via* the Welland and St. Lawrence Canals, there can be no question as to which route must always be the superior. The one now gives 352 miles of Canal, with a lockage of 675 feet, whilst the other, with all its imperfections, has only 71 miles of Canal, with a total lockage of 553 feet, the remaining distance being river and lake.

We have already seen how much the producer saves on freight by the St. Lawrence route, with its imperfect system of Canals. By improving the Canals to Montreal, freight must be reduced at least 15 per cent., and the consumer of Western breadstuffs in Great Britain will secure his supply cheaper, and necessarily come to obtain the greater part of it from this continent rather than from the Eastern parts of Europe, on which he now mainly depends in seasons of scarcity for making up the deficiency in the home production.

One important element in the consideration of the question of transportation between East and West is that of return freights. New York, being the great centre of the import trade for the West, has hitherto naturally drawn to it the commercial marine of all nations, and vessels carrying wheat, corn and other products of the grain-growing States, have never wanted return freights. Hitherto, however, the direct foreign trade with the West, *via* the St. Lawrence, has been insignificant (although on the increase), compared with the dimensions it might assume under a more favorable condition of things.

It is clearly our interest to try and satisfy the natural aspirations of the West in this particular.

The report of the Chicago Board of Trade for 1869 refers to this subject, and shows the difficulties to which it, in common with other Western Towns, is now subject: "Efforts hitherto made to induce Congress to make Chicago and other Western cities ports "of entry for foreign goods received *via* the sea-board cities have failed thus far, but "will not be abandoned until their full accomplishment is realized. Goods to a limited "extent are now received in Bond, but they are subjected to examination, more or less "damage, detention, and expense, at the point of delivery by ship which Western Merchants believe can be avoided by proper regulations for their prompt delivery in bond "from the Vessel to responsible transportation lines, subject to examination and appraisement at this or other prominent cities in the West."

The whole question hinges on the transportation charges, and whether the foreign goods reach Chicago by a propeller running directly from Boston, or by the transferrence into the propeller at Montreal, the West will be equally benefitted. Everything, however, will depend on the facilities it may be the policy and interest of Canada to afford. What should be the policy of Canada has been foreshadowed frequently by far-seeing men interested in the Erie Canal route to New York.

In 1869 Hon. Israel T. Hatch, formerly in Congress, and prominent for his zeal in promoting New York commercial interests, held out this warning to the Produce Exchange of that city: "If the ambitious views of our people in the North West, originat-"ing in Chicago, its commercial centre, and in New England with Boston, its commercial "centre, could be realized, the signal flags of your line of splendid ships would be floating "in the ports of your rivals, Montreal and Boston, for you would have to send them there "to get freights. The North West aims at direct trade with Europe, and Boston believes "that if the St. Lawrence Canals can be enlarged, they can bring their largest class of "propellers upon the lakes now engaged in carrying from Chicago to Ogdensburg, and "then by rail to Boston, through the St. Lawrence to Boston and so become respectable "rivals to you in the inland commerce of this country. Schemes to accomplish these "objects are now pending, and I do not hesitate to say that I believe as certainly as that "the waters of the St. Lawrence will continue to flow to the Ocean, that this commercial "experiment will be tried to change the channels and outlets of the inland commerce of "this country.

Shall it be said that the people, outside of Canada, alone appreciate the natural advantages which the Dominion enjoys by virtue of its geographical position, and its possession of the finest system of water inter-communication on this continent? So far, it can be truly urged, that our public men, irrespective of political parties, together with the great mass of intelligent people from one end of the country to the other, have ever been alive to the intimate connection that exists between the commercial prosperity of Canada and the improvement of the noble artery of communication afforded by the St. Lawrence. Even if we had not the public records, or the history of our Canal System, or the expressions of opinion in Parliament, or the utterances of the public press, guide us in determining our policy, we have now in the abstracts given elsewhere a large amount of valuable evidence to show us the direction which an intelligent public sentiment has taken on this important question. All agree that the Welland and St. Lawrence Canals should form part of a uniform system of Canal navigation, that the enlargement and extension of one should be simultaneous with the enlargement and extension of the other.

In this connection we cannot refrain from referring especially to the carefully prepared replies of the Board of Trade of the City of Hamilton, which are the results of the experience, not of any particular commercial interest, but of merchants, shipowners and shipmasters, who are thoroughly conversant with the trade of the lakes and its requirements. "The capacity of such vessels for the proposed increased size of locks would be "similar to those engaged on the American side on the Upper Lakes, viz: 230 to 250 "feet in length, 30 to 34 feet beam, with a draft of water of 12 feet, and a carrying "capacity of 30,000 bushels of wheat. At present first class propellers of 450 to 500 "tons and carrying fifteen thousand bushels of wheat through the Welland, can afford to "carry from Chicago to Montreal at a freight of 12½ cents per bushel, and *do well* at that; "and if the locks were enlarged to the suggested dimensions, then steam and sail vessels "of a carrying capacity of 30,000 bushels could advantageously engage in the trade between "the Upper Lakes and Montreal; and a reduction in the present rate of freight might "reasonably be anticipated to the extent of at least 12½ per cent. By steamers of the pro-"posed size engaging in the trade between Montreal and the Upper Lakes, not only would "the large bulk of the produce of the basin of the great lakes find its way to tide water by "the St. Lawrence, but return cargoes of iron, salt, crockery, and other heavy goods would "find their way into the interior by the same route. Iron is now received from ocean "ships in Quebec, and laid down in Chicago for $3.50 per gross ton, by the water route,

"even with our present imperfect facilities; and when it is understood that the cost of "haulage over a railway for the same distance is at least $10 per ton, it appears impossible "for the rail to compete successfully with water. In the face of competition which we "have inevitably to run, it becomes of paramount importance to avoid all unnecessary "transhipments, and by grasping every natural advantage within our power, resolve with "heart and hand, to place the St. Lawrence route in a position of unquestioned superiority "to that of Buffalo, Oswego and New York, and thus render our own unrivalled inland "waters the great highway to Europe. The people of the Dominion owe it to themselves, "as the guardians of a noble heritage, to see that the American people on the shores of "the great lakes have every possible facility given them freely to use the Welland, St. "Lawrence and Lachine Canals on the same terms as our own people, with a view to "assist in developing the enormous produce traffic that annually rolls its increasing volume "from the West to the Atlantic. No unwise legislation should, in imitation of the crude "fiscal policy of our neighbors, be permitted to check the growth of a commerce that is "destined to eclipse in magnitude all the realizations of the past, and all the most sanguine "anticipations of the future."

Nor is this language, we repeat, the mere expression of the opinion of a single commercial community; it is supplemented by the opinions of all classes of the community, through the length and breadth of the Dominion.

When the St. Lawrence has become the principal avenue of intercourse with the seaboard, the people who live along its route must be largely benefitted by the tolls the trade will pay to the Canals, then at last remunerative, as well as by the stimulus it will give to all branches of industry; but there is another consideration which is all important in the estimation of Canadians, and must be particularly taken into account in maturing a policy respecting the inland navigation of the Dominion. The Boards of Trade of the principal cities of Canada have made especial reference to this point in the course of their replies to the queries the Commissioners addressed them. The language some of them used is so emphatic that we cannot pass it by without quoting a few very significant expressions. The Board of Trade of Toronto, after referring to the necessity of developing Western trade, say they are satisfied that by the deepening of the Canals the trade with the Maritime Provinces would be increased, for then "it would be carried without breaking bulk, "from the lakes to the ocean, creating thereby a reciprocity of interest, and connecting our "several provinces more closely." The Corn Exchange Association of the same city points out, that under existing circumstances "that reciprocity of trade, upon which we must "count as the only basis of legitimate commerce, and the one great means of uniting the "Provinces in the strong bonds of mutual interest, remains undeveloped, *and will con-"tinue so* until our water communications shall have been permanently established on such "a scale as to induce the building of vessels suitable at once to the navigation of the "lakes, the Canals and the ocean."

These words give expression, briefly but emphatically, to the aspirations of the people of the Dominion, East and West, to stimulate trade between the different sections, and in that way create a feeling of mutual interest which will very materially strengthen the political ties which now unite Quebec and Ontario to Nova Scotia and New Brunswick.

Intimate commercial relations with one another must tend to dissipate jealousies and create a truly national spirit, which will be the best guarantee of the stability of the edifice which we are now raising on the Northern half of this continent.

Intercolonial trade has already made considerable progress since the establishment of the Confederation and the repeal of the Reciprocity Treaty with the United States; but its proportions are still necessarily dwarfed by the want of facilities for cheap and rapid intercourse between the different Provinces. The enterprise of the Grand Trunk Railway Company in putting on a line of steamers between Portland and Halifax, has done much to facilitate trade between Montreal and the Capital of Nova Scotia. The Gulf steamships, which ply between Quebec, Shediac and Pictou, and other ports of the Gulf of St. Lawrence, have also done a great deal towards developing a trade which, ten years ago, had reached its minimum point. Unfortunately the Trade and Navigation Returns,

since the 1st of July, 1867, when Confederation came into operation, do not enable us to ascertain the progress of the trade between the Provinces constituting the Dominion, and we are consequently forced to seek elsewhere for information which is especially interesting to us at the present time. We know, however, that there has been a steady increase in the trade carried on in the chief staple of the Provinces—the coal of Nova Scotia and the flour of Ontario for instance. In 1865, Canada only exported 58,233 brls. of flour to Nova Scotia, whilst she sent 131,336 to Halifax alone, *via* the Grand Trunk Railway during 1869. The total amount of shipments for four years by the same route to Nova Scotia and New Brunswick was as follows:—

1869	1868	1867	1866
293,754	328,204	228,345	157,859

In 1864-'65 the total quantity of flour exported from Canada to all British North America was only 139,581 brls., while the quantity had reached 542,412 during 1869. Of this quantity 293,754 were sent by the G. T. R., *via* Portland, and the remainder by steamers and sailing vessels by the St. Lawrence. The consumption of Nova Scotia coal, on the other hand, is steadily increasing in the Province of Quebec. Still the balance of trade is largely against Nova Scotia, who now buys over a million and a half of dollars of Canadian produce without receiving a corresponding return.

Direct trade between Ontario and the lower ports has no actual existence, and cannot be developed whilst the Canal communications above Montreal are so imperfect. An attempt was made not long since to employ a propeller, *Her Majesty*, between Toronto and Halifax. That steamer carried 7,000 barrels of flour, or about 32,000 bushels of grain, and drew 10 feet 6 inches of water, but she could only go through the Canals partly laden. Before this experiment could be fairly worked out, the Boat was lost on the lower St. Lawrence, but it was at all events sufficient to show what could be done under more favorable circumstances of inland navigation.

The growth of Intercolonial trade depends on *cheap transit*, since the merchandize passing between the Maritime Provinces and Ontario must be of a bulky character, requiring large vessels and rapid despatch to be really profitable. When a propeller can go direct with a cargo of coal, or other produce of the Eastern Provinces, to Kingston and Toronto, and there get a return freight of flour, barley and other Western produce, Intercolonial Trade will have entered on a new era.

When Nova Scotia coal of the best description can be supplied abundantly and cheaply to Western Ports, a great impulse will necessarily be given to the transfer of the trade of the St. Lawrence and Lakes to screw steamers, a transfer already taking place, as we have previously shown. A wrong impression prevails in many quarters with respect to the value of Nova Scotia coal for steam purposes; many think it very inferior to the American article in this particular. The true state of the case, however, is that whenever it has had a fair trial, it answers steam purposes most admirably. The last annual report of the Boston and Yarmouth (N. S.) Steam Navigation Company gives us some important facts bearing upon this subject. In 1868, they had to change the coal used in their boats, in consequence of the strike among the miners of Pennsylvania. Cow Bay, Cape Breton, Coal was then burned during the latter part of the season. Fourteen trips were made in which hard coal was used, and eighteen with soft or bituminous. A saving of $1,000 was the result of the eighteen trips. The same steamer has, on the average, consumed forty tons of anthracite per round trip, which at a cost of $5 50 per ton, made $220. The round trip requires forty-three tons of Cow Bay Coal, which at $3 60 per ton is $154 80, showing a saving of $66 20 per trip, or upwards of $2,000 for the season. With a through trade between Toronto and Pictou, there is every reason to believe that coal suitable for propellers can be supplied at depots on the lake and river for very little over $4 a ton. With the Canals enlarged, coal freights would be reduced to the minimum point—a lake propeller would always bring back from the lower ports a cargo of coal, rather than come empty—just as the English timber ships have been accustomed to bring the same article instead of ballast.

Inseparably connected with the growth of Intercolonial Trade is the construction of the Bay Verte Canal, across the Isthmus connecting the Provinces of Nova Scotia and New Brunswick. The advantages that must accrue, not merely to the Dominion as a whole, but to the commerce of the Maritime Provinces, are so clearly pointed out by the Boards of Trade of all the leading cities of Canada, and by men interested in the development of our commercial interests, not simply the merchants of St. John and other places in the locality of the proposed Canal, but merchants of Hamilton, Toronto, Ottawa, Montreal and Quebec, that it is superfluous for the Commissioners to do more than briefly refer to a few salient features of the scheme.

A steamer laden with flour for St. John, N. B. now goes down the Gulf as far as Shediac, where the cargo is transported by rail to its destination. The total distance by water from Shediac through the Gut of Canso and around the coast of Nova Scotia to the Bay of Fundy as far as the commercial Capital of New Brunswick, is about 600 miles, and the consequence is that there is little or no direct communication between the Bay of Fundy Ports and those of the River St. Lawrence. By a Canal through the Isthmus the distance from Shediac to St. John will not be much more than one hundred miles.

This fact will show the insuperable obstacle that now exists to anything like extensive commerce between Montreal and the Bay of Fundy Ports of New Brunswick and Nova Scotia, and the great impulse that must be necessarily given to trade by the opening up of a route which will shorten distance so considerably, furnish an inland navigation from the Lakes to Boston, and consequently lessen freights between these points at least 25 per cent.

The interests of the Maritime Provinces that will be especially benefitted will be their Coal Trade, their Fisheries, and the valuable products of their quarries. Pictou on the Straits of Northumberland now sends a large portion of its coal to Boston, and other American Ports, despite the high tariff which the selfish policy of the dominant party in Congress has imposed upon that article of traffic, so indispensable to the manufacturers and other classes of people in New England. A cargo of coal is now carried through the Strait of Canso (often a troublesome route in the Autumn and Spring) at the average rate of $2 50 gold per ton to Boston, or $3 to New York. According to a statement given elsewhere, the freight from the head of the Bay of Fundy is frequently as low as $1 50, and averages $1 75 to Boston, and $2 and $2 25 to New York. Gypsum, equivalent to coal as an article of freight, is carried from Windsor at the head of the Avon (less accessible than the Bay of Fundy terminus of the Canal) to New York for $2 25 gold. When we consider the shorter distance, and the lessening of Insurance in the autumn, on account of a safer route than that now taken through Canso and round the Atlantic Coast of Nova Scotia, so exposed at certain seasons to fogs and storms, it is safe to estimate the saving of the freight on a ton of Coal from Pictou to Boston or Portland at $1 per ton. The amount therefore saved, on the 60,000 tons which now find their way to Boston, would be $60,000. It is also obvious that the coal production of Pictou county would be largely increased.

The lumber and fishery interests of the Gulf of St. Lawrence, both of the Island of Prince Edward, and what is generally known as the North Shore of New Brunswick, will also be benefitted equally with the coal trade of Pictou, by their being afforded a safer and shorter route not only to the Ports of the Bay of Fundy, but also to those of the North Eastern coast of the United States.

The fisheries of the Bay of Fundy are valuable, and prosecuted with considerable energy by the population that lives along its borders. Shad and Herring are the most profitable source of trade at present, but with the opening of the Canal, there must necessarily be a remarkable impulse given to the Mackerel Fisheries of the Gulf of St. Lawrence, to which a short and secure route will be given, not only to the inhabitants of the North and South Shores of the Bay, but to those in the Counties of Yarmouth and Shelburne, who are altogether engaged in Maritime pursuits. Yarmouth is the shipbuilding and shipowning county of Nova Scotia,—owning now an aggregate tonnage of over 90,000 tons, and already sends a number of schooners to the Gulf and Bank

Fisheries. With the construction of the Canal the people of this section of the Dominion will be encouraged to engage more largely in the prosecution of the deep Sea and Gulf Fisheries, especially of Mackerel, and to build a large number of the small craft suitable for this branch of enterprize. The American Fishermen, who also resort to the Gulf in such large numbers, will find it to their interest to use this Canal, as it will enable them to make an additional trip every season.

The country lying contiguous to the Bay of Fundy and the streams which flow into it is exceedingly fertile, and no part of Ontario or Quebec can surpass Dorchester, Hillsborough, Sackville, Annapolis or King's Counties in the growth of certain agricultural and horticultural products. Not only will this Canal give freer access to this fine section, a great part of which is the result of the action of the tides, which have in the course of ages formed a soil of rare fertility, but it will enable the valuable stones of its quarries, the olive freestone of Dorchester, the gypsum of Hants and Hillsborough, the grind and scythe stones in the vicinity of Cumberland Bay, as well as the Albertite of New Brunswick, which is unsurpassed for illuminating purposes, to be transported to the Canadian Market, from which it is now virtually shut out by the difficulty and cost of transit.

All these mines and quarries a now in active operation, and do a large business with the United States. They lie accessible to the water, and every convenience exists for rapid shipment.

A vessel taking these products of the Maritime Provinces to Canada, can return with cargoes of flour, and manufactures of Ontario and Quebec, which the people of the Bay of Fundy Ports are now buying in the American market.

The opening up of this new commerce is largely a question of freight. The St. John (N. B.) Chamber of Commerce tersely recapitulates the benefits arising from the construction of this as follows:—

"First: The Maritime Provinces import, say 700,000 barrels of flour annually, "besides a great many other articles of bulky character.

"Second: The Maritime Provinces possess inexhaustible supplies of productions "required by Ontario and Quebec.

"Third: The chief articles of import from Ontario to the Maritime Provinces, and "*vice versa*, being bulky, the element of freight forms a large item in their value; hence, "any greater facility for transit tending to cheapen the cost, must be productive of a greatly "increased demand.

"Fourth: This Canal would not only afford the desired facility for transit, by render- "ing it unnecessary to break bulk between the points of shipment and destination, but "would remove a great barrier to cheap freights by enabling owners of vessels to secure "return cargoes to Ontario and Quebec, and thus build up a mutually desirable reciprocal "trade, which may be increased to almost any extent."

This Canal cannot be considered apart from the Canals of the St. Lawrence navigation. As a Canadian Canal at Sault Ste. Marie is the natural commencement of the improvements of the Inland navigation of the Dominion, so the work through the Isthmus of Chignecto is the inevitable conclusion necessary to give unity and completeness to the whole system. It is Canadian in design, and must prove national in its results.

We have considered this question of Canal improvements with reference to Western trade, as well as to internal or intercolonial commerce, but there is another aspect in which it may be viewed, and that is in connection with the very important subject of commercial relations with the British, and especially the Foreign West Indies.

Formerly the direct trade between those countries and the old Province of Canada was very considerable; but of recent years it has comparatively disappeared, though more attention has been directed to the subject since the visit paid, sometime since, to those Southern latitudes by the Commissioners appointed by the Four Provinces to enquire into the trade of the West Indies and South America, for the purpose of establishing, if possible, larger commercial relations between them and Canada.

As yet, however, the only sections of the Dominion that do any large business with those countries are Nova Scotia and New Brunswick. Quebec has a very insignificant

trade with them, whilst there is virtually none with Ontario. According to the trade and navigation returns for 1869, we learn the following facts :—

Exports from	To South America.	To British W. I.	To Foreign W. I.
	$	$	$
Nova Scotia	111,010	1,421,972	605,561
New Brunswick	91,641	51,322	608,419
Ontario	.....	.....	.....
Quebec	304,570	73,296	9,602

Imports to	From South America.	From British W. I.	From Foreign W. I.
	$	$	$
Nova Scotia	.....	337,100	34,752
New Brunswick	142	211,293	83,933
Ontario	.....	46,032	212,081
Quebec	.....	267,100	

From another statement in the same returns we find that of the total value of Importations into Quebec from the foreign West Indies, viz. : $1,355,554, no smaller amount than $1,032,594 came through the United States. Of the $198,577 worth that came into Ontario, $194,556 passed also through the American Ports.

A large direct trade must be opened sooner or later between the Western sections of Canada and these countries, which now purchase from the United States a great quantity of goods which can be supplied more cheaply from Canada. The only reliable figures available at present are found in the Commissioners' report of 1864. The Americans exported to South America and the West Indian Archipelago the following articles :—

Flour	to the value of	.....	$10,140,852
Bread and biscuits	,,	.....	479,404
Butter	,,	.....	823,856
Candles	,,	.....	902,838
Cheese	,,	.....	305,925
Hams and beacon	,,	.....	838,309
Lard	,,	.....	3,797,115
Apples	,,	.....	116,614
Pork	,,	.....	2,267,475
Potatoes	,,	.....	433,655
Eggs	,,	.....	30,628
Onions	,,	.....	131,906
Rye, oats, barley, &c.	,,	.....	332,430
Fish	,,	.....	1,169,327
Beef	,,	.....	528,069

Wheat	to the value of	.....	$144,010
Beer, Ale and porter	,,	.....	107,332
Petroleum and coal oil	,,	.....	1,025,221
Boots and shoes	,,	.....	902,038
Timber, boards, planks, &c.	,,	.....	2,889,990
Staves, hoops, shooks, barrels and hogsheads		.....	3,109,454

Besides a great many other articles, unnecessary to enumerate, which can be supplied to a large extent by Ontario and Quebec. With the improvement of the St. Lawrence Canals, Ontario may be induced to embark to a certain extent directly in trade with the West Indies, for she possesses the products which those countries demand. By means of the Bay Verte Canal, a shorter and safer route will be open to propellers and sailing vessels.

The Ontario and Quebec merchants can supply the firms of St. John, interested in this trade, with the description of merchandise for which there is an ever ready and remunerative market in the tropics, and in that same way get back sugar, molasses, and other West Indian and South American produce, which is now supplied indirectly to so large an extent through the United States,

The largest class of screw steamers which must originate as one of the results of improving the inland navigation, can also late in the autumn proceed to the lower ports, and thence to the West Indies, where it is quite possible for them to find employment during the winter season, instead of laying up for five months in the year in Upper Canadian ports. In fact a large proportion of vessels and steamers which will trade between Quebec or Montreal and the West Indies will generally take this route.

The impulse that will be given to ship building and the carrying trade of the Dominion must be very considerable. Of late years the shipping interests of the British American Provinces have made very great progress, and now they are entitled to the proud position of owning the largest commercial marine in the world after England, the United States, and France—in fact, it is almost equal to that of the latter country. Ship building as a branch of industry has almost disappeared in the United States, in consequence of their enormous taxation and the high price of labor; and Nova Scotia and New Brunswick have now taken the place that Maine and Massachusetts formerly occupied on this continent. Not only does Canada own her ships, but she sails them; her flag is to be seen in every port of the world where commercial enterprize has found its way.

The carriage of this great Western trade, the proportions of which can be measured by its rapid development, despite the obstacles to its free egress to the principal markets of the world, must sooner or latter find its way into the hands of Canadian shippers. New sailing vessels and propellers, better adapted to the sea and lakes, must be built in course of a short time, for the demands of trade must be satisfied; and the enlargement and extension of our Canal system will therefore be immediately followed by an increase of Canadian tonnage and the general improvement of our shipping interests, already large for a country whose commercial history does not extend beyond the present century.

At present the Canadian carrying trade is very much crippled by the Navigation Laws of the United States, which shut out Canadian vessels from the coasting trade of the lakes as well as the sea-board. By reference to the returns of the Welland Canal, noticed elsewhere, it will be seen how large is the trade in the hands of American shipowners Our vessels are now unable to trade between Chicago and Oswego, and must also be prevented from trading between the American Lake ports and Boston or other places, with which there will be more or less direct trade after the improvement of our Canal System.

Indispensable as the navigation of the St. Lawrence is to the Americans, we can justly claim from them, as one of the conditions of its free use in the future, that they should abolish restrictions which are really more injurious to the commercial interests of their own Western Country than they are to those of Canada. No doubt the moment our Canals are improved, and the Great West sees the advantages the liberal policy of Canada has conferred on her, that her surplus wealth is no longer at the mercy of Erie Canal

monopolists, and New York forwarders, that her produce has increased in value by the saving in time, and decrease in the cost of freight, which the St. Lawrence route offers her, that her import trade has also decreased in the cost of its transit: then she will be the first to demand that these useless short-sighted Navigation Laws, the relic of an age of commercial fallacies, be struck off the statute book of a people, whose true policy is the freest intercourse with the whole world of commerce.

From the extracts we have given in the previous parts of this letter, the value the people of the Great West put on the free use of our Canals and system of Inland Navigation has been clearly shown, but it is hardly necessary to point out to those whom we are now addressing that it has always been the policy of the Government of the United States to obtain that boon from Canada. Mr. Andrews, in his valuable report submitted to Congress in 1852, on the subject of commercial relations between the British Provinces and the United States, said: "The free navigation of the St. Lawrence is greatly "desired by all those Western States bordering on the great Lakes, as their natural outlet "to the sea." This report had much effect in bringing about the Reciprocity Treaty, the fourth article of which extends to the inhabitants of the United States the right to navigate the River St. Lawrence and the Canals in Canada, used as the means of communication between the great Lakes, and the Atlantic Ocean, with their vessels, boats, and crafts, as freely as the subjects of Her Majesty. It also gives to British subjects the right freely to navigate Lake Michigan, and pledge the faith of the Government to secure to them the use of the several state Canals on terms of equality with the inhabitants of the United States.

The Reciprocity Treaty was a measure of mutual compromise and mutual concession; the use of our Canals, Fisheries and river navigation was given to the Americans in return for certain *quasi* privileges extended to Canada. Yet, despite the fact of the repeal of that treaty and its concessions, Canada has not closed her Canals to foreigners, but has given them every right which legitimately can be claimed by them; and it is only necessary to refer to the returns of trade to see how largely the Americans have availed themselves of the privilege.

Under these circumstances, we can fairly claim some return for the still greater advantages which their Western commerce must receive from the extension of Canal improvements.

DECISION ARRIVED AT BY THE COMMISSIONERS CONCERNING THE FOREGOING WORKS.

It will be observed that the evidence laid before us relative to the proposed enlargement and extension of our Canal System for the purpose of securing to Canada a larger share of the growing trade of the West, comprehends a wide range of opinion gathered from all quarters of the Dominion as well as from the neighboring cities of the United States interested in the subject. In some cases it may be supposed to represent the sectional or vested interests of the places from which it emanates, but for the most part it is characterized by the broad and definite views of the persons practically acquainted with the actual requirements of the trade.

We have carefully analyzed the statements and recommendations elicited by our questions, comparing them with each other, and considering them in relation to our own previous knowledge of the subject; and after earnest and mature deliberation in the interest of the Dominion, as to the best means of obtaining the desired object, we are enabled to arrive at decisions on the several points submitted.

Although there is a good deal of discrepancy between many of the replies which have been received, both as to the proper lines to be improved and the proper scale of improvement, still we think it will be sufficiently evident, all things considered, after a fair comparison of the answers given by parties best acquainted with the wants of the trade and the existing condition of our Canals, that there is a remarkable degree of unanimity in regard to all the essential requirements—so great an unanimity, indeed, that no person of ordinary capacity can fail to see what improvements are essential to the development of a proper Canal System for the Dominion.

Scale of Navigation.

First, then as regards the proper scale of navigation for the main line of water communication from Lake Superior to tide water, we are of opinion that there should be one uniform size of lock and Canal throughout, including the *Welland Canal*, the *St. Lawrence Canals*, and the proposed Canal at the *Sault Ste. Marie*.

That the most suitable size of lock for these Canals will be one having 270 feet length of chamber between the gates, 45 feet in width, and 12 feet of clear draught over the mitre sills.

That the bottom of the Canal should be sunk at least one foot below the mitre sills of the locks, with a width throughout of not less than 100 feet, to admit of two vessels passing each other with perfect ease in any part of the Canal, and that the slopes both in earth and rock excavation should be such as the nature of material may require for the preservation of the Canal, and the protection of the vessels navigating it.

That the most suitable size for the locks on the proposed *Bay Verte Canal* will be 270 feet in length of chamber between the gates, 40 feet in width, and having 15 feet draught of water on the mitre sills.

That the most suitable size for locks on the proposed *Ottawa improvements* will be 200 feet in length of chamber between the gates, 45 feet in width, and 9 feet draught over the mitre sills.

That the proper size for the locks on the *Chambly Canal* will be 200 feet in length of chamber between the gates, 45 feet in width, and of such draught over the mitre sills not exceeding nine feet, as the channel in the River Richelieu will conveniently afford.

The size of the locks, and the sectional area of the Canal must of course be suited to the class of vessels now in use and best adapted for the movement of the immense tonnage

of the Lakes. The vessel that does this work with the greatest economy of time and money, is the true ideal vessel of the future, the one that will continue to transport the most tonnage, and consequently presents the best claims for consideration.

The tendency in shipbuilding for the last quarter of a century on the Upper Lakes has been to construct larger vessels every way, whether propelled by steam or sails; while the screw is superseding the paddle everywhere on the lakes as well as on the ocean, the relative number and tonnage of screw steamers is gradually increasing upon the sailing craft.

The Lake St. Clair Flats were, in former years, the accepted gauge of the navigation; but, by the combined action of the Canadian and United States' Governments, the obstacles in this lake have been so far removed that vessels can now pass through it drawing 14 feet. The channel has been dredged out to 300 feet in width, and 13 feet depth at low water, affording 14 feet, however, at the ordinary level of the lake. As fast as the channel was deepened so the draught of the vessels increased. The iron screw-steamer *Philadelphia* can now navigate this channel at all ordinary stages of the water, drawing 14 feet. Her length is 234 feet, beam 34 feet, and carrying capacity 1,500 tons. The wooden screw steamers *Nebraska* and *Colorado* are each 265 feet in length, 34 feet in beam, and 1,600 tons capacity.

Then again as the line of navigation is extended, so the long voyage demands larger tonnage. As an approximate rule for the size of a vessel for any particular route, it has been observed that any vessel to be properly adapted to its business should have one ton of measurement for every mile of her voyage; and as examples, in illustration of the rule, it may be remarked that the vessels plying between Chicago and Buffalo, 916 miles, now range between 600 and 1,500 tons, while many persons, of considerable experience in the trade, are of opinion that a medium size of about 1,000 tons is best suited for this route. The ocean vessels laid upon the line between Montreal and Liverpool, for a journey of 3,220 statute miles, have a capacity from 2,000 to 4,000 tons. The distance between Chicago and Montreal, 1,261 miles, would seem, from these examples, to require that the vessels trading between these ports should have a capacity ranging somewhere between 1,000 and 1,500 tons.

The superior economy of the larger vessel is sufficiently established by the present cost of transport on the great channels of trade between Chicago and Buffalo, and Chicago and Oswego. On the former route, where all classes of vessels from 600 to 1,500 tons are in use, the average charge on a bushel of wheat, in 1869, for the whole year, struck from the weekly quotations, was 5·65 cents, while on the latter route, where the size of the vessels is limited to 500 tons, the average cost for the same year taken in the same way was 11·13 cents, or a difference of 5·48 cents for only 143 miles extra distance. Making a fair allowance for this extra distance, and the time and tolls on the Welland Canal, there is still a difference due to the different kind of vessel of about four cents a bushel. This agrees with many of the answers given on this point. As the price of freight to Kingston is generally the same as to Oswego, there would appear to be a saving of four cents a bushel after the Welland is enlarged, so as to bring through the larger vessels. This saving is equal to the cost of carrying a bushel of wheat from Kingston to Montreal, and the same difference obtains whether the cereal is carried by screw steamers or by sailing vessels.

The locks should not be of larger size than is necessarily convenient to pass the vessels using them. To make them larger than the necessities of the case demand, entails not only an unnecessary expense in cost and maintenance, that has to be borne by the vessel itself in the form of tolls to pay interest on the outlay, but causes a waste of water and loss of time in filling and emptying the locks.

Width of Locks.

If we had now for the first time to consider the proper width of the locks in relation to the most suitable breadth of beam for vessels adapted to the St. Lawrence trade, we

should feel disposed to limit it to 40 feet; but inasmuch as 30 out of the 54 locks now in use on this line alone are 45 feet wide, we think this fact has already established the width, and, therefore do not recommend any change. The replies on this point correspond very generally with this view of the case. To reduce the width of the St. Lawrence Canals to 40 feet would exclude from them all the best class of steamers now running on this route, and inflict a serious injury upon the trade of the country.

On the Bay Verte Canal, however, we can see no good reason for a greater width than 40 feet, which will take in all the largest class of sea-going vessels which it is designed especially to accommodate.

Length of Locks.

If, from the length proposed of the chamber of the locks, 270 feet between the gates, the space required for the swing of the gates (20 feet) be deducted, the available length for the vessel is 250 feet, which, in proportion to the width, is as little as can be allowed by the accepted rules of naval architecture.

The Draught.

While some of the writers, who ought to be best informed on the subject, recommend a draught of 14 feet, and others as much as 16 feet, regard must nevertheless be had to the capabilities of the harbors, and to the engineering characteristics of our Canals, as well as to the prudent suggestions of moderate and experienced men who have limited their views to 12 feet. It would be extremely unwise to embark in magnificent schemes, exceeding the resources of a young country, with the view of introducing ocean vessels into our Canals and lakes. Montreal and Quebec are now established seaports and natural points of transhipment; but under the influence of Confederation we are warranted in looking forward to a great development of trade between Ontario and the Maritime Provinces, and the interchange of commodities between them can best be effected by a special class of coasting vessels going directly through without breaking bulk.

Having, therefore, a prudent regard to the demands upon the resources of the Dominion, to the condition and capabilities of our Canals and harbors, and to the actual wants of the trade, we have agreed upon a draught of 12 feet as most suitable for the St. Lawrence route, and 15 feet as most suitable for the Bay Verte Canal.

The Ottawa Canal.

The scale of improvement recommended for this route is the same as that of the existing St. Lawrence Canals—locks 200 by 45 by 9 feet, and has been so fixed in consequence of the peculiar character of this river, which, when improved, as suggested by the engineers who have surveyed this route, by a series of locks and dams, making slack water navigation throughout, will be admirably adapted for a barge navigation similar to that which now obtains on the River St. Lawrence, and, as appears by the evidence, by far the cheapest means of transport. (App. A.)

The Chambly Canal.

The scale recommended for the enlargement of this Canal corresponds with that suggested for the Ottawa, except that the draught may fall a little short of nine feet in case the River Richelieu will not afford it without involving considerable expense.

As both these Canals will be principally used for the conveyance of lumber from Ottawa to the American market, it is desirable that they should be built of corresponding dimensions.

CLASSIFICATION OF WORKS.

Secondly,—Respecting the relative importance of the several public works and proposed improvements to which our attention has been directed, and the order in which they should be proceeded with, we have found it expedient to divide them into four separate classes, as follows :—

Works of the First Class.

In the first class we have placed all those works which it is for the general interest of the Dominion should be undertaken and proceeded with, as fast as the means at the disposal of the Government will warrant.

These works are—

The Sault Ste. Marie Canal.

The raising of the lock walls, waste weirs, and banks of the Welland Canal, on the present line from Allanburg to Port Dalhousie, in a permanent manner, to admit the passage of vessels drawing twelve feet of water.

The enlargement of the Welland Canal on the scale adopted for it.

The Ottawa Canal improvements from Ottawa City to Lachine, and the enlargement of the Chambly Canal on the scale adopted for them.

The deepening of the navigable channel in the River St. Lawrence between Quebec and Montreal to twenty-two feet draught at low water.

The construction of the Bay Verte Canal on the scale adopted for it.

The enlargement of the St. Lawrence Canals to the same scale as the Welland. At the lower entrance of the Lachine Canal another set of locks to be constructed with seventeen feet of water on the mitre sills, forming a second line of connection between the Montreal Harbor and the upper basin of the Canal. The lands purchased and set apart in former years for increasing the accommodation to the trade at this point when required, we now propose shall be used for the establishment of commodious docks and basins, the whole of which, as far as Wellington street, are to be made eighteen feet deep.

The improvement of the channel in the River St. Lawrence above Montreal, by removing all obstructions in the river and lakes between the several Canals, and also at the ingress and egress of these Canals, so as to give fourteen feet of water throughout.

We consider that all the works embraced under the head of *first class*, are really of so great importance, so essential to the welfare and prosperity of the whole country, that we feel some degree of embarrassment in recommending which of them should be first proceeded with ; but we respectfully suggest that they should be undertaken in the order in which they are here recited, or as far as possible, simultaneously.

Without classing the Upper Ottawa Canal, the improvements of the rapids of the St. Lawrence, and the Murray Canal, among *works of the second class*, the Commissioners resolved, on the subject of the Upper Ottawa Canal, that the wide discrepancy between the different Engineers' Plans and Estimates, one being as high as $12,058,680, and the other $24,000,000, leaves them in doubt, both as to the proper methods of improvement, and their probable cost. The importance of this work to the whole Dominion cannot well prospectively be over-estimated, and the Commissioners are of opinion that further examination into the subject is necessary as early as possible, in order that, if found advisable, action may be taken with regard to it.

As regards the improvements of the rapids in the St. Lawrence, it is very desirable that the depth of water in the river should be so increased, as to afford, at least, eight feet at the lowest water.

The Commissioners are led to believe that this depth can be obtained at a very moderate expenditure, and recommend that it should be done as early as convenient. The further deepening of the channel to fourteen feet, is no doubt quite practicable, but it may be left for future consideration.

The Murray Canal is entirely a work of local importance, and is not required by the general trade of the Dominion. In this view, while so many works of general importance are calling for execution, the Comissioners recommend that for the present the consideration of this Canal be deferred.

Works of the Third Class.

In the *third class* we have placed the works which have been undertaken by private companies, which companies have received the necessary powers for constructing them, under special and most liberal charters from the Dominion Parliament; and for this reason we do not feel warranted in offering any recommendation in regard to them.

These works are :—

The Caughnawaga Canal;

The Erie and Ontario Ship Canal.

Works of the Fourth Class

In the *fourth class* we have placed that proposed work, projected by a chartered company which has applied for a grant of the public lands to aid in its construction, but on which we do not recommend any expenditure of the public resources of the Dominion.

That work is ;—

The Georgian Bay Canal, otherwise designated in the Charter as the Huron and Ontario Ship Canal. 29 Vic., chap. 78, Sept., 1865.

Rideau Canal.

From the evidence submitted in reference to this Canal, we are led to the conclusion that it is an important work, which ought to be maintained as one of the public works of Canada. That as constructed it is quite sufficient for the wants of the trade, provided it is kept in good working order, and the summit level maintained at its original height. That it requires no extension or enlargement, but only to be cleared of deposits which have accumulated in certain parts of the Canal, and to have the locks, gates, dams and sluices made reasonably water-tight—the cost of which falls naturally under the head of ordinary repairs and management.

Appendix A.

To insure a constant supply of water, at all seasons, for the several reaches of the Canal, but more especially at the summit, it is necessary that dams and regulating sluices should be constructed at the outlets of the larger lakes which empty into the Canal in order to retain the flood-waters, and let them off as may be required during the season of navigation. Four such dams appear to be necessary to secure this object. An appropriation of $12,000 was made last year for this purpose, and two of these dams are now in course of construction.

ENGINEERING ASPECT OF THE ENLARGEMENT.

We now propose to sketch the engineering aspect of the proposed improvements.

As it would obviously be out of place in a communication of this nature to enter minutely into engineering questions, they are accordingly treated in a general way, merely sketching their more salient features, but it is hoped, with sufficient distinctness, to afford a clear and comprehensive view of the subject.

SAULT STE. MARIE CANAL.

A survey for a Canal to surmount these rapids was made upon the Canada side, under the directions of the Department of Public Works, in 1852, some time before the existing Canal on the American side was commenced. The results of this survey are now before us. There are no engineering difficulties; on the contrary, every condition seems favorable to the construction, at a moderate expense, of a first class Canal, of the dimensions proposed for the Welland and St. Lawrence.

St. Mary's Island, through the middle of which it is proposed to make a straight cut, is about half a mile in length, and is composed of a regularly stratified sandstone (Lower Silurian), which is easily wrought, and of such solidity as to afford a good foundation for the lock. It has a superficial covering of drift, a few feet in thickness, barely rising above the level of Lake Superior.

The distance between the deep water bays at the upper and lower entrances, corresponding with the length of the Canal from end to end of the piers, is little over a mile.

The fluctuations in Lake Superior are limited to a rise and fall of about eighteen inches. The fall in the rapids varies according to the different stages of the lake and river, from 17 to 19 feet, but is generally about 18 feet.

This survey was made at a time when side-paddle steamers were in the ascendant, when they had nearly reached their maximum of size and tonnage, and monopolized the greater share of the passenger and freight business on the Upper Lakes.

The screw steamer was then on its trial, and its superiority in point of economy, speed and carrying capacity, was as yet undeveloped.

It is not surprising, therefore, that under these circumstances the Chief Engineer of the Department proposed to build this Canal of sufficient size to pass the largest class of side-paddle steamers at that time employed in the trade. Locks 350 × 66 × 10 feet, and the prism of the Canal 130 feet at the bottom and 140 feet at the surface to admit of two steamers passing each other in any part of the Canal. His estimate for this Canal with the two locks, (which it was necessary to build when the breadth was so great) was $480,000. If the same amount of work had to be performed now, when labor is so much higher, a large percentage would have to be added to this estimate.

It is believed, however, that on the more moderate scale we have suggested for the Canal System of the Dominion, it will be quite practicable to overcome the whole fall by a single lock of 18 feet lift, and thus avoid the expense of the regulating weirs which would be necessary if two locks were constructed to divide the lift.

This will materially simplify the construction and operation, reduce the quantity of work to be performed, and consequently the cost of the Canal, and the time of passing through it.

There are now no less than three locks of equal lift in daily working on the Welland Canal, and therefore there can be no doubt, that if properly constructed, a single lock will be found most suitable for this short Canal, the last link in the great chain of the Canadian Canal System from Lake Superior to the Atlantic Ocean. The estimated cost for a Canal and single lock—Canal 100 feet at bottom, 110 feet surface, 13 feet deep—lock 270 × 45 × 12 including the entrance piers, and excavation to deep water, superintendents' and lock-tenders' houses, is $550,000.

THE WELLAND CANAL.

The Grand River Level.

Up to this time the navigation of this Canal has been dependent on the Grand River. This river takes its rise in the southern part of the County of Grey, less than thirty miles from the shores of the Georgian Bay. In its circuitous course of one hundred and thirty miles, thence to Lake Erie, it, with its branches, waters the greater portion of the populous and flourishing Counties of Wellington, Waterloo, Wentworth, Perth, Oxford, Brant and Haldimand, and drains an area of 2,600 square miles.

If one-half the annual rain-fall within its watershed could be stored up and let off as required, it would afford 275,000 cubic feet of water per minute, or about nine times as much as would be necessary for continuous lockages both ways for the enlarged Canal. But there are no means of doing this, and only a fractional portion of the supply can be utilized. It flashes off at the the dam at every flood, and the waste is so great that there is often in dry seasons a scanty supply, even for the smaller locks now in use after shutting it off from all the mills along the line. A dam at Dunnville, four miles from its mouth, raises the water in that river nine feet, making slack water navigation for 16 miles, as far up as Cayuga, and a feeder 21 miles in length, 26 feet at bottom, and 9 feet deep, conveys to the main line at the junction the water required for locking both ways, towards Lakes Erie and Ontario.

A vessel entering the Canal at Port Colborne is first locked up 8 feet to the present summit level of the Grand River, and going towards Port Dalhousie begins its descent immediately, after passing through the deep cut at Allanburgh, a distance of 15 miles from Lake Erie, and in its course crosses the Welland River, by an aqueduct, at a distance of 8½ miles from the lake.

The lock at the junction is not used so long as the Canal is fed from the Grand River, but when Lake Erie becomes the summit and feeder, the water on the main line will be lowered to its level, and this lock will then have a lift of 3 feet, and will be used for all vessels and craft passing thence to Dunnville and Port Maitland.

From the annual reports of the Department of Public Works it appears that, while the business on the Canal is continually increasing, the supply of water continues to diminish from year to year, and in some seasons has fallen as low as 3 or 4 feet in the summit level. At no time, however, has the navigation been stopped on the main line from failure of supply in the Grand River, because of the great depth in the summit and the power reserved to the Superintendent of shutting off the water from the mills when it is wanted for the Canal.

Lake Erie Level.

While the Grand River, therefore, has continued for thirty-seven years, ever since the first opening to Port Colborne, in 1833, to afford a precarious supply of water, the existing conditions of the navigation were never considered satisfactory, nor looked upon as final. They left the most important link in the great chain of water communication, between two great lakes entirely dependent on the stability of a wooden dam, the sufficiency of an earthen embankment, and the possibility of failure in the source of supply. At an early day it was foreseen that as the country through which this river took its course was

cleared up for settlement, and opened to the influence of the sun and winds, it could not be depended upon as a feeder.

It was, therefore, wisely determined by the Board of Works, as early as 1843, to make Lake Erie the summit and feeder of the Canal, and the plans for its enlargement were arranged accordingly.

It was at first intended to lock down at the junction to Lake Erie level, and to raise the banks and mechanical structures on the summit of the main line from Allanburgh to Port Colborne to that level only; but when the slides began in the banks of the Deep Cut, it was deemed advisable to raise all the banks and structures high enough for the Grand River level, while at the same time the bottom was kept down to that of Lake Erie, so that, as now arranged, this 15 miles of the main line of the Canal is adjusted for both levels.

The Guard Lock at Port Colborne is provided with a double set of gates made to act in opposite directions, and the walls of this lock, of the lock at Allanburgh, the locks into the Welland at Port Robinson and Welland, and the walls of the aqueduct are all now raised to the Grand River level.

In the event of the navigation, at the lower level, being stopped by accidents from slides, it was deemed indispensable that there should be the means of resorting to the higher level to pass over them. Throughout the summit level the prism of the Canal was intended to be excavated to 50 feet at bottom of Lake Erie level and 11½ feet deep, and the work is now very nearly completed.

The direct line of the Welland Canal between Port Colborne and Port Dalhousie, presents the lowest summit between these two lakes—yet on this line, nature has interposed two formidable lines of defence against the waters of the Upper Lake. The *first* consists of a band of stratified limestone two miles in breadth along the lake shore, rising eight feet above the level of the lake. Through this a channel has been cut 58 feet in breadth, with vertical sides, and with a depth of 12 feet below the low water surface of the lake.

The Deep Cut.

The second line of defence is the "Deep Cut," near Allanburgh, about a mile and three quarters in length, consisting of clay, resting in a bed of soft material of the nature of quick-sand. This clay cutting presents more formidable obstacles to the Lake Erie summit, than the longer and harder rock excavation. From the natural surface of the ground to the Lake Erie bottom level the depth at the summit of the cut is 45 feet, but in consequence of the spoil bank having been at first placed too near the slopes, the depth of the cutting, since it has been widened, is 60 feet.

In the early history of this undertaking by the Welland Canal Company, as previously stated, it was attempted to make the Welland River the feeder, and it was not until they had succeeded in excavating two-thirds of the whole length down to that bottom level, that the slides occurred which closed up the channel, and compelled the Company to abandon their plan and seek a higher level.

By means of powerful steam dredges the Deep Cut has been excavated to a depth of 19½ feet below Grand River level, or 11½ feet below Lake Erie level, and fifty feet at bottom, with slopes two feet horizontal to one foot vertical; but serious slides on several occasions have all but closed the channel, and their removal has delayed for many years the achievement of this important design. The work was begun in 1846, and with slight intermission has been prosecuted from year to year until the present time. In the last general report of the Minister of Public Works for 1869, the hope was expressed of bringing the Lake Erie water into the Canal during the summer of 1870, but settlements in the banks having been discovered in four different places during the season of navigation, in 1869, fortunately without any accident, the lowering of the water has been deferred in the hope that in the meantime the bank of the Canal will solidify and become more secure.

The upper portion of this cut is a stiff strong clay, passing by degrees as it goes below the water, into a treacherous unstable material resembling quicksand. When a slide

occurs, the bottom rises, and the harder material at the top descends on the line of fracture, and takes the place of the softer material. The dredging operations remove the softer substance, and the harder clay is left as a lining to the bottom, giving greater resistance to the pressure of the banks. It would therefore appear, that the only practical means of preventing slides, is to remove the superincumbent weight of the spoil bank, and widen the cut.

Years ago a scheme was mooted of washing out the Deep Cut, and wasting the material down the valley of the Twelve Mile Creek, and if there had been any other place to receive the stuff, than the harbor of Port Dalhousie, and the Canal between it and St. Catherine's, the project might have been entertained.

What the Enlargement Requires.

In order to enlarge the Welland Canal to the scale now proposed—locks 270 × 45 × 12, and Canal 100 feet at bottom—it will be necessary—

1. To construct a new Canal from Thorold to Port Dalhousie.
2. To raise the locks, banks, and weirs on the present line, so as to give 12 feet of water.
3. To deepen the Harbors at Port Colborne and Port Dalhousie to 15 feet, so as to give safe entrance to vessels drawing 12 feet of water.
4. To widen and deepen the main line between Thorold and Port Colborne to 100 feet bottom, and 13 feet depth, one foot below the lock sills.
5. To build a second lock at Port Colborne, in order to admit more water into the Canal.
6. To sink the floor of the aqueduct two feet, and possibly to build another aqueduct alongside of it, so as to give the free passage to the water for supplying the double set of locks from Thorold downwards.

As the Commissioners cannot have the results of the survey now in progress, before closing their letter, they are unable to give a correct estimate of the probable cost of these works, but would respectfully submit that, as well as they can judge in the absence of more positive data, their cost will be about $6,550,000.

New Line—Thorold to Port Dalhousie.

The construction of an entirely new line from Thorold to Port Dalhousie, or to some point on the present line between the first and second lock, is imperative, for the following reasons.

The reaches between the present locks on the mountain declivity are entirely too short, and of too small capacity for the enlarged Canal. The locks are so close together that even supposing it possible to construct the large locks on this line without stopping the navigation, and to make use of one of the present walls to form part of the new locks, still the enlarged locks would be placed so close together, that there would not be left a vessel's length between them. They would be tantamount to combined locks, the operation of which is to retard the passage of vessels, and cripple the efficiency of the Canal.

Therefore, as combined locks cannot be admitted on such an important navigation as this is, it is imperative to seek another line where ample basins can be established between the locks to admit of the passage of vessels, and capable of holding an abundant supply of water for working the lock without drawing down the levels. It is believed that there is no difficulty in finding such a line, and of locating the locks on the sloping ground descending from Thorold to Port Dalhousie, where an efficient Canal can be economically constructed under the most favorable conditions. This survey is now in progress, under the direction of the Public Works' Department.

Lateral Cut to Niagara.

The idea has often been discussed of making an entirely new line of Canal from Thorold to Niagara, instead of the projected one to Port Dalhousie, thus giving two entrances to the Canal from Lake Ontario.

The inhabitants of the town of Niagara have always taken a lively interest in this question, and only last year a Company was formed, and received a most liberal charter from the Dominion Parliament for the construction of this branch.

A survey for a lateral cut to Niagara was made by Messrs. Barratt and Keefer in 1839, and again by Mr. Walter Shanly, in 1854. The estimate of the latter for a Canal 12½ miles in length, on a scale commensurate with the Sault Ste. Marie Canal, with locks 350 × 75 × 12, and Canal 100 feet broad at bottom was at that time nearly four millions of dollars.

More Water in Present Canal.

While the construction of the new line is in progress, it is not only necessary to keep up the present line to its full working capacity, but it is also desirable to extend further accommodation to the trade, by making it of the same depth as the proposed enlargement, viz., to pass vessels drawing 12 feet of water.

For the class of smaller vessels it will be advisable always to maintain the existing line of locks and keep them in good working order. At a moderate expense, these locks with the banks and waste weirs between Allanburgh and Port Dalhousie can be raised and finished in a permanent manner to admit 12 feet of water on the sills, and as this would have to be done at any rate, it is better to do it at once and secure a present advantage. The entrance locks at Port Colborne and Port Dalhousie have now the full depth of 12 feet on their sills. The second lock from Port Dalhousie is at St. Catherine's, 3½ miles from that port, and is of the same size, only the depth is 10¼ feet on the sills. They are all 45 feet in width.

The aqueduct is also 45 feet in width. Thus the part of the Canal where the smaller locks obtain is confined to the eight miles between Allanburgh and St. Catherine's. The 24 locks on this division are 150 × 26½ feet. They were originally designed and built for 9 feet draught, but some years after they were completed, the water was raised to 10¼ feet by bolting down timbers upon the copings of the walls, and by raising the banks and weirs. The immediate effect of this improvement, was to increase the tonnage capacity of the vessels navigating the Canal, from 400 to 500 tons net. For the same reason, another addition of 1¾ feet will increase the tonnage capacity from 500 to 650 tons net.

There is no doubt that ship owners will immediately avail themselves of such an important addition to the carrying capacity of their vessels, and thereby avoid the necessity of lightening through the Canal, as they are obliged now to do when heavily laden.

The temporary timber now used to raise the water, should be replaced by substantial masonry, and the locks, gates, weirs and banks should be permanently finished to the higher level.

RIVER ST. LAWRENCE.

Quebec to Montreal, Distance 100 Miles.

Before any improvements were commenced on this part of the St. Lawrence, the draught of vessels was limited by the flats in Lake St. Peter to 11 feet at low water. The dredging of a channel through this lake was commenced in 1844, and completed in 1865, at a cost of $1,347,018. It is 11½ miles long, 300 wide at bottom, and nearly, if not quite, 20 feet deep at low water.

As the dredging of this artificial channel proceeded, it was discovered that several other points in the track of sea-going vessels presented obstructions which likewise had to be removed. These are all particularly pointed out by the Chief Engineer of the Public Works' Department in his report of the 25th January, 1868, published in the general report of that Department for the same year.

This marked improvement in the channel of navigation has given access to Montreal for a much larger and better class of sea-going vessels, including Atlantic steamers of

3,000 tons capacity, the effect of which has been a considerable reduction in the cost of Ocean freight, and a corresponding advantage to every branch of business throughout the country.

In order, however, to benefit to the full extent by the proposed enlargement of the Canals, and to be prepared for the great increase of business they will naturally bring to Montreal, it is considered essential that still further facilities should be extended to Atlantic vessels frequenting this port, so that they may be in a position to compete successfully with New York and Boston shipping, for the carrying trade to European ports.

Many of the larger steamers now trading at Montreal draw from 18 to 23 feet laden, without coal, and range from 290 to 350 feet in length. For the security of the navigation, the channel should be as wide as the length of the vessel, and the depth fully one foot more than her draught; this would require the enlarging the channel throughout, between Quebec and Montreal, to 400 feet in width and 24 feet in depth at low water.

The cost of such an enlargement has been estimated by the Chief Engineer in his report, before referred to, at $2,500,000, but he states that having made no examination for this purpose he assumes the depths shewn on the Admiralty charts as giving a fair idea of the channel way not included in his surveys; consequently it is not founded on correct data, is partly conjectural and merely submitted for the purpose of giving some idea of the extent of the work. He remarks that it is a work of great magnitude involving the removal of a larger mass of material than has been excavated up to the present time, while it would of course embrace all those portions of the river where improvements have already been made, and probably other parts where no work was required for a twenty feet channel.

We therefore, recommend that the necessary surveys and examinations be made with a view to finding out all the places where obstructions to a channel 24 feet in depth are likely to be encountered, and that an estimate be prepared of the probable cost of removing them. Meanwhile the Commissioners recommend that the deepening of the channel to 22 feet depth of water be undertaken and proceeded with as already indicated.

THE ST. LAWRENCE RIVER.

Kingston to Montreal, 178 miles.

Fall in the rapids from Lake Ontario to tide water 234 feet.

The navigation of these rapids by steamboats was never thought practicable until after the completion and opening of the Cornwall Canal in 1842, when the experiment was tried and proved entirely successful. A daily line of passenger steamers was soon established, and for about seven months in each year these vessels have continued daily to descend all the rapids between Kingston and Montreal, affording for the pleasure travel in summer, one of the most delightful trips to be found in any part of the world.

Returning, these steamers make use of the Lachine, Beauharnois and Cornwall Canals, but have sufficient power to ascend the upper rapids, Rapide Plat, Iroquois and Galops without entering the Canals.

It is not usual, however, for freight vessels to navigate the lower rapids, Long Sault, Coteau, Cedars, Cascades, and Lachine, but as they can safely descend the upper rapids, it has long been a favorite project with many, and one that was strenuously advocated by the late Honorable William Hamilton Merritt, to make such improvements in the channel through the lower rapids as would enable all vessels, and especially the propeller class, to pass down with safety without making use of the Canals, thus saving both time and expense.

For this purpose, no less than three different surveys and reports have been made under the direction of the Public Works' Department for the improvement of the downward navigation.

The first was made by Mr. T. C. Keefer, in 1850; by placing wing dams and glancing piers at certain points, and removing certain rocks and shoals by blasting under water, it was proposed to increase the volume of water through the navigable channel, sufficiently to allow vessels drawing 9 feet of water to pass down in safety. His estimate at that time amounted to $60,000.

The second report was made by the Chief Engineer of the Department in 1853. After a somewhat more extended examination of the currents, the Coteau, Cascades and Lachine rapids, he submitted an estimate of $120,000, predicated upon nearly the same method of pier work and blasting out of the channel to afford a draught of 10 feet, but recommended, before actually commencing operations, that further surveys and examinations of the rapids should be made.

The attention of the Department having soon after been directed to the successful operations of Messrs. Maillefort & Raasloff in submarine blasting without drilling at Hell Gate, near New York, arrangements were made with those gentlemen in 1854 for a regular hydrographic examination of all the rapids above Lachine, and the testing of their method by firing a certain number of charges. Their Report and Plans dated 15th November, 1854, were laid before Parliament in 1856. They reported that in order to make a perfectly navigable channel throughout, from Prescott to the head of the Lachine Canal, for vessels drawing 10 feet of water, improvements were required at the Galops, Long Sault, Coteau, Cedars and Cascades, the channels through which were to be mined out 200 feet wide and from 12 to 13 feet deep, and that the cost of carrying out this plan on their system of submarine blasting would be $720,000. It does not appear, however, that any action was taken upon this Report.

Mr. J. B. Jarvis, in reporting on the Caughnawaga Canal, in 1855, seems to have entertained an unfavorable opinion of the project, remarking that "It would require "much improvement in the channel to navigate a propeller of 600 tons with reasonable "safety through the rapids opposite the Cornwall and Beauhornois Canals," and that, "no advantage can be promised to the route from this source."

With the information supplied by these Reports, the Department of Public Works, did not undertake any improvement of the rapids, and consequently, up to this time, the channel through them remains in its natural condition.

We have not time at present to give this subject the consideration its importance seems to deserve, but we state that, in our opinion, by a judicious employment and combination of the two systems—pier work for confining the currents within certain limits, and sub-aqueous blasting with the more powerful explosive substances now in use, nitro-glycerine or *dynamite*—very considerable improvements can be made, and at a much more moderate expenditure than that contemplated in the last estimate laid before the Public Works' Department.

SAINT LAWRENCE CANALS.

An estimate was prepared by the Chief Engineer of the Department of Public Works in 1860 for increasing the draught of water in the St. Lawrence Canals to 10½ feet—the depth specified in the Address of the Legislative Assembly of Canada of the 16th March, 1859. The Engineer's report and estimate were published in the Public Works' report for 1859, and were accompanied with copious notes, "explanatory of the circumstances, "nature, and extent of the work to be done" in the accomplishment of this object.

The draught at present is nine feet. To increase it by only 1½ feet, the estimated cost was $1,028,000. It does not follow, however, that doubling this increase and making the draught 12 instead of 10½ feet will necessarily double the cost. The difference between raising the banks, and deepening the Canal for 1½ feet or for 3 feet, may be directly arrived at, but if certain lock walls have to be taken down in order to sink the sills, or if the sills can otherwise be lowered by undersetting without disturbing the walls, the mere addition of work and material necessary for 3 feet instead of 1½ feet, is small in comparison to the cost of the elaborate preparations indispensable in either case. On the other

hand, since it has been recommended to add 70 feet to the length of the locks, which was not contemplated in the estimate referred to, it is evident that it cannot be taken at this time as any measure of the cost of increasing both the *length* and *draught* to the scale now proposed. It will therefore be necessary that another survey and estimate should be made in order to ascertain the probable cost of the enlargement.

It is unnecessary, therefore, at present, to enter into the engineering details respecting the manner in which the existing works will be affected by the proposed enlargement, but it may be proper to state in a general way that we do not apprehend any serious difficulty in carrying it out, and that we think it may be accoplished for somewhere about the sum of $3,150,000.

Lachine Canal.

From the evidence laid before us, as well as from the Annual Reports of the Public Works' Department for many years past, there appears to be the most urgent necessity for increased accommodation to the trade at the lower entrance of this Canal.

Vessels are so crowded together in the limited space afforded, both in the Montreal Harbor and in the upper basin of the Canal, and the delays in passing the two lower locks forming the connection between them are so great as to become constant sources of complaint, and a heavy tax upon the business of this port. As the trade increases, matters are only getting worse. The entrance locks are proved to be altogether inadequate to the present requirements, and it is time that some action should be taken to remedy the evil, for if it is suffered to continue, the products of the West will be drawn into other channels.

As far back as 1860 particular reference was made to this subject in the general Report of the Public Works' Department for that year, setting forth the necessity for increased accommodation, and suggesting the means of supplying it, in the following terms :—

"The quantity of produce now arriving at Montreal indicates the necessity of pro-
" viding, at an early day, for far greater dock room and warehouse capacity than is at
" present, or is likely this year to be afforded.

" By opening new basins on the south side of the Canal, and deepening the channel
" through the middle of the large basin up to them, sea-going vessels may with facility be
" brought in connection both with the Upper Lake vessels and the Grand Trunk Railway,
" for the draught upon the sills of the two lower locks has been made 16 feet expressly
" with this view, and the requisite quantity of land has long since been acquired, and is
" still retained for that express purpose.

" These basins might be proceeded with from time to time according to the require-
" ments of the trade, and it is believed that the requisite accommodation can be obtained
" in this manner, in the readiest way, and at the very least amount of expenditure.
" Besides the advantage to the trade thereby afforded, the sale of the building lots around
" these basins, for the erection of warehouses, would alone, in the course of a few years,
" more than repay the cost of their construction.

" It is unnecessary to dwell upon the importance to the trade of the St. Lawrence,
" of having proper facilities for receiving, storing, and transhipping grain and other pro-
" duce, or to recount the inconvenience and loss of time it has sustained during the
" past season for want of them. The mere fact that the Railway, although it reaches
" the city which is the head of ocean navigation, possesses none of these facilities, and is
" as yet, unconnected with the Harbor, is sufficient in itself to show that a radical defect
" in the traffic arrangements remains to be remedied, and a great want supplied."

To meet the increasing demands of the trade at this port we consider it indispensable that the former entrance to this Canal should be re-opened and another set of locks laid alongside the present ones, in the line of the old Canal, with 17 feet of water on the sills to admit ocean vessels into the upper basin, and that the whole of the Canal reserve containing upwards of fifty acres, be laid out into docks and basins in the manner suggested in the report just quoted, but instead of proceeding gradually with the

improvements, the whole as far up as Wellington street should at once be undertaken, and made 18 feet deep.

We feel confident that the additional basin accommodation will be used as fast as it can be provided, and that the warehouse lots can be sold as soon as they can be put into the market.

These are not merely local works—they have a direct bearing upon the interests of the whole country, and are essential to the proper development of the Canal System.

We have not had time to obtain the necessary information in regard to the cost of the proposed works, but in order to give some general idea of it, we may state that they have been roughly estimated at $1,350,000. Adding $3,150,000 for the enlargement of the St. Lawrence Canals, the total cost will be $4,500,000.

BAY VERTE CANAL.

The evidence submitted points out with remarkable force and unanimity, the necessity of opening a highway for commerce between the Gulf of St. Lawrence and the head waters of the Bay of Fundy through the Isthmus of Chignecto dividing them.

The project of connecting these two tideways by a Canal has been discussed for the last fifty years without arriving at any practical result. The perusal of the reports heretofore made by Royal and Civil Engineers including that of the Chief Engineer of the Department of Public Works, submitted to the Legislature in 1869, tends rather to create a doubt as to its practicability than to encourage a hope of its accomplishment.

In his several interviews with the Commissioners this latter gentlemen represented that the surveys, as far as known, did not warrant him in saying whether the Canal was feasible or not; but accepting such facts as he has made known to us we cannot see that nature has here placed any insuperable obstacle to the progress of commerce when it demands a passage through this Isthmus; and therefore we submit the following special report on this subject by the Secretary of our Commission, endorsed by one of our own body, both of whom are Civil Engineers. We think this will remove all doubts as to the practicability of the proposed undertaking.

HUGH ALLAN, ESQ.,
Chairman, Canal Commission,
Ottawa.

SIR,—I beg to submit the following remarks on the practicability of the Bay Verte Canal.

In the reports which have been made on this projected work, which for so many years has been under consideration, without as yet any definite action having been elicited, it appears that while Captain Crawley, R. E., in 1840 pronounced it impracticable, Mr. Thomas Telford, C. E., a higher authority in engineering matters, when reporting on Mr. Hall's Survey of 1825, "saw no serious obstacle to be encountered."

Francis Hall had proposed an intermediate summit six feet above high water of Cumberland Basin, to be fed by the fresh water streams of the Isthmus. Mr. Telford, however, observing that the whole of the ground over which the Canal will pass between the two tideways approached nearly to a level, proposed the adoption of the highest spring tides in Cumberland Basin for the top water line of the Canal, remarking that the omission of the extra locks on Mr. Hall's summit would greatly facilitate the navigation and afford better opportunity of acquiring the use of the water of adjoining districts. His estimate for a Canal on this summit, 14 feet deep, 45 feet wide at bottom and 90 feet at surface, except in deep cuttings where the bottom would be 30 feet, and top 70 feet, with locks 150 × 40 × 13 feet was £155,898 sterling; but no provision was made in this estimate for piers or harbors at either end.

In reviewing these several reports in 1860, the Chief Engineer of the Public Works' Department remarks that the adoption of the highest spring tides in Cumberland Basin

as the summit level of the Canal in the manner proposed by Mr. Telford "would doubtless "be in many respects a serious mistake." He says the highest spring tides are of uncertain occurrence and at most only periodical, and consequently the supply would be irregular. "In fact the Canal could only be used for a few hours at a time, and at distant "intervals, whilst it would be wholly unserviceable during neap tides."

However, not to leave the advocates of the Canal without hope, after observing that Captain Crawley could not find a sufficient body of fresh water to supply a summit above that of Cumberland Basin, he suggests that the "Canal would be much more "serviceable if the main level were made 10 or 12 feet below that summit," at which height he thinks it quite probable an abundant supply of fresh water could be obtained, whilst the water of the Bay of Fundy could be kept back by a lock at the western entrance of the Canal. But whether this arrangement could be judiciously carried out depends entirely on the height and nature of the ground between the terminal points. Before venturing to offer a definite opinion, he recommends another survey and examination of the Isthmus. This survey is now in progress under his own directions, but he has informed the Commissioners that he will not be able to submit his report thereupon before the time fixed for sending in their present communication. Consequently, from the documents now before them, as well as from the verbal statements of the Chief Engineer himself, they are not in possession of sufficient information to enable them to offer any opinion on the practicability of the scheme. In fact, as before stated, the Engineer referred to would not then undertake to say that the project was feasible.

It is very desirable that something more definite should be laid before the Commission with regard to the practicability of the Canal, before communicating with the Government, otherwise, action on this important question may have to be deferred. Under these circumstances I feel called upon to submit an opinion on the subject, expressed in general terms. This opinion, however, is based on the facts contained in the foregoing reports, and upon such further information as I have gathered from different sources including that communicated by the Chief Engineer in his several interviews with the Commissioners, in reference to the results of the survey as far as known.

The main facts are these.

1. The turbid water of Cumberland Basin cannot be used for feeding the Canal, nor can it with propriety be admitted into the Canal, as from the great quantity of vegetable and earthy matter held in suspension, it would, when quiescent, soon deposit and fill up the channel.

2. The fresh water supply in the district through which the Canal passes, available at some certain level below high water in the Bay of Fundy, has been found by measurement to amount to 3,981 cubic feet per minute.

3. The extreme range of tides in Cumberland Basin falls somewhere within 48 feet.

4. The extreme range of tides in Bay Verte is limited to 8 feet.

5. The lowest water of Cumberland Basin falls about 25 feet below the level of medium tides, and high water rises about 23 feet above that level.

6. The direct distance between the two tideways is about 15 miles, and between the mouths of the Aulac and Tignish rivers about 11 miles, and no serious difficulties are likely to be encountered in the excavation of a channel.

7. By the construction of the necessary artificial works at both ends of the Canal, it is assumed that the entrances can be made practicable.

The quantity of fresh water available at some certain level not yet determined, supposing the whole of it could be used for feeding the Canal, is barely sufficient, after making the necessary deductions for leakage, absorption, and evaporation, to afford one lockage in an hour and twenty minutes or 18 lockages in 24 hours, whereas with an abundant supply of water 70 or 80 vessels could be put through in the same time.

This statement is sufficient to show that the quantity of fresh water is inadequate for the supply of such an important public work as this is intended to be.

It has, however, been remarked with regard to the water in the Bay of Fundy, that it is only at the beginning of the flood that it is so exceedingly muddy as to be inadmissible, while at high water, it is comparatively clear, containing much less foreign matter, and therefore not altogether objectionable if used only to supplement the fresh water supply. If this be so then, Telford's summit, or one a few feet lower, corresponding with high water or neap tides, might be found to answer all the conditions. Further information on these points, and especially as to the proper level for receiving the fresh water into the Canal, is essential before they can be accepted as influencing the design.

Should these two sources of supply, however, fail to meet the requirements, it does not necessarily follow that the resources of the engineering art are exhausted. If the plan that is cheapest of accomplishment cannot be carried out, because Nature has not given the necessary facilities, the interest of commerce in this project is too great to be baulked by an expenditure we did not at first anticipate. It demands the speedy opening of the channel, and will justify its construction almost at any cost.

There is nothing but the additional quantity of excavation to prevent the adoption of the high water of Bay Verte as the summit level of the Canal, and this may be reduced to a certain extent by seeking out the lowest and most favorable ground for the channel of communication. On this plan there will be one lock at the Bay Verte of 8 feet lift at low water, and three of 48 feet aggregate lockage at the other end of the Canal, the highest of which will have its gates set to work in opposite directions to the other two, serving to keep back the highest water of Cumberland Basin, and to pass vessels in either direction, and at any stage of the tidal fluctuations. See Sketch, page 83.

The clear water of the Gulf would be the source of supply, and render the Canal independent of the fresh water streams, while it would afford the means of washing out the mud from the south end of the Canal, and of keeping the locks and their machinery clear of deposits.

Mr. Hall's summit was six feet above the highest spring tides of the Bay of Fundy; Mr. Telford's summit corresponded with the highest spring tides of that bay. The Chief Engineer suggested the possibility of a summit, some ten or twelve feet lower, while the one I have here suggested would lower it still farther down to the high water of the Bay Verte, some 15 or 20 feet below that of the Bay of Fundy. The only object of adopting any intermediate summit between the high-water levels of the two tideways is to save expense in the cost of construction. The difference to the vessel in navigating the Canal is immaterial as regards the time and convenience of the transit, but, if anything, in favor of the lowest summit.

From my point of view, I am clearly of opinion that a Canal through this isthmus is practicable; but I would not venture to decide upon the most feasible plan without having first examined the ground, and been informed of all the details of the survey.

All of which is respectfully submitted for the information of the Commissioners, by

Your obedient Servant,

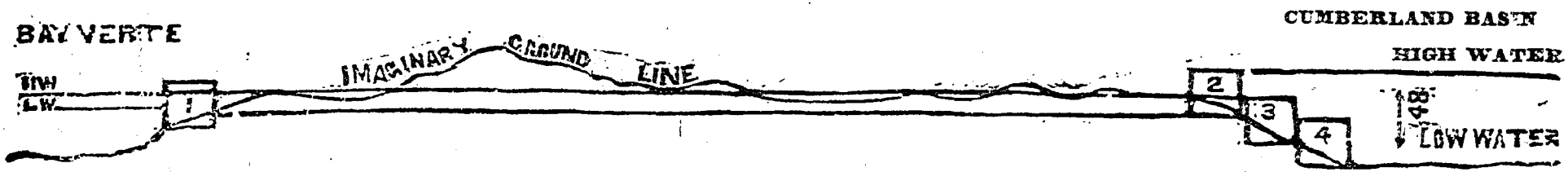
SAMUEL K[illegible]FER,
M. Inst. C. E.

OTTAWA, 8th Feb., 1871.

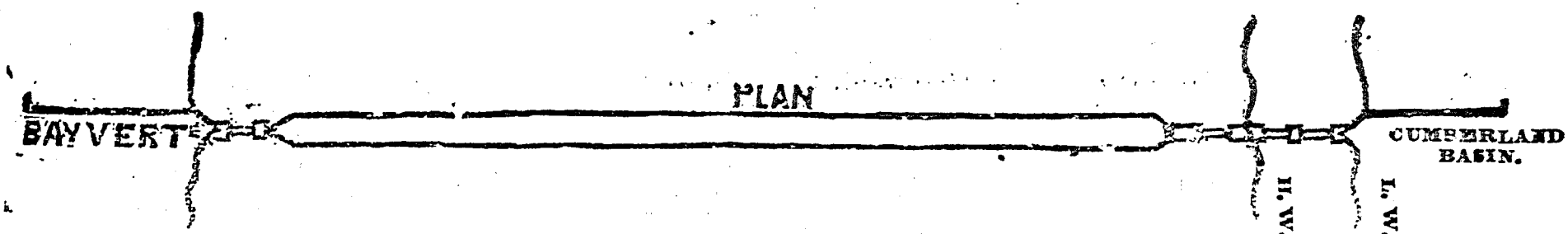
Having read all the existing reports referring to this Canal, and given the subject my very best consideration, I am perfectly satisfied that Mr. Keefer's plan is quite practicable, with or without a supply of fresh water; and that a Canal of the dimensions the Commissioner. have decided on recommending, can be built for the amount estimated.

C. S. GZOWSKI, C. E.,
Canal Commissioner.

LONGITUDINAL SECTION.



If the water of Cumberland Basin could, without injury to the Canal, be admitted into it, No. 2 might be removed to the other end of the Canal, and thereby save a large amount of cutting. This would be coming back almost to Telford's plan. But if this water is inadmissible, then No. 2 must stand where it is. There being insufficient fresh water to supply an intermediate summit—this seems the only alternative.



ROUGH SKETCH of the arrangement suggested for a Canal across the Isthmus separating Bay Verte from Cumberland Basin, Nova Scotia, intended merely to shew the practicability of a Canal for uniting these two tide-ways.

S. KEEFER, C.E.

Ottawa, 8th Feby., 1871.

THE PROPOSED OTTAWA CANAL.

The proposed improvement of the Ottawa and French Rivers forming a line of navigation between Montreal and Lake Huron. From Reports of the two Surveys made between the years 1856 and 1860.

The Report of Mr. Walter Shanly is dated 22nd March, 1858.

That of Mr. T. C. Clarke for the same is dated 2nd January, 1860.

Both these engineers had the advantage of consulting the geographical results of the Geological Survey conducted under Sir William Logan, between the years 1852 and 1855, and they agree very nearly as to the proper line for improvement, as well as to levels and distances, and generally as to the method of improvement by locks and dams. Their estimates, however, are made on entirely different bases, and for different scales of navigation

The Ottawa is one of the main tributaries of the St. Lawrence. It drains an area of 80,000 square miles, and by Mr. Clarke's measurements at Carillon, discharges five millions cubic feet of water per minute, at its ordinary stages. This is about one-sixth of the volume discharged by the St. Lawrence at the Cascades.

Its course from Montreal to the mouth of the Matawan is nearly due west. Here it turns away to the north, and the line of the proposed navigation continues on in the course of the Matawan, running in the same westerly direction to the line dividing the water sheds of the Ottawa and the St. Lawrence, on the border of Lake Nipissing. Crossing this summit, it then follows Lake Nipissing, and descends the French River to its mouth on Lake Huron, a distance of 431 miles from Montreal. The low water surface of the Ottawa River at Ottawa City, 116 miles from Montreal, is 120 feet above tide water. At the mouth of the Matawan, 308 miles from Montreal, it is 489 feet above the sea, Lake Nipissing is 640 feet, and Lake Huron 574 feet above the same level.

That portion of the Ottawa River between Lachine and Ottawa City is called the Lower Ottawa, while the part westward of that city is called the Upper Ottawa.

Mr. Shanly's estimate is made for 58 miles of Canal, from 60 to 100 feet at bottom, according to the magnitude of the obstacles to be overcome, and 10 to 11 feet deep; locks 250 × 50 × 10 feet.

It is not predicated, however, on the actual location of the proposed works at all the rapids, nor does it appear from his report that any plan was matured. He had commenced an elaborate hydrographic survey of the river which he intended should be as accurate and reliable as the admirable survey, by Bayfield, of the St. Lawrence and inland lakes, and when only a small portion of the long chain of navigation had been submitted to the test of instrumental examination, his labors were brought to a somewhat abrupt termination by instructions from the Public Works' Department. To arrive at the cost of the improvements, however, he estimates the 58 miles of Ottawa Canal (the enlargement of the Lachine Canal included) at upwards of $370,000 per mile, and adding $2,250,000 for the removal of shoals, makes the total amount $24,000,000.

Mr. Clarke's estimate does not include the enlargement of the Lachine Canal, and provides for only 21 miles of Canal, with locks 250 × 45 × 12 feet. It amounts to $12,058,680 exclusive of interest, legal expenses and land damages. It is accompanied with plans and sections shewing throughout the whole line the location, nature and extent of the works proposed for the improvement of the navigation, and with detailed estimates giving the quantities and prices of every description of work and material required in their construction.

Both these engineers aimed at providing a slack water navigation adapted for the largest class of screw steamers on the Upper Lakes, by a series of locks and dams and short cuts around the rapids. The main differences observable between these plans are;

(1.) Mr. Clarke's line of improvement is more in the river, having more dams but a less number of miles of Canal, as appears from the fact that including the Lachine Canal, he gives only 29 miles of Canal where Mr. Shanly provides for 58 miles.

(2.) Lake Nipissing is dealt with differently. They both propose making it the summit and feeder of the Canal, but Mr. Shanly proposed raising its surface 23 feet to the level of Trout Lake, and flooding a very large tract of the best lands that are to be found in the immediate vicinity, while Mr. Clarke proposes raising it only 9½ feet, and lowering Trout Lake 8 feet, and by also lowering Turtle Lake 7 feet, and raising Lac Talon 21 feet he reduces these four lakes all to one common level, linking them together and making the summit level of navigation 57 miles in length, thus creating a vast reservoir 330 square miles in area, and affording an abundant supply of water, more than sufficient for the utmost demands of the navigation. His summit will be 651 feet above the level of the sea and 77 feet above that of Lake Huron.

In instituting a comparison between the St. Lawrence and Ottawa Routes, it is necessary here to point out an error which has been repeated in various official reports on the subject, with regard to the comparative distance by these two rivers, between Chicago and Montreal. This error has tended to exaggerate the advantage in favor of the Ottawa, and seem to have arisen from assuming that the distance between Chicago and Buffalo is 1,100 instead of 916 miles as shewn by the recent surveys of the U. S. Topographical Engineers.

The two lines of navigation are thus compared :—

	St. Lawrence.	Ottawa.
Lake Navigation	1,145 Miles	575
River Navigation	132 „	347
Canal Navigation	71 „	58
Totals	1,348	980

Shewing a difference of 368 miles in favor of Ottawa :—

The correct distances appear to be

	St. Lawrence.	Ottawa.
Lake Navigation	1,005 Miles	560
River Navigation	185 „	402
Canal Navigation	71 „ (Clarke)	29
	1,261	991

Shewing only 270 miles in favor of the Ottawa.

A comparison of Locks and Lockage will stand thus :—

	St. Lawrence.	Ottawa.
Number of Locks	54	69
Feet of Lockage	553	710

Making a difference against the Ottawa of 15 locks and 157 feet of lockage.

The Lower Ottawa.

Since the very great increase of traffic of late years on the Lower Ottawa, especially in lumber, has been such as to demand greater facilities of transport than the Ordnance Canals can afford, it has been decided to place the enlargement of these Canals, or the construction of a new line of navigation of greatly increased capacity, amongst the works of the *first class*, to be proceeded with as soon as the means can be granted for that purpose.

Mr. Shanly proposed a new line of Canal at St. Anne's, three miles in length, and to enlarge the Ordnance Canals. This would make altogether 11 miles of Canal, which, at the per mileage rate of his estimate, would amount to four and a half millions of dollars, for a Canal on the scale proposed by him.

Mr. Clarke's estimate for the necessary improvements on this section of the river, for a navigation of 12 feet draught (including $136,105 for deepening the channel through Green Shoal) amounts to $2,255,686.

He proposed to enlarge the St. Anne's Lock and deepen the channels leading to it—to dam the Ottawa at the Carillon and Châte à Blondeau Rapids, and to enlarge the Grenville Canal. This plan requires two dams and 7 new locks in lieu of the 11 locks now in operation on the Ordnance Canals.

Without further information as to the effect of the proposed dams we are unable at present to decide upon the most feasible plan, but we are of opinion that a Canal of sufficient dimensions, such as we have suggested, can be constructed at a cost of about $1,800,000.

RIVER RICHELIEU AND LAKE CHAMPLAIN.

Lake Champlain is only ninety feet above tide water, and thirty-four feet above the St. Lawrence at Lachine, while the Champlain Canal, connecting it with the Hudson at Albany, has a summit, fed by Glens Falls Feeder, only 150 feet above tide water, and occupies the lowest, shortest, and most favorable line for a Canal uniting these two great rivers. It is, however, of inferior capacity to the least of the Canadian Canals, allowing boats of only 70 tons to pass from Lake Champlain into the Hudson, whereas barges of 230 tons can navigate the Chambly Canal, steamers of 600 tons the St. Ours, and boats of 100 tons the Ottawa Canals,

See Appendix C for relative sizes of Locks.

This anomalous condition of these Canals on the line of water communication between the lumber yards at Ottawa and the great lumber markets at Troy and Albany necessarily limits the dimensions of the boats engaged in this trade to the capacity of the smallest Canal, the class that can navigate the Champlain, many of which find their way to this city; but no Canadian boat or barge can make its way to Troy; and even if it were possible for the larger Canadian craft to navigate an enlarged American Canal, it would still be excluded by the operation of the American navigation laws, and if the lumber is carried in Canadian bottoms, transhipment must take place at Whitehall.

In the confident expectation, however, of seeing our international relations placed upon a more equitable footing, it is considered the wisest policy for Canada to enlarge all the Canals on this line of navigation from Ottawa City and Lake Champlain to one uniform scale, commensurate with that recommended for the Ottawa Canals, with which the lock at St. Ours already corresponds.

This necessarily involves the enlargement of the Chambly Canal, extending from Chambly basin to St. John's, 12 miles with 74 feet of lockage and 9 locks, the cost of which we have estimated, in round numbers, at $1,500,000, and it is not considered necessary to make improvements in any other part of the Richelieu.

SUMMARY

Of the Estimates for the Works embraced in the First Class.

Sault Ste. Marie Canal	$ 550,000
Welland Canal	6,550,000
Lower Ottawa	1,800,000
Chambly Canal	1,500,000
Deepening River St. Lawrence between Quebec and Montreal	800,000
Bay Verte Canal	3,250,000
St. Lawrence Canals	4,500,000
Upper St. Lawrence River	220,000
Total	$19,170,000

Georgian Bay Canal.

It has been stated by the promoters of this Canal that Engineers of high standing in England have given it the weight of their professional sanction, but we are not aware that any of these gentlemen have ever visited this country or passed over the ground to give it that personal examination, without which it appears to us impossible they can be qualified to offer any reliable opinion as to its practicability. In this case their opinions must be formed on such facts only as are laid before them while it is quite possible that other facts, essential to the formation of a proper judgment and to afford a comprehensive view of the whole question, may have been altogether omitted or overlooked.

We do not think that any of the promoters of this scheme, in this country, have ever fully realized the enormous magnitude of the undertaking.

Setting aside the estimates that have been published, which are merely conjectural, and not to be admitted as correct, it is only fair that the public should be reminded of the facts; that the proposed Canal is of equal length with the Suez Canal, which has cost upwards of eighty millions of dollars, and occupied fifteen years in construction. But it is encompassed with natural obstacles infinitely greater. While the Suez, being on a dead level from sea to sea, is unencumbered with a single lock, the Huron and Ontario has an intermediate summit of 470 feet above Ontario, to surmount which requires forty-two locks, and 600 feet of lockage. It has also no less than three deep cuts, the least of which is larger than the celebrated deep cut on the Welland, and the largest of which exceeds it in volume of material eighty-fold.

The formidable cutting through the township of King, is about two miles in length, and nearly 200 feet deep at the summit. It belongs to the same geological formation as that through which the Welland Canal was made, and is not unlikely to partake of the same uncertain character.

It has been stated that by test pits and borings it has been satisfactorily ascertained that the ground consists of indurated clay and gravel, but it is well known to practical engineers that neither borings nor test pits can fully reveal the true nature of the material to be encountered at so great a depth, and over such an extended surface, and therefore there is really no certainty that before the excavation is half done, slides may not occur as they have on the Welland, and render the whole scheme abortive.

In view of these incontrovertible statements, it must be apparent to any impartial judgement, even admitting it to be physically possible, that the cost of carrying out such a project would be so great as to render it commercially worthless.

CONCLUSION.

In urging this policy of Canal enlargement and extension upon the favorable consideration of the Government, the Commissioners feel that it is the one which will best stimulate the commercial development of the whole Dominion, and bind all sections together in the bonds of mutual amity and interest.

The expense of these improvements will be insignificant compared with the direct benefits Canadian commerce will receive, and will be immediately met by the larger revenue that must accrue from the tolls on a vastly increased traffic.

The contest for the supremacy of the carrying trade of the great West will be between New York, Montreal and Quebec. Nature has given the latter cities the advantage of position and route, and it now only depends on enterprise and capital to determine whether they shall be left behind in the competition for an enormous traffic, the control of which must elevate them to the foremost position among commercial communities.

If we look at the routes of all other projected Canals, the Ottawa, the Erie and Ontario, or the Georgian Bay, we see that each and all are intended to be subsidiary to the St. Lawrence route. Our duty is to improve that navigation in the first place, because it is the one which has been tried and found to answer all the purposes for which

it was intended. It would be unwise to spend millions of public money in assisting enterprises of minor utility at present, when a comparatively reasonable sum can so improve existing works, like the Welland and St. Lawrence system of Canals, as to answer all the requirements of trade for many years to come, and with the certainty of retaining a large income to the public revenues, and giving an impulse immediately to the development of the commerce of the whole Dominion.

In taking upon herself the entire burden of opening an avenue to the sea through her own waters for the trade of the West, Canada has a right to expect that the influence of the people of the Western States (whose commerce already employing five-eighths of the traffic now passing through the Welland Canal will be further stimulated, and whose productions will be enhanced in value by the expenditure), should be felt in the councils of their country, and that all unnecessary restrictions upon the trade between the two countries should be abolished.

The question is now presented, whether, under our existing commercial relations with the United States, it is advisable for Canada to embark in this expenditure without first obtaining such reasonable concessions, as she has so clear a right to demand. She may not unreasonably expect that the navigation laws of the United States should be so modified as to promote free intercourse with Canada, and that our trade relations should be put on a footing mutually advantageous to both countries.

We have thus endeavored to lay before His Excellency in this communication, as fully as our limited time permitted, all the information we could gather on these important questions without waiting until our report could be submitted.

By the categorical method of enquiry we have taken the sense of the community at large on all these questions, and in coming to a decision upon them, our labors have been very much facilitated by the methodical arrangement of this voluminous evidence under the directions of the Secretary, as well as by his intimate acquaintance with the public works, from the many years of his official connection with them both, during and after construction.

In setting forth the Canal policy recommended by us in the previous pages, and sustaining it by the facts and statements therein contained, the Secretary has been ably assisted in the historical and commercial portion by Mr. J. G. Bourinot, who, under his instructions, compiled the historical sketch of the Canals from official documents and other sources of information within the archives of the Dominion, and the commercial and statistical statements from the evidence submitted, and from such further information as could be collected in the course of this enquiry.

We have the honor to remain, Sir,

Your obedient servants,

HUGH ALLAN, *Chairman.*

C. S. GZOWSKI,
D. D. CALVIN,
P. GARNEAU,
ALEX. JARDINE,
S. L. SHANNON.

SAMUEL KEEFER, *Secretary.*

OTTAWA, 24th February, 1871.

COMMISSION.

JOHN A. MACDONALD, *Atty. Genl.* CANADA. } LISGAR.

VICTORIA, by the Grace of God, of the United Kingdom of Great Britain and Ireland, QUEEN, Defender of the Faith, &c., &c., &c.

To CASIMIR STANISLAUS GZOWSKI, of the city of Toronto, in the Province of Ontario, Esquire, Civil Engineer; DELINO DEXTER CALVIN, of the township of Wolfe Island, in the County of Frontenac, in the Province aforesaid, Esquire; GEORGE LAIDLAW, of the said city of Toronto, in the Province aforesaid, Esquire; HUGH ALLAN, of the city of Montreal, in the Province of Quebec, Esquire; PIERRE GARNEAU, of the city of Quebec, in the said Province of Quebec, Esquire, Merchant; the Honorable WILLIAM J. STAIRS, of the city of Halifax, in the Province of Nova Scotia, and ALEXANDER JARDINE, of the city of St. John, in the Province of New Brunswick, Esquire, Commissioners for the purposes hereunder set forth:—And to SAMUEL KEEFER, of the town of Brockville, in the County of Leeds in the said Province of Ontario, Esquire, Civil Engineer, Secretary of this Our Royal Commission, and to all others to whom these presents may come or whom the same may in any wise concern.

GREETING,—

Whereas it appears to us that the improvements required for the development of the trade of the Great Western country and the affording of such means of access to the sea-board as may best be calculated to attract a large and yearly increasing share of that trade through Canadian waters, as well as a thorough and comprehensive improvement of the Canal System of our Dominion of Canada, on such a scale and of such a character as would best tend to afford ample facilities for the expansion and due development of its growing trade and commerce, are objects of the highest importance to Our said Dominion.

NOW THEREFORE KNOW YE, that reposing especial trust and confidence in the loyalty, integrity and ability of you the said CASIMIR STANISLAUS GZOWSKI, DELINO DEXTER CALVIN, GEORGE LAIDLAW, HUGH ALLAN, PIERRE GARNEAU, WILLIAM J. STAIRS, ALEXANDER JARDINE, and SAMUEL KEEFER, We, of Our especial grace, certain knowledge and mere motion, and of Our Royal Will and Pleasure do, by these presents, under, and in pursuance of the Act of the Parliament of Canada made and passed in the thirty-first year of Our Reign, chaptered number thirty-eight and intituled, "An Act respecting enquiries concerning public matters" nominate, constitute, and appoint you the said CASIMIR STANISLAUS GZOWSKI, DELINO DEXTER CALVIN, GEORGE LAIDLAW, HUGH ALLAN, PIERRE GARNEAU, WILLIAM J. STAIRS, ALEXANDER JARDINE, and such other person and persons as We may think fit, by order of Our Governor-General in Council, and to add to this Our Commission to be Our Commissioners for the purposes following, that is to say: to institute and make a thorough enquiry as to the best means of affording such access to the sea-board as may best be calculated to attract a large and yearly increasing share of the trade of the North Western portion of North America through Canadian waters, as well as a thorough and comprehensive improvement of the Canal System of Our said Dominion on such a scale and of such a character as would best tend to afford ample facilities for the expansion and due developement of its growing trade and commerce; and in such enquiry to consider the whole subject in all its bearings, as well in a commercial as in an engineering point of view, with the object of obtaining such reliable information thereupon as may furnish the necessary *data* on which to base a plan for the improvement of the Canal System of Our said Dominion, of a comprehensive character, and such as will enable Canada to compete successfully for the transit trade of the Great Western country,

and especially to enquire into the public works and improvements hereinafter enumerated, that is to say :—

1st. The Welland Canal and the enlargement thereof.

2nd. The St. Lawrence Canals and the enlargement thereof.

3rd. The deepening of the channels through the Rapids of the River St. Lawrence.

5th. The deepening of the said river in its most shallow parts between the cities of Montreal and Quebec.

5th. The Rideau Canal and its improvement, and the development of trade through the same.

6th. The construction of a Canal at the Sault de Ste. Marie between Lakes Superior and Huron.

7th. The construction of a Canal between the St. Lawrence at Caughnawaga and Lake Champlain.

8th. The improvement of the River Richelieu, and Lake Champlain line of Canals.

9th. The completion of the Montreal and Lake Huron system of navigation *via* the Ottawa and French rivers.

10th. The construction of the Georgian Bay Canal, to connect the Georgian Bay with Lake Ontario.

11th. The construction of a Canal in the Township of Murray through the neck of land lying between Lake Ontario and the Bay of Quinte, and

12th. The construction of a Canal through the Isthmus dividing the Bay of Fundy from the Gulf of St. Lawrence at Bay Verte.

And also to enquire as to which of the said several works and improvements hereinbefore mentioned and referred to ought, in the judgment of Our said Commissioners, to be made and constructed for the purposes aforesaid; and in what order they respectively should be proceeded with; and of what dimensions and depths they should be constructed; and the probable cost of the construction of such several works and improvements respectively; and generally to enquire into and ascertain and report fully on the whole subject in all its bearings, making such recommendations as may appear to you Our said Commissioners hereby appointed, and to such other person and persons as We may think fit, by order of Our Governor-General in Council to add to this Our Royal Commission, to be likely to contribute to the better accomplishment of the said object so in view.

To have and to hold, the said office of Commissioner as aforesaid, unto each and every of you Our said Commissioners above named, and to such other person and persons as We may think fit, to add to this Commission as aforesaid during Our Royal pleasure.

And we do further hereby require you Our said Commissioners, to associate with you as Commissioners under this Our Royal Commission all such person or persons as We may think fit, by order of Our Governor-General in Council, to add to this Commission as Commissioners thereunder.

And we do further nominate, constitute and appoint you, the said SAMUEL KEEFER to be the Secretary of, and to the said Commissioners.

And it is Our further will and pleasure and We do, in pursuance of the statute in that behalf, confer upon you, and each of you, Our said Commissioners above named, and such other person and persons as We may think fit to add to this Our Royal Commission as aforesaid, the power of summoning before you any party or witnesses, and of requiring them to give evidence on oath (or on solemn affirmation if they be parties entitled to affirm in civil cases), orally or in writing, and to produce such documents and things as you Our said Commissioners may deem requisite to the full investigation of the respective matters into which you are hereby appointed to examine and enquire.

And We do hereby enjoin and require that a majority of you Our said Commissioners hereby appointed and such other person and persons as We may think fit to add to this Our Royal Commission as aforesaid shall be held to be, and be a quorum for the transaction of business, and the carrying out of the purposes of this Our Royal Commission,

Of all which Our loving subjects, and all others whom these presents may concern are hereby required to take notice, and to govern themselves accordingly.

In testimony whereof, We have caused these Our Letters to be made patent, and the Great Seal of Canada to be hereunto affixed, witness: Our Right Trusty and Well Beloved the Right Honorable John, Baron Lisgar of Lisgar and Bailieborough, in the County of Cavan, Ireland, in the Peerage of the United Kingdom of Great Britain and Ireland, and a Baronet, one of Our Most Honorable Privy Council, Knight Grand Cross of Our Most Honorable Order of the Bath, Knight Grand Cross of Our Most Distinguished Order of Saint Michael and Saint George, Governor-General of Canada, and Governor and Commander-in Chief of the Island of Prince Edward.

At Ottawa this Sixteenth day of November, in the year of Our Lord one thousand eight hundred and seventy, and in the thirty-fourth year of Our Reign.

By Command,

(Signed), J. C. AIKINS,

Secretary of State.

APPENDIX A.

ABSTRACTS OF THE EVIDENCE LAID BEFORE THE COMMISSIONERS.

1st. The Welland Canal.
2nd. The St. Lawrence Canals.
3rd. The St. Lawrence River and Rapids.
4th. The St. Lawrence River—Montreal to Quebec.
5th. The Rideau Canal.
6th. The Sault Ste Marie Canal.
7th. The Caughn[illegible]aga Canal.
8th. The River Richelieu and Chambly Canal.
9th. The Ottawa Navigation.
10th. The Georgian Bay Canal.
11th. The Murray Canal.
12th. The Bay Verte Canal.
13th. The St. Peter's Canal.

WELLAND CANAL.

1. To what extent should the Welland Canal be enlarged, viz:—To what depth of water, to what width of locks, and to what length of chambers between the gates?

	Depth of Water.	Width of Locks.	Length of Chambers
S. D. Woodruff, St. Catharine's, Superintendent Welland Canal Office.—Locks of these dimensions will admit the passage of craft either way through the St. Lawrence Canals, with exception of depth. With this depth in sills, harbors can be made easily to correspond; now, with high water, vessels can enter the harbors with nearly this draught.	12	45	200
It may be advisable to make the locks not less than 230 feet in length (that of Port Colborne is of these dimensions) as more suitable for propellers and sailing craft. Although the width may be greater than necessary for such craft, still it is desirable to have locks commensurate with size of vessel passing through the St. Lawrence.			
J. W. Winn, Montreal.—Deems uniformity of locks in all Canals indispensable, and recommends as standard present depth of Welland, with length and width of St. Lawrence Canal locks, viz:	10½	45	200
This enlargement would involve moderate labor and expense, and and not serve to divert trade from Canadian ports to Oswego			

	Depth of Water.	Width of Locks.	Length of Chambers
and Ogdensburg, as would be the probable result of a greater depth.			
G. E. Jaques, Montreal.	12	45	250
A. R. McGibbon, Montreal.—Recommends enlargement to correspond with St. Lawrence Canals, as hereafter decided.			
David McLean & Co., Montreal.—Recommend enlargement for passage of largest vessels now trading on the Upper Lakes, and 25 per cent. over, as every year the craft of those waters are increasing in size, and Western harbors are being dredged to supply the necessary depth.			
Hon. Malcolm Cameron, Ottawa.—Would, of course, deepen the St. Lawrence, Beauharnois, and Lachine Canals to same depth. At present greater depth would entail too much expense.	12½	....	....
Board of Trade, Toronto.—Or of equal size to the Sault Ste. Marie after the enlargement.	14	70	350
Corn Association, Toronto.—Earnestly recommend that the capacity of the Welland should be equal to the dimensions of Sault Ste. Marie.			
Arthur Harvey, W. H. Howland, Toronto.	12½	45	210
J. H. Ingersoll, St. Catharine's.	12	....	....
Board of Trade, Ottawa.—Same dimensions as Sault Ste. Marie Canal.	12	75	350
Board of Trade, Kingston.	12½	37	200
George Fellers, Mayor of Sandwich, for Duncan Stuart, of Detroit.	14	45	275
Montreal Corn Exchange Association.—Recommend enlargement *without delay* to such a capacity as will admit the largest steam vessels trading on the Upper Lakes.			
Board of Trade, Toledo.—Depth same as St. Clair Flats.	....	45	215
Oswego Board of Trade.	14 ov'r the Mitre Sill.	45	250

	Depth of Water.	Width of Locks.	Length of Chambers
Town Council of St. Catharine's, per J. G. Currie.	12½	37	200
F. S. Holcomb, Toronto.—He says that experience is divided as to the size of locks required. The Americans are adopting 14 feet as the standard over the St. Clair Flats and in the Sault Ste. Marie Canal. This would seem to indicate what policy we should pursue to control Western trade.	14	75	350
W. H. Smith, Master Mariner, Owen Sound.—Welland and St. Lawrence should correspond.			
Board of Trade, London.—Recommend deepening the St. Lawrence and Welland Canals to admit ocean-going vessels with full cargoes.			
Board of Trade, Windsor, O.	14	45	275
Board of Trade, Stratford, O.—Recommend enlargement of the Welland, so as to allow the largest class of sailing vessels and steamers, now navigating the Upper Lakes, to pass through.			
Chamber of Commerce, Milwaukee.	15	50	300
Allan Gilmour, Ottawa.—Is of opinion that when it is deemed necessary or judicious to enlarge this Canal it should be done in keeping with the depth of water in the principal shipping ports of the Lakes, and the size of vessels now in use or likely to be used in the Lake trade.			
Board of Trade, Chicago.	14	35 to 40	250 to 300
Board of Trade, Guelph.—Express their belief that the Canals at present in use ought to be enlarged sufficiently to enable vessels of (say) 14 feet draught to pass.			
Board of Trade, Detroit.	15 to 16	45 to 55	250 to 275
Adam Brown, Hamilton.—The Welland and St. Lawrence Canals should be enlarged to admit vessels of not less than 1,000 tons measurement—indeed of 1,500 tons.			
F. Wilson, Port Dover.	12	36	130
Board of Trade, Hamilton.—(Send opinion of Ship Masters and Ship Owners, &c., of Hamilton, and adopt them as their own.) The St. Lawrence Canals, including the Beauharnois and Lachine, should have the same depth of water and size of locks as the Welland.	12	45	250 to 275

	Depth of Water.	Width of Locks.	Length of Chambers
Board of Trade, Stratford.—(The Secretary only sends replies of the Secretary of the Chicago Board, which are already given.)	14	35 to 40	250 to 300
Angus Morrison, Vice-President, Ontario & Erie Ship Canal Company.—Replies to this question and following ones are identical with those of Secretary of the Chicago Board of Trade, who revised them.	14	35 to 40	250 to 300
Alvin Bronson, Oswego.—Who has had a life-long connection with the trade of the Lakes advocates an enlargement of the Welland to accommodate sail vessels and propellers of about 750 tons burden of the best models, excluding side wheel steamers and large armed Government vessels. Locks of ..... would meet the wants of these 750 ton vessels. He believes that these locks will be sufficiently ample for the internal commerce of the Lakes, the Lower Provinces and New England. It would not be a wise policy to build larger locks, which would involve considerable expense, and cause a strong current in the Canal, and delay in working them, and all this to provide for a few and rare cases where large vessels would desire to pass them to and from the ocean.	12	45	200 excl. of gates.
In anticipation of an enlargement of the Welland, the property holders on the west side of Oswego have expended $100,000 to obtain 12 feet of water on that size of the river. The objections to large locks and deep Canals are:—			
First.—Their cost to the Government and the necessity of high tolls on the commerce, thereby impairing their utility.			
Second.—The necessity they impose upon the whole lake region of a large and often repeated expenditure of money on harbors and rivers to meet the wants of a large class of vessels; with a tendency to throw the lake trade into the hands of large capitalists, or associations of wealth, to the exclusion of men of smaller means; or, of a few cities of large population, able and willing to make large disbursements on their harbors, to monopolize the traffic of the lakes, to the exclusion of their less opulent competitors.			
Third.—It is believed a large portion of the future traffic of the lakes will seek propellers; these, if constructed of wood, and more than 200 feet long, will require heavy and expensive arches, augmenting their cost, and diminishing their carrying power.			
Charles Howard, New York.—These locks will be large enough to admit vessels of 800 tons, and would allow deep sea-going vessels of 1,000 tons to pass two-thirds loaded.	12	36	200
Edsall & Wilson.	12	50	250

	Depth of Water.	Width of Locks.	Length of Chambers
A. Wright, M.P.—The Welland should be enlarged to the same extent as the Sault Ste. Marie.			
Hon. John Young, President of Dominion Board of Trade.—Urges enlargement so that propellers of 850 or 900 tons, now in use on the Upper Lakes, may descend from Lake Superior or Michigan to Montreal or Quebec, or proceed on to Halifax without breaking bulk.			

2. What is the most suitable size of vessels, with reference to the general capabilities of the navigation, in order to carry produce from Chicago to any port on Lake Ontario, on the most economical terms, and which kind—whether steam or sailing vessels—are likely to be the most suitable ?

G. E. Jaques, Montreal.—Says that to conduct the Western trade, and direct it by the St. Lawrence route, both steam vessels and sailing craft are required—each carrying from 15,000 to 20,000 bushels of grain, or its equivalent in rolling freight, like flour, pork, &c.

Board of Trade, Toronto.—1. From 35,000 to 50,000 bushels capacity ; 2. Steam vessels are likely to be most suitable.

Arthur Harvey, W. H. Howland, Toronto.—Vessels of not less than 25,000 bushels capacity. Sailing vessels most profitable, if Canals are not deepened ; steamers otherwise.

Board of Trade, Ottawa.—Propellers' length 320 feet, beam 70, draught 11 ft., 6 ins. The trade of Lake Superior has to be taken into account, as during the incoming season the grain trade of Minnesota (which is now 20,000,000 bushels) will be enabled to pass down it by the Duluth and St. Paul Railroad, and the Northern Pacific from Duluth to Georgetown on Red River, whence there is steam navigation to Fort Garry.

Board of Trade, Kingston.—Sailing vessels for 30,000 bushels.

G. Fellers, Mayor of Sandwich, for Duncan Stuart, of Detroit.—With Canal enlarged, propellers of 1,500 tons, 250 feet long, 15 feet depth of hold, and 37 to 40 feet beam, would be best craft. Such propellers, with low pressure engines, would cost from $95,000 to $100,000 American currency.

Board of Trade, Toledo.—1,000 tons. Steam is most economical.

Hugh McLennan, Montreal (Manager of Transportation Co.)—Sailing vessels of 20,000 bushels capacity are most suitable for present harbors, as well as in reference to length of voyage.

Board of Trade, Oswego.—Experience on Upper Lakes shows that the largest class of sailing vessels and propellers, now plying on these waters, carry property at the

cheapest rate, and, therefore, the Canal should accommodate craft of the largest size. Yet an open question which class is most economical; but highly probable, taking competition with railways into account, steam craft must, before long, control the carrying trade.

Town Council, St. Catharine's.—Vessels of 185 feet in length, and 34 in beam are likely to be most suitable; would carry 40,000 bushels of grain.

W. H. Smith, Owen Sound.—35,000 to 40,000 bushels; draft of water, 11 feet 6 inches. Steam vessels.

Board of Trade, Windsor, Ontario.—Propellers that would carry about 1,500 tons.

Chamber of Commerce, Milwaukee.—35,000 bushels capacity; 800 tons register; 1,200 tons actual. Sail is cheaper—either suitable.

Allan Gilmour, Ottawa.—Believes that little, if any, benefit would arise from the employment of larger vessels than now navigate these lakes—many of these being quite up to the capacity of the chief harbors on the lakes. He understands that powerful steam-tugs, with large barges lightly masted and rigged for sailing under favorable circumstances only, are now doing a considerable portion of the lake trade, that of carrying lumber particularly; and they do it more cheaply and expeditiously than vessels dependent only on sail. The carrying trade might be advantageously extended in this way.

Board of Trade, Chicago.—Sail most in use now, and most likely to be; capacity of 35,000 to 50,000 bushels most profitable.

Board of Trade, Detroit.—Freight can be carried cheapest in the largest class of vessels allowed by depth of water in our harbors and Canals—probably from 1,000 to 1,500 tons, but tendency decidedly in favor of steam, on account of greater despatch.

Adam Brown, Hamilton.—Large vessels can be worked at comparatively less cost than small ones. Steam vessels would carry grain from Chicago to Montreal at less cost, owing to heavy expense for towing on the St. Lawrence Canals, and the time that would be saved.

G. Wilson, Port Dover.—Steam.

Board of Trade, Hamilton.—Under existing circumstances, steam vessels carrying 15,000 bushels, and sailing craft carrying from 15,000 to 18,000 bushels, are most suitable. Steam is believed to be increasing faster than sail; a fact which shews it must be found most profitable.

Alvin Bronson, Oswego.—(See answer to Question 1.)—The enlargement he there recommends, will add 50 per cent. to the present capacity of the Canal and locks; and the burden of the sail and steam vessels, giving them 24,000 bushels of wheat instead of 16,000, or 720 tons in place of 480, of the most approved models. Future traffic is likely to seek propellers.

Charles Howard, New York.—Experience has clearly established the fact that vessels over 700 or 800 tons are not so profitable on these lakes as vessels of less tonnage, even when they are not compelled to pass through Canals, and the records of our underwriters fully prove that small vessels are much safer on the lakes, and equally as safe at sea. With few exceptions, none of our harbors admit of vessels of over

12 feet draft of water in good weather, while it is hazardous to enter most of them, when drawing over 10 or 11 feet in a storm. Nature has placed barriers in front of most of our harbors; also wide flats across some of our greatest thoroughfares, that will, in spite of art, for ages to come, make it necessary to build light draft vessels. In his opinion, there will be always more vessels employed on these lakes under 500 tons than over. Besides, no sailing vessel over 700 or 800 tons could safely navigate the lakes, even if the harbors and Canals were deep enough. Square-rigged vessels cannot have sufficient sea-room—they would be stranded before they would be put in "trim." The only vessels suitable for this navigation are what are called "fore-and-aft" rig. Vessels of 700 or 800 tons must have three masts, or the sails will be too large for safety or convenience. Such as are designed for foreign voyages could be "square-rigged" forward, with the "main" or "mizzen mast" rigged "fore-and-aft." This "rig" would answer well for both lake and ocean trade. In his opinion, the lake trade will continue to be about equally divided between sailing vessels and propellers. He writes from experience—most of his life having been spent in the commerce of the lakes—as early as 1829 he discharged a cargo at St. Catharine's.

Edsall & Wilson.—Steam for through traffic, from 800 to 1,500 tons, with enlarged locks. Sail for long shore traffic.

A. Wright, M.P.—Propellers with a draught of 12½ feet.

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3. What classes and sizes of vessels—whether steam or sail—are now employed in the trade between Chicago and Buffalo, and between Ports on Lakes Superior, Erie and Michigan?

Board of Trade, Toronto.—All classes from 100 to 1,000 tons.

Arthur Harvey and W. H. Howland, Toronto.—The trade between Lakes Michigan and Erie is chiefly carried on by sailing vessels, but between Superior and other lakes, chiefly by steamers. Sailing vessels, from 100 to 800 tons; steamers, from 100 to 1,200 tons, but from 400 to 900 tons principally.

Board of Trade, Kingston.—Classes from 10,000 to 50,000 bushels; sail and steam.

G. Fellers, Mayor of Sandwich, for Duncan Stuart, of Detroit.—Steam and sail varying from 300 to 1,500 tons capacity. At present there is only one of the latter class, the screw steamer *Philadelphia*, which has been very successful on Western Lakes. Steam must ultimately be entirely used.

Board of Trade, Toledo.—Various classes—steam, sail, and barges; 7,000 to 45,000 bushels capacity, or 150 to 1,500 tons.

Board of Trade, Oswego.—Propellers and sail vessels of all sizes, up to a capacity of 50,000 bushels, and wheat and corn.

Town Council, St. Catharine's.—Steam and sailing vessels, many 165 feet long, 32 feet beam, others nearly 200 feet long.

W. H. Smith, Owen Sound.—Sail and steam—major portion, sail on Lake Superior; steam on Erie and Michigan.

Chamber of Commerce, Milwaukee.—Steam and sail—400 to 1,500 tons.

Board of Trade, Chicago.—Propellers from 400 to 1,500 tons capacity, and sailing vessels from 500 to 1,200 tons.

Board of Trade, Detroit.—Majority sail—from three to fifteen hundred tons.

Adam Brown, Hamilton.—Both sail and steam are employed, and the tendency for some time has been to increase size of vessels for the Upper Lakes. Minimum to maximum of capacity is from 1,500 to 42,000 bushels—the latter yet few in number but increasing.

George Wilson, Port Dover.—Sail vessels, from 15,000 to 35,000 bushels. Steam barges, 35,000 to 70,000 bushels.

Board of Trade, Hamilton.—Both steam and sail of a capacity of about 30,000 bushels.

Edsall & Wilson.—Both steam, sail and barge. Sail from 200 to 1,000 tons; steam from 500 to 1,500 tons.

4. Is there any difference between the average cost of carrying grain from Chicago to Kingston and Oswego. If so, is it in any way owing to a relative scarcity of Canadian bottoms or to the navigation laws of the United States, or from what other cause?

Board of Trade, Toronto.—About the same rate, conditions being equal.

Arthur Harvey, W. H. Howland, Toronto.—Very little, and rates are generally the same. The trade is principally carried on in American bottoms, because the largest vessels that can be used carry freight cheapest and under the United States' navigation laws large Canadian vessels cannot be sailed in this trade to advantage, as they can only run from Chicago to Kingston, while American vessels can run from Chicago or Milwaukee to both Kingston and Oswego.

Board of Trade, Kingston.—As a rule the freight quotations from Chicago and Milwaukee to Kingston are the same as to Oswego, but when freights are brisk, the rate to Oswego is quoted at often one-half cent less in consequence of vessels going thither being sure of despatch and a better chance of getting an up freight. If it happened, as it does sometimes, there are little or no shipments to Canada, Canadian vesels have to lay up or to take a low freight to Kingston, whilst an American vessel can load to Oswego or Buffalo.

G. Fellers, Mayor of Sandwich, for Duncan Stuart, Detroit.—Little or no difference when Canal is enlarged. At present, owing to total want of anything like a spirit of accommodation at Kingston, American vesse avoid that port as much as possible. This necessarily cripples trade.

Board of Trade, Toledo.—With equal facilities at Kingston for discharging vessels, and with upward freight, there would be no difference.

Hugh McLennan, Montreal, Manager Montreal Transportation Company.—The rates to Kingston and Oswego are about the same.

Board of Trade, Oswego.—But very little difference. Rates of freight from Chicago to Kingston or Oswego are almost always about the same—as surplus of Canadian bottoms offering for freight at Chicago depresses the rates to Kingston, and a sur-

plus of American vessels does the same with respect to Oswego, and *vice versa*. There may be a variation of a cent per bushel according to the season and demand, as between Kingston and Oswego.

Town Council, St. Catharine's.—No difference.

W. H. Smith, Owen Sound.—Answers in the affirmative. There being but few Canadian buyers and vessels, Buffalo and Oswego get the preference. The United States' regulations exclude Canadian bottoms.

Chamber of Commerce, Milwaukee.—To Oswego it is ½c. less on account of no return freight from Kingston. Not owing, however, to any scarcity of Canadian bottoms, or to navigation laws of the United States.

Board of Trade, Chicago.—Freights between Chicago and Kingston or Oswego, are slightly in favor of Oswego, mainly on account of better and more return freights.

Board of Trade, Detroit.—Not much difference in the average cost of carrying grain to Kingston or Oswego. The small difference is against American vessels.

Adam Brown, Hamilton.—Freight higher to Oswego, because Chicago and Oswego are United States' ports. American vessels can only load for that voyage, as Canadian craft are precluded by the navigation laws of the United States; but the former can load for Kingston.

George Wilson, Port Dover.—Negative answer.

Board of Trade, Hamilton.—No difference except what arises from the superior facilities at Oswego for despatch in unloading vessels as compared with Kingston.

Edsall & Wilson.—Two cents less to Kingston. Oversupply of Canadian vessels for through traffic sometimes. The trade is spasmodic.

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5. What reduction per bushel in the rates of freight from Chicago to Kingston and Oswego would result from the enlargement of the Welland Canal to the capacity of the largest class of vessels now carrying from Chicago or Milwaukee to Buffalo?

Board of Trade, Toronto.—From two to three cents.

Arthur Harvey, W. H. Howland, Toronto.—From two to three cents.

Board of Trade, Ottawa.—Fully one-third if not two-thirds.

Board of Trade, Kingston.—1½ per bushel reduction.

C. Fellers, Mayor of Sandwich, for Duncan Stuart of Detroit.—25 per cent. at least.

Board of Trade, Toledo.—40 per cent.

Hugh McLennan Montreal.—Difference between Buffalo and Oswego or Kingston, is now about five cents on grain; enlarged capacity of Canal would reduce this 1½ @ two cents per bushel (tolls about one cent payable by vessel), two cents would be ½ of present difference.

Board of Trade, Oswego.—Calling the present Welland Canal cargo 18,000 bushels of wheat, it is probable that a said vessel carrying 50,000 bushels could freight at least 25 per cent. cheaper than vessels of the present capacity; the same ratio will hold good in case of large over small propellers.

Town Council, St Catharine's.—From 20 to 25 per cent. less.

W. H. Smith, Owen Sound.—Prices fluctuate, like supply of vessels; difference from one to 1½c.; some seasons none at all.

Chamber of Commerce, Milwaukee.—25 per cent.

Board of Trade, Chicago.—Two to three cents on low freights, more when freights are high.

Board of Trade, Detroit.—25 per cent.

Adam Brown, Hamilton.—10 per cent. on cost of freight would be a low estimate.

George Wilson, Port Dover.—Two cents per bushel.

Board of Trade, Hamilton.—About 12½ per cent.

Edsall & Wilson.—Four cents per bushel.

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6. What is the average difference for the last three years, in the rates of freight from Chicago to Buffalo and Kingston or Oswego?

Board of Trade, Toronto.—From five to six cents.

Arthur Harvey, W. H. Howland, Toronto.—From five to six cents.

Board of Trade, Kingston.—One-third less to Buffalo.

G. Fellers, Mayor of Sandwich, for Duncan Stuart of Detroit.—From three to five cents per bushel.

Board of Trade, Oswego.—Submit following figures:—

	1869 cts. m.	1870 cts. m.
Average wheat freight from Chicago to Oswego	10 7	10 6
" " " " " Buffalo	6 6	6 2
Difference	4 1	4 4

Following shows average rates of freight on Wheat from Chicago to New York by Lake and Canal, during the season of navigation in the years specified:—

	1869 cts. m.	1870 cts. m.
Via Buffalo	22 9	17 2
" Oswego	22 5	18 5

The advantage gained by the Buffalo route in 1870 is owing to reduction of tolls on New York State Canals.

Town Council, St. Catharine's.—About five cents.

Chamber of Commerce, Milwaukee.—Five cents per bushel.

Board of Trade, Chicago.—Four to seven cents; average probably 4½ cents.

Board of Trade, Detroit.—From 50 to 75 per cent.

George Wilson, Port Dover.—Four cents.

Board of Trade, Hamilton.—Rate from Chicago to Buffalo has averaged about 6 cents.
" " " Kingston or Oswego " 10 "
per bushel of 60 lbs.

W. J. Patterson, Montreal.—Average rates of freight (per bushel of wheat) by schooner or propeller, from Chicago to Kingston, during four years, were as follows:—

	cts.		cts.
1863	12½	1865	13¾
1864	14	1866	14

These rates are in American currency. Average rate from Kingston to Montreal during those years was four cents per bushel in gold. Average rate paid by propeller from Chicago to Montreal in 1868, was 13 cents in gold; in 1869, 12 cents; immense difference, therefore, in favor of Montreal.

Edsall & Wilson.—Chicago to Buffalo in 1868-69, six cents. Kingston or Oswego, 1870, five cents.

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7. What is the average difference for the last three years in the rates of freight between Buffalo and New York, and between Oswego and New York?

Board of Trade, Toronto.—See Buffalo trade returns.

Board of Trade, Toledo.—Three cents to four cents per bushel on wheat and corn.

G. Fellers, Mayor of Sandwich, for D. Stuart of Detroit.—Just about the difference in Lake freights—sometimes a little less and sometimes a little more than that difference. These differences would be the same from all lake ports between the points named.

Board of Trade, Oswego.—Average Canal freight on wheat:—

	1868	1869	1870
	cs. m. ths	cs. m. ths.	cs. m. ths.
From Buffalo to New York	15 6 5	16 3 1	11 0 3
" Oswego " "	11 2 2	11 8 1	8 0 0
Difference	4 4 3	4 5 0	3 0 3

Canal tolls on wheat during three past seasons of navigation were:—

1868	0 3 0	per 1,000 lbs. per mile
1869	0 3 0	" " " " "
1870	0 5 1	" " " " "

Reduction in Canal tolls in 1870 was 50 per cent., which gave Buffalo the advantage of one cent, four mills, seven-tenths of a mill per bushel over Oswego compared with previous years.

Town Council, St. Catharine's.—From five to six cents.

Chamber of Commerce, Milwaukee.—33⅓ per cent. less from Oswego.

Board of Trade, Chicago.—From nothing to two cents per bushel during the last year.

George Wilson, Port Dover.—Five cents in the former case. Three cents in the latter case.

Board of Trade, Hamilton.—Six cents in favor of Oswego.

Edsall & Wilson.—Four cents in favor of Oswego.

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8. What difference in the demand for sea or American salt, and steam or other coal, would result from the employment of the largest class of American vessels on the Upper Lakes in the Kingston trade?

Board of Trade, Toronto.—Probably a large increase.

Arthur Harvey, W. H. Howland, Toronto.—The demand in the west for sea salt would greatly increase, if the navigation from the Upper Lakes to Montreal were improved throughout. Steam and household coal would, in all probability, be taken for return freight for a long distance west, without the deepening of the St. Lawrence as well as the Welland Canal; this return freight would be limited to American coal from Oswego, which would afford no profits to Canadian producers or employment to Canadian bottoms.

Board of Trade, Kingston.—No difference.

G. Fellers, Mayor of Sandwich, for D. Stuart of Detroit.—Lower rates of transportation would largely increase the demand for foreign salt, and the largely increased steam tonnage would greatly increase the use of Nova Scotia coal; for it would then come in the largest ship that could cross lake St. Peter, and would be transferred at once at Montreal to barges to fill the coal yards of Kingston, Toronto, the Welland Canal, &c. The returning coal ships would afford cheap transportation for the flour, beef, pork, butter, cheese, and other products of western Canada, required by the people of the Maritime Provinces.

Board of Trade, Oswego.—Cheapening of rates of freight by large vessels would doubtless tend to increase the demand for sea salt, but consumption would depend on Canadian tariff. As respects coal, there would not probably be much change except that cheaper freights would lower the price of Nova Scotia coal delivered at western ports.

Town Council, St. Catharine's.—Demand for both would increase.

Chamber of Commerce, Milwaukee.—Decided increase.

Board of Trade, Chicago.—These questions are more controlled by the American tariff, than by freight considerations, with a low tariff the demand would be largely increased, especially for salt.

Board of Trade, Detroit.—Cheapening transportation (which w[illegible]ually done by substituting large for small vessels) will, of course, b[illegible] more general use coars[illegible] articles that cannot afford high freights.

Adam Brown, Hamilton.—Answers in affirmative. He has good reason to believe bituminous coal from the Maritime Provinces could be brought to Western Canada,

and undersell the American. He also thinks there would be greater demand for salt from Montreal and Quebec. The original cost of Liverpool salt is so trifling that all reduction in the cost of transit must increase the consumption at the point of delivery. Chicago is the largest packing point in the world, and as Liverpool salt is preferred to the American article, its consumption ought to increase in the ratio of the reduction of the freight.

Board of Trade, Hamilton.—Reduced freight would cause greater demand.

Edsall & Wilson.—As respects English salt no difference; it is now carried from Kingston to Chicago, 75c. to $1 per ton. Not much wanted. Turk's Island could be carried by the St. Lawrence. Questionable if we could compete with American coal.

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9. What have been the relative rates, for three years, of freight from Chicago to Montreal; and Chicago to New York—distinguishing between the summer rates and the winter rates?

Board of Trade, Kingston.—13c. to Montreal; 18c. to New York—summer. Winter rates at the caprice of Railway Managers.

G. Fellers, Mayor of Sandwich, for D. Stuart, of Detroit.—The winter rates have been at least 30 per cent. in favor of Montreal; they should be no more by rail to one place than to another.

Board of Trade, Oswego.—For rates to New York see question 7.

Town Council, St. Catharine's.—Summer rates have been 13c. to Montreal; summer rates have been 17c. to New York.

Chamber of Commerce, Milwaukee.—Summer rates about two cents less to Montreal.

Board of Trade, Chicago.—Summer rates about 13c. to Montreal; do. 20c. to New York—per bushel of wheat.

Board of Trade, Detroit.—Summer rates 25 per cent. less to Montreal.

Board of Trade, Hamilton.—Rates from Chicago to Montreal about 13½c. per bushel; do New York about 22½c. per bushel.

W. J. Patterson, Montreal Board of Trade, Gives the following (from official sources) as the average rate of freight per bushel of wheat from Chicago to New York:—

Years.	*Via Buffalo.*	*Via Oswego.*
1861	27¼	27
1862	26¼	26¼
1863	23	22¾
1864	28¼	28½
1865	26¾	27½
1866	30½	31½
1867	22½	22½
1868	23	23
1869	23	23¼

The average rate paid per bushel by propeller from Chicago to Montreal, 1868 was 13c. in gold; in 1869 the average rate was 12c. in gold.

These figures show an immense difference in rate in favor of the St. Lawrence route to Montreal as an ocean port (the difference in time being 10 or 12 days) and yet only a small proportion of wheat comes to the sea-board by that route.

Notwithstanding that the recorded receipts of wheat at Montreal during the season of 1870 show a decrease of 724,019 bushels, as compared with 1869, still the aggregate is one-third of the quantity carried from the West to New York city; but it is impossible that that proportion can be maintained, as the small lock capacity of the Welland Canal is forcing Canadian vessels out of the Upper Lake trade. The following figures are very suggestive on this point:—

Receipts of wheat and corn at Kingston during season of 1858:—

58 cargoes in British vessels	839,948	bushels.
46 „ „ U. S. „	641,311	„

Receipts of wheat and corn from U. S. during season of 1870, as per statement made by *one* Forwarding Company.—

79 cargoes in British vessels	1,127,987	bushels.
111 „ „ U. S. „	1,892,875	„

Total receipts of grain at Kingston in season 1870, from U. S. ports amounted to a trifle over 6,000,000 bushels.

The proportion is computed to be—

In British vessels	2,256,000	bushels.
„ U. S. „	3,785,000	„
	6,041,000	„

In 1857 there were at least as many Canadian vessels of all classes trading between the Upper and Lower Lakes as in 1870; while U. S. craft during the same period had probably increased ten-fold. Unfavorable trade relations have no doubt had much to do in bringing about this decay in Canadian Commerce; and while the enlargement of the Welland would be of great advantage in removing a natural impediment —were American vessels allowed to navigate the improved outlet it might enable the Government to secure some advantage in return.

Edsall & Wilson.—1868-9, Chicago to New York, 26c.; do. to Montreal, 18c.—summer. 1870, Chicago to New York, 19c.; do. to Montreal, 17c. Low rates in 1870 to New York, due to railway competition.

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10. Has there been during the last twenty years, any increase in the relative number of any one class of carrying vessels?

Board of Trade, Toronto.—A large increase in vessels of large capacity.

Arthur Harvey, W. H. Howland, Toronto.—In large American vessels. The large vessels which have been built in Canada have been generally turned into American bottoms, the limitation of their business to Kingston, which affords no return freight, making them comparatively unprofitable while owned on this side.

Board of Trade, Kingston.—An increase of vessels to the full capacity of the Welland Canal trade.

G. Fellers, Mayor, Sandwich, for D. Stuart, of Detroit.—Steam is rapidly displacing sail for all freights requiring despatch.

Board of Trade, Toledo.—An increase in size of both sail and steam vessels.

Board of Trade, Oswego.—A very great increase in large propellers, and a like increase in large carrying capacity sail vessels, over small or present Welland Canal vessels and propellers. It is probable three-fourths of all the steam and sail craft built for the last ten years on the Upper Lakes, *cannot pass* the Welland. Doubtless, the most of them would gladly do so if it were possible, as the longer the voyage, the cheaper and more profitable the vessel can afford to freight. This agrees with the expressed opinion of Upper Lake owners of large steam and sail craft.

Town Council, St. Catharine's.—Steam vessels have increased most in proportion.

W. Smith, Owen Sound.—In steam—steam barges and barges.

Chamber of Commerce, Milwaukee.—Steam vessels.

Board of Trade, Chicago.—Large vessels have been steadily increasing.

Board of Trade, Detroit.—Steam vessels.

Adam Brown, Hamilton.—In steam vessels and sailing craft of large size.

Geo. Wilson, Port Dover.—In vessels of full capacity of the Canal.

Board of Trade, Hamilton.—In propellers and sailing vessels of large size.

Edsall & Wilson.—Enormous increase in British sail; enormous increase in American steam and sail.

Hon. John Young.—The demands of trade in its infancy required the smallest class of vessels. As trade increased the demand was met by an increased number; but during the last twenty-five years it has been found that the cost of transport is much less in large than in small vessels, both on the ocean and on the lakes; hence the tonnage of the propellers now engaged in the trade of the Upper Lakes to Buffalo, is about five times the size of the vessels employed a few fears ago, and freight can be carried in these one-third less than formerly, the improvement in the steam engine ensuring the greatest economy of fuel, and the celerity and certainty of the voyage by the steam propeller, has drawn to that class of vessels a large part of the carrying trade of the Upper Lakes.

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11. What are the dimensions, power and tonnage capacity of the largest propellers now doing profitable business on the Upper Lakes?

Arthur Harvey and W. H. Howland, Toronto.—From 600 to 900 tons.

G. Fellers, Mayor of Sandwich, for D. Stuart, of Detroit.—From 1,000 to 1,500 tons; no small propeller can now pay expenses in the general trade of the lakes.

Board of Trade, Toledo.—1,000 to 1,500 tons.

Board of Trade, Oswego.—Carry from 30,000 to 50,000 bushels of corn or wheat. Propeller *Philadelphia*, of Buffalo, carries 1,500 tons dead weight, in 14 feet of water. *Colorado* and *Nebraska*, 1,600 tons. Smaller craft, from 700 to 800 tons, can only be used in Lake Superior trade, as the depth of water in Sault Ste. Marie Canal, ten feet, precludes the heavier craft.

Town Council, St. Catharine's.—Propellers of 1,000 tons, 200 feet long and 35 feet beam, with a carrying capacity of 50,000 bushels.

W. H. Smith, Owen Sound.—900 tons.

Chamber of Commerce, Milwaukee.—250 feet long, 36 feet wide, 16 deep, and 1,500 tons.

Board of Trade, Chicago.—Length 240 to 250 feet; breadth of beam, 33 to 36 feet; depth of hold 14 to 15 feet.

Board of Trade, Detroit.—Length 350 feet; breadth of beam 35 feet; depth of hold 15 feet, with power sufficient to drive them ten miles an hour when laden, and capacity for carrying 1,500 tons.

Board of Trade, Hamilton.—Largest propellers on Upper Lakes are:—230 to 250 feet long, 32 feet beam and 12½ feet deep. Carrying capacity about 30,000 bushels.

Edsall & Wilson.—1,000 sail, and 1,500 tons steam.

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12. Viewing time, insurance, and interest as elements of cost, can propellers carry freight between Chicago and Kingston, as cheaply as sailing vessels—or can they carry at less cost?

G. E. Jaques, Montreal.—Propellers can and do carry freight from Chicago to Montreal, at rates not exceeding those by sailing vessels; although the daily cost of management of the former is greater than that of the latter, yet the time of the trip is so much less by steam, as to enable them to compete with sailing vessels.

Board of Trade, Toronto.—Believe propellers cannot carry freight between Chicago and Kingston so cheaply as sailing vessels, from the difficulty of obtaining back cargoes from that point.

Arthur Harvey and W. H. Howland, Toronto.—They cannot now carry as cheaply, owing entirely to the fact that at Kingston they cannot get return freight. If the Canals admitted of their going to Montreal they could, we think, carry freight cheaper than sailing vessels.

Board of Trade, Kingston.—Sailing vessels cheaper.

G. Fellers, Mayor of Sandwich, for D. Stuart, of Detroit.—Propellers of the kind previously described are cheaper.

Board of Trade, Toledo.—Answer in affirmative.

Board of Trade, Oswego.—Taking everything into account including time and railway competition, large propellers can probably freight from Chicago to Kingston, or to Oswego, or through to Montreal, if the St. Lawrence Canals admitted the trade,

more cheaply than sail vessels of equal size or capacity, and large propellers much more cheaply than small ones.

Town Council, St. Catharine's.—About the same rate.

F. G. Holcomb, Toronto.—Refers in general terms to carrying trade of Lakes. The expense outside of first cost of vessel in transportation, is very much in favor of the larger class of vessels. For instance the only difference in a vessel of 10,000 or 20,000 bushels, will be one or two additional men. In the case of steam the same remark holds good with this exception, that by increasing size and power the consumption of fuel becomes greater, but still favors the large class of vessels. The theory of some practical men is, that a vessel to be profitable, should be at least one ton per mile for the route they are employed on. Practical men differ in opinion as to the relative merits of steam and sailing craft; both have their advantages, and can be employed to advantage. In moving the grain of the country, vessels will always be employed though at less rates than steamers. The auxiliary steam vessel is competing successfully with clipper and sailing ships on the ocean, and in the Indian trade, is driving them out of it. They combine economy of fuel and speed, and take coal for the round trip. Vessels of this class, if introduced on inland waters, no doubt would bring about similar results.

W. H. Smith, Owen Sound.—Steam costs less, provided there is quick despatch, and Welland Canal to accommodate vessels with 35,000 to 50,000 bushels.

Board of Trade, Windsor, O.—If propellers of 1,500 tons could go direct from Chicago to Montreal (not merely to Kingston) they would be cheaper than sailing vessels, owing to the saving in time, interest, insurance, &c.

Chamber of Commerce, Milwaukee.—Sail the cheaper.

Board of Trade, Chicago.—Reply in the negative.

Board of Trade, Detroit.—Expense about equal, taking time into account. Sail vessels can carry at a trifle less cost.

Adam Brown, Hamilton.—Propellers cannot carry so cheaply between Chicago and Kingston as sailing vessels, the expense of towing being light, as the Canal mileage is so trifling in comparison to the total distance; but should cargoes be consigned direct from Chicago to Montreal, then propellers would have the advantage over sailing vessels, as the Canal mileage would be largely increased on the total distance, thereby giving the propellers the advantage of their own tonnage on the canal system of the St. Lawrence.

George Wilson, Port Dover.—Propellers can carry at less cost.

Board of Trade, Hamilton.—Sail vessels are thought to be cheaper, but on the Upper Lakes steam vessels are increasing faster than sail vessels, which seems to establish the fact that steam must be found most suitable and profitable.

Edsall & Wilson.—Sail with present size of locks; steam with locks enlarged.

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13. What is the cost, and what are the daily working expenses of a sailing vessel of 500 tons capacity?

Board of Trade, Kingston.—Cost, $18,000; per day, $25.

G. Fellers, Mayor of Sandwich, for D. Stuart, of Detroit.—First-class sailing vessels can be built of wood, and fitted ready for work in an A 1 manner for $45 and $47, American currency, per ton. The expense of sailing a 1,000 ton vessel would not be ten dollars per day more than for a vessel of 500 tons. The only extra cost would be in towing, and a few more seamen.

Board of Trade, Toledo.—Cost of vessel, $25,000; daily expenses, $30.

Board of Trade, Oswego.—Cost of sail vessels, of 500 tons, $25,000; daily expenses, $60.

Town Council, St. Catharine's.—Cost, about $20,000; daily expenses, $45.

W. H. Smith, Owen Sound.—$34 and $40 if fore and after, but if square rigged, more expensive.

Chamber of Commerce, Milwaukee.—$25,000 cost; $50 daily expenses.

Board of Trade, Chicago.—Cost, about $30,000; running expenses, $37.40 to $40.

Board of Trade, Detroit.—Cost, $25,000; daily expenses, $25. Working expenses here and hereafter do not include elevating, trimming and shovelling, Canal tolls, towing, insurance, &c., which constitute large items in the expense of transportation.

Adam Brown, Hamilton.—Including insurance and depreciation of property, about $40.

Board of Trade, Hamilton.—Cost, $18,000; daily expenses, $30.

Edsall & Wilson.—Daily, $25.

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14. What is the cost, and what are the daily working expenses of a sailing vessel of 1,000 tons capacity?

G. Fellers, Mayor of Sandwich, for D. Stuart, Detroit.—See answer to question 13.

Board of Trade, Toledo.—Daily working expenses, $40.

Board of Trade, Oswego.—Cost of sail vessels of 1,000 tons, $60,000; daily expenses, $100.

Town Council, St. Catherine's.—Cost of sail vessel of 1,000 tons, $35,000; daily expenses, $60.

W. H. Smith, Owen Sound.—From $90 to $120, according to fuel, daily.

Chamber of Commerce, Milwaukee.—Cost of sail vessel of 1,000 tons, $40,000; daily expenses, $70.

Board of Trade, Chicago.—Cost of sailing vessel of 1,000 tons, $40,000; daily expenses, $45 to $50.

Board of Trade, Detroit.—Cost of sail vessel of 1,000 tons, $45,000; daily expenses, $35.

Board of Trade, Hamilton.—Cost of sail vessel of 1,000 tons, $30,000; daily expenses, $45.

Adam Brown, Hamilton.—Daily expenses, $55.

Edsall & Wilson.—Daily expenses, $30.

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15. What is the cost, and what are the daily working expenses of a propeller of 500 tons capacity?

Board of Trade, Kingston.—Working expenses, $80 a day.

G. Fellers, Mayor of Sandwich, for D. Stuart, of Detroit.—A propeller of 1,000 tons can be worked as cheaply as one of 500 tons; except the greater cost of loading and unloading the cargo, the expense of carriage is no more except for increased fuel and oil, and this expense will not go beyond 30 per cent.

Board of Trade, Toledo.—Working expenses, $50 a day.

Board of Trade, Oswego.—Cost, $45,000 daily expenses, $120.

Town Council, St. Catharine's.—Cost, $35,000; daily expenses, $120.

Chamber of Commerce, Milwaukee.—Cost, $50,000; daily expenses, $100.

Board of Trade, Chicago.—Cost, $50,000; daily expenses, $120 to $140.

Board of Trade, Detroit.—Cost, $45,000; daily expenses, $100.

Adam Brown, Hamilton.—Daily, $125.

Board of Trade, Hamilton.—Cost, $28,000; daily, $65.

Edsall & Wilson.—Daily, $70.

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16. What is the cost, and what are the daily working expenses of a propeller of 1,000 tons burden?

G. Fellers, Mayor of Sandwich.—See question 15.

Board of Trade, Toledo.—1,000 tons, $75 a day.

Board of Trade, Oswego.—Cost of 1,000 tons, $75,000, of 1,500 tons, $125,000; daily expenses, $160 to $200. (These and foregoing statements are estimates of men experienced in trade at Buffalo, and elsewhere, and are for wooden craft, and in American money.)

Town Council, St. Catharine's.—Cost of 1,000 tons, $55,000; daily expenses, $160.

Chamber of Commerce, Milwaukee.—Cost of 1,000 tons, $80,000; daily expenses, $125.

Board of Trade, Chicago.—Cost of 1,000 tons, $80,000; daily expenses, $180 to $200.

Board of Trade, Detroit.—Cost of 1,000 tons, $75,000; daily expenses, $120.

Adam Brown, Hamilton.—Daily, $200.

Board of Trade, Hamilton.—Cost, $45,000; daily expenses, $85 to $90.

Edsall & Wilson.—Daily, $90.

In reference generally to the Welland Canal, the Hamilton Board of Trade remarks:—

The locks and bridges on the Welland Canal have not a sufficient number of lock and bridge tenders. Captains of sailing vessels especially complain that they are compelled to allow a portion of their crews to assist in opening the locks and bridges, at a time when all hands are required for the safe working of the vessels. The closing of the locks on the Welland on Sunday is a great hardship to our mercantile marine. The loss of a day with a fair wind frequently prolongs the voyage for a week. It is a grievous tax on our shipping interest; neither is it desirable in a moral point of view, as a large concourse of sailors subjected to compulsory idleness, is far more objectionable and less likely to be attended with beneficial results than when all are engaged in the midst of a voyage in attending to their ordinary every-day duties. It is alleged that farming the public property on Sundays is not an uncommon occurrence, and that masters of vessels frequently pay a handsome gratuity to the lock tender for opening the lock on a Sunday. At all events, the Canal locks should be opened on Sundays after the 1st of November, as is the case with the Lachine; and during the whole season of navigation, vessels reaching the two last locks at Port Dalhousie or Port Colborne, any time on Sunday, should be locked out into the lake. The same regulation as to Sunday traffic on the Welland does not exist on the St. Lawrence Canals, and no good reason has ever been assigned for the distinction. The completion of the long-talked of Lake Erie level, combined with increased width in the Canal at an early day, is a work of great importance to the future enlargement and success of the Welland Canal, and should receive prompt attention at the hands of Government, as the Grand River is understood to be annually failing in the supply of an adequate quantity of water for the purposes of the Canal, as predicted by Hon. H. H. Killaly nearly 30 years ago:

ST. LAWRENCE CANALS.

1. Is it your opinion that the carrying of produce from the West can be best and most economically performed by vessels which navigate the lakes proceeding through the Canals to their destination, or by the transhipment at Kingston of their cargoes into barges specially adapted for Canal transportation, and what would be the difference of cost between the two systems?

T. Rimmer, Montreal.—The best and most economical method, even with grain grown in the Lake Ontario districts, is to tranship into barges at Kingston. His firm pays a schooner from two to three cents a bushel for freight of grain from a Lake Ontario port to Kingston; or if they engage the schooner to come to Montreal, they pay her just as much additional freight as they would have to pay a barge between Kingston and Montreal. But the schooner prefers the short voyage, for she can earn more money, if lucky, by trading on the lakes than by doing barge work. A barge is also very much more convenient to move about the harbor of Montreal, and deliver grain into ships, than a schooner can be, and will give a firm more time to discharge; or if, on demurrage, it is employed at a lower rate than a schooner—the former being a cheaper craft and paying a small crew. Then the grain is benefitted by the transhipment at Kingston—a very large proportion every year is rendered fit for shipment in this way, otherwise it would have to go into store at Montreal. Both Canadian wheat (after June) and Western maize, as well as the Western spring wheat (after July) require this transhipment.

J. W. Winn, Montreal.—His firm largely furnish return cargoes of pig iron from Montreal to Chicago, Milwaukee, &c., which are usually cheapest when sent by barge to Kingston, and thence by schooner. In his opinion, enlargement of Canals, with uniformity of locks, would make steam throughout, without transhipment, the cheapest as it is otherwise the best mode of transport.

G. E. Jaques.—In the present state of Canals—that is, the Welland being ten and the St. Lawrence only nine feet—most vessels have to lighten for the river, 20 or 30 per cent. of the cargo, and so long as this continues it would be no doubt desirable for many vessels to discharge at Kingston or Prescott, rather than proceed to Montreal.

A. R. McGibbon, Montreal.—Favors carriage by vessels direct from lakes to Montreal.

D. E. McLean & Co., Montreal.—Recommend transhipment into barges.

Board of Trade, Toronto.—As Canals are at present, transhipment of grain at Kingston from sailing vessels into barges would be cheapest; but in the event of enlargement of these works, this would be otherwise, for grain could be carried more cheaply without the transhipment.

Board of Trade, Ottawa.—As there must be a second transhipment at Montreal, that at Kingston should be avoided if possible. At the same time, it is fair to state that the oftener grain is shipped, the better will be the condition of the cargo at the end of the voyage. Barge navigation will be altogether too slow and expensive, for, taking into account the short season of navigation, such means of transport is likely to drive trade from the St. Lawrence route.

Board of Trade, Kingston.—Pronounce in favor of barges.

G. Vellers, Mayor of Sandwich, for D. Stuart, of Detroit.—There is no kind of transportation that can compare in cheapness with barge transportation. The new class of

steamers we suggest, in answer to questions on Welland Canal, should go to Prescott instead of Kingston, and there unload, for the reason the further the greatest tonnage can be carried, the cheaper the freight.

Board of Trade, Toledo.—With sufficient depth of water, transhipment should be avoided.

H. McLennan, Manager of Montreal Transportation Co.—Barges are cheaper both as respects original cost and working, better for Canals, and more convenient to discharge alongside ship, and deliver grain in better condition, owing to extra handling at Kingston.

Arthur Harvey and H. Howland, Toronto.—At present, it pays best to transport grain coming from Lakes Erie and Michigan from lake vessels into barges at Kingston. If the Welland and St. Lawrence Canals could admit the large-sized vessels which are profitably employed on the Upper Lakes, it would be without doubt cheaper to carry the grain to tide water, and possibly to its destination without transhipment. Under a proper system of through navigation, the cost of carrying through would be from 1½ to 2 cents less than to tranship. No distinction whatever should be made between Welland and St. Lawrence Canals.

Town Council, St. Catharine's.—Produce can be best carried direct to Montreal without transhipment.

Board of Trade, Windsor, Ontario.—Are of opinion that the carriage of produce from the west can be best and most economically performed by a large class of propellers carrying between Chicago and Montreal or Quebec, and not by transhipment into barges at Kingston.

Chamber of Commerce, Milwaukee.—In favor of vessels proceeding through.

Allan Gilmour, Ottawa,—Is inclined to the opinion that the carrying of produce from the west can be done more cheaply by transhipment at Kingston into barges especially adapted to Canal navigation; but in the case of steamers doing a general business, it would be otherwise, for they would doubtless find it more profitable to make the through trip without transhipment.

Board of Trade, Chicago.—Think it can be most economically done by barges.

Board of Trade, Detroit.—With the canals enlarged to the size mentioned for Welland (15 to 16 feet deep), and the river deepened so as to admit vessels of large capacity to proceed to Montreal, the carrying of produce could be more economically done by vessels proceeding through the Canals to their destination. The expense of transhipment, including detention, would be about ten per cent.

Adam Brown, Hamilton.—Direct transportation through enlarged Canals would be a great advantage to the trade, in time, money and preservation of bulk, and rolling freight, and would save the risk of deterioration of property; of course cereals are rather improved by transhipment.

Hamilton Board of Trade.—Same opinion.

Erie & Ontario Ship Canal Co., per Mr. A. Morrison.—Cheapest to transfer to barges until the Welland is enlarged to the capacity of the St. Lawrence Canals.

Edsall & Wilson.—Must be done by barge; at present delays occur at Kingston in connection with storage, and discharging; delivery in excess at spring and fall, but not at midsummer.

A. Wright, M.P.—Transhipment should be avoided.

Canadian Navigation Company, Montreal.—Transhipment into barges is the cheapest mode.

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2. In the event of barge transportation being preferred, to what extent in your opinion is it desirable to increase the length, breadth, and depth of the locks?

T. Rimmer, Montreal.—Considers that the barges now employed in the trade are quite as large as is convenient, and therefore no increase in the size of the Canals appears to be necessary.

J. W. Winn, Montreal.—Believes that the deepening of the locks to 10½ feet would be an advantage to barges, though more necessary, steamers. Present length and breadth of locks sufficient in any case.

G. E. Jaques, Montreal.—Considers it would be unjust to owners of steam vessels to regulate water of Canals for use of barges only. In his opinion, the whole system of Canal improvement should be based on assimilating the size and depth of water of the Welland and St. Lawrence Canals. It is now a disadvantage for crafts having passed the Welland to lighten, in some instances 3 per cent. at Kingston.

Board of Trade, Ottawa.—Barge navigation is inadvisable. The country should be spared the expense of an enlargement, if the Canals are only to be adapted to barges.

Board of Trade, Kingston.—Locks in length and breadth sufficient, but if practicable the depth should equal that of the Welland; doubtful, however, if possible. The flats below Cornwall should be dredged, entrance to Beauharnois cleaned of boulders, and entrance to Lachine deeper and safer.

G. Fellers, Mayor of Sandwich, for D. Stuart, of Detroit.—The Canals below Kingston are all large enough for the next 25 years, for barge transportation. Eight barges could be taken in one tow, when of 8 feet depth and built in first-class style.

Montreal Corn Exchange Association.—If it were possible (see answer to St. Lawrence River 3.) to open a channel of ten feet for vessels between Prescott and Montreal, it would be advisable to give same depth to Canals; but the immediate necessity, not imperative.

Arthur Harvey and W. H. Howland, Toronto.—In that event, no enlargement may be necessary.

Town Council, St. Catharine's.—Do not consider it necessary to increase length or breadth, only depth to 12½ feet or thereabouts.

Board of Trade, Chicago.—Perhaps to capacity for passing barges of 20,000 to 25,000 bushels.

Board of Trade, Detroit.—No increase would be required.

Erie & Ontario Ship Canal Co.—They should be of the same capacity as the enlarged Welland.

Edsall & Wilson.—No enlargement of locks wanted.

Canadian Navigation Co.—Then, present locks sufficient.

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3. Are there any points on the Canals, or connected with the Canal Navigation which, in your opinion, can be materially improved, so as to facilitate the passage of carrying produce through the Canals ?

J. W. Winn, Montreal.—Obstructions exist which prevent at times vessels drawing anything near 9 feet from passing. Deepening to 10½ feet, therefore, earnestly recommended

G. E Jaques, Montreal.—Has a decided opinion that nothing short of making the St. Lawrence Canals the same depth as the Welland, can subserve any satisfactory purpose of trade.

Board of Trade, Toronto.—The deepening of the Canals and the river to 12½ feet would materially improve the navigation.

Board of Trade, Ottawa.—Canals should be enlarged to size of Sault Ste. Marie Canal.

Board of Trade, Kingston.—See answer to question 2.

G. Fellers, Mayor of Sandwich, for D. Stuart, Detroit.—If any reasonable sum would give the same depth of water through the small Canals above the Beauharnois as the Welland Canal would have, then he would recommend their simultaneous enlargement. This would double our chances of obtaining preponderance of Western business, and increase that business besides. Then, after some years' experience, the Government would be able to judge whether it would be expedient to enlarge the Beauharnois and Lachine to same dimensions as those above them.

A. Harvey and W. H. Howland, Toronto.—The deepening of the Canals is by so much the principal improvement to be desired that all others are quite subordinate to it.

Town Council, St. Catharine's.—A greater depth of water at some points is only required.

Chamber of Commerce, Milwaukee.—Recommend enlargement of Welland and St. Lawrence Canals to same capacity.

Board of Trade, Detroit.—Same reply.

Board of Trade, Hamilton.—The Cornwall Canal is being turned into a mill race from the machinery erected thereon, and the difficulty in navigating the Canal is greatly increased. The fact of the waste weirs being so close to the entrance of the locks renders it dangerous for vessels passing out or into the locks, although it is quite possible to improve them so as to obviate this objection. It is generally supposed that the current created by supplying mills prevents the Canals from freezing over, but this is a mistake, as may be seen from the Lachine Canal, which is noted for its strong current and rapid freezing. This subject should be considered.

Erie & Ontario Ship Canal Co.—The construction of the branch Canal from Thorold to Niagara river.

Edsall & Wilson.—The west end sea wall requires extending to dead water by separate piers, to cause the water to draw into Canal. As the entrance now is, the water returns and creates a current outwards.

A. Wright M. P.—Advocates enlargement of the St. Lawrence Canals to same size as the Saul Ste. Marie Canal.

Canadian Navigation Co.—Upper entrance of the Beauharnois Canal requires improving by the removal of some dangerous boulders, and by placing a light-house on the Government pier. The Cornwall Canal requires bumping post at each lock.

L. H. Masson, M. P., Soulanges.—Refers at length to the Beauharnois, Canal, and adds that the fact is now recognized by every one that this work should have been made on the north side of the Rapids at the head of which Coteau Landing would have had its entrance upon Lake St. Francis, with 18 feet of water. A great error was certainly committed in building the work on the south side, and it was recognized when it was too late to remedy the evil. Not only did many difficulties arise, but numerous losses from the mistake in the construction of this Canal. Not only is commerce more or less injured, but the Canal in a military point of view is a great mistake—a nuisance rather than a utility. During the two last Fenian invasions the authorities have been obliged to guard it by companies of volunteers, because it was possible for the enemy at any moment to seize it and effectually stop the navigation of the St. Lawrence. General Michael and all the other military authorities have pointed out the dangerous position of this Canal in case of invasion. Hon. John Young has also expressed the same opinion as to the mistake that was made in constructing the work on the south side. In conclusion he does not hesitate to say that he warmly approves of the scheme of improving our inland navigation, with a view to increasing the commerce of the Dominion, provided it is done as economically as is consistent with the interests of the public service. Above all, he presses earnestly upon the Commission the consideration whether it would not be more advantageous in point of usefulness, economy and defence, to construct a new work for large (ocean) vessels, on the north side of the Coteau Rapids, instead of enlarging the present Beauharnois Canal.

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4. What is the bushel capacity of the largest barges navigating the St. Lawrence and Lachine Canals ?

T. Rimmer, Montreal.—A large sized barge carries 20,000 bushels.

Board of Trade, Toronto.—20,000 bushels.

Board of Trade, Ottawa,—20,000 bushels.

Board of Trade, Kingston.—22,000 bushels.

Hugh McLennan, Montreal.—About 20,000 bushels.

Arthur Harvey and W. H. Howland, Toronto.—20,000 bushels.

Town Council, St. Catharine's.—25,000 bushels.

Chamber of Commerce, Milwaukee.—22,000 bushels.

Board of Trade, Chicago.—Think about 15,000 bushels.

Board of Trade, Hamilton.—20,000 to 22,000 bushels.

Edsall & Wilson.—25,000 bushels.

A. Wright, M. P.—20,000 bushels.

5. Can such capacity be advantageously increased, without increasing the size of the present locks ?

T. Rimmer, Montreal.—Believes this capacity is quite as much as it is convenient to handle in the harbor in one barge, and also states, by Act of Parliament and the regulations of the trade, a bin of wheat in a sea-going ship must not exceed 1,200 bushels. A barge carrying 20,000 bushels must go to several vessels to discharge—at least generally so.

Board of Trade, Toronto.—Yes, provided the river and Canals be deepened to 12½ feet.

Board of Trade, Ottawa.—Doubtful if capacity can be profitably enlarged with view to general interests; but it may be with regard to interests of forwarders.

Board of Trade, Kingston.—See question 2.

G. Fellers, Mayor of Sandwich, for D. Stuart, of Detroit.—Would increase capacity of barges to that of locks and depth of water at point of lowest water.

Hugh McLennan, Montreal.—Negative answer.

Arthur Harvey and W. Howland, Toronto.—The experiment was tried, but found unsatisfactory; the barges were sold to be used in the lumber trade between Belleville and Oswego.

Town Council, St. Catharine's.—Answer in negative.

Board of Trade, Chicago.—Think not.

Board of Trade, Hamilton.—Not without deepening the Canals.

Edsall & Wilson.—Increase in width and length.

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6. What has been the average rate of freight, for the last three years, for the carriage of wheat and flour from Kingston to Montreal and to Quebec, and by what class of vessels carried ?

Board of Trade, Toronto.—4¼ cents to Montreal, and 6¼ cents to Quebec—wheat in barges. 14 cents to Montreal, and 20 cents to Quebec—flour by steamer.

Board of Trade, Kingston.—Four cents to Montreal (free of tolls)—wheat by barge. 15 cents to 20 cents to Montreal (free of tolls)—flour.

Hugh McLennan, Montreal.—Wheat, four cents per bushel; barges carrying 10,000 to 20,000 bushels.

Arthur Harvey, W. H. Howland, Toronto.—Averaged 4¼ cents to Montreal, averaged 6¼ cents to Quebec, wheat chiefly in barges.

Very little, if any, flour is shipped from Kingston, it being nearly all sent through by steamer from lake ports. The proportions of freight from Kingston to Montreal would be about 12 cents.

Town Council, St. Catharine's.—About four cents to Montreal by barges.

Board of Trade, Chicago.—Barges have been carrying wheat at about four cents per bushel to Montreal.

Board of Trade, Hamilton.—Wheat, four cents to Montreal. Flour, 15 cents to Montreal.

Edsall & Wilson.—From Kingston to Montreal :—Wheat, five cents to six cents ; Flour, 15 cents. From Kingston to Quebec:—Wheat, 8 cents, Flour 20 to 25 cents.

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7. Is it practicable or advisable to enlarge the St. Lawrence Canals and deepen the Upper St. Lawrence River to the extent necessary to enable ocean vessels drawing 16 feet or over, to navigate from the Ocean to the Upper Lakes.

J. H. Ingersoll, St. Catharine's.—Argues at considerable length in favor of improving our inland navigation with the west, by deepening the channel and enlarging the locks on the present St. Lawrence Canals, so that sea-going vessels of 1,000 tons burden and drawing 12 feet of water will be enabled to reach the different ports on Lake Ontario, without transhipment. In his opinion, it would be the height of folly to ask the country to construct entirely new works, costing from 30 to 40 millions of dollars, when, at a comparatively trifling outlay for enlarging the present Canals, we would effect the desired object, viz: Of connecting the two greatest food producing and food consuming countries in the world by the shortest, cheapest and quickest route.

T. Rimmer, Montreal.—Argues against sending ocean vessels beyond Montreal. Most of these vessels are clipper built, of very light class and finish, and so far as his own experience goes, no money would induce them to go into a Canal. Neither would it be generally advantageous to send them there, should they be willing to go. For example, the *Peggy*, 247 tons, cost about $20,000, and was navigated by a crew of 10 men —her full capacity being 14,000 bushels. A barge to carry the same load costs $8,000 and is worked by a crew of five men. These vessels, like most ships of whatever size in the trade, do not stand and cannot be moved without ballast, therefore they take in a part of their return cargo (grain) before they complete the discharge of their inward cargo. To effect this, he knows of no method so convenient and economical, and in all respects so desirable, as bringing a barge alongside which will put in grain enough to ballast her, and give the shipper time to handle the rest, say at a moderate charge for inevitable detention. In the Buffalo trade, all the grain goes at once into store, and barges or propellers cannot be too large. In the Montreal trade, on the other hand, the bulk of grain goes on board ship, and barges must consequently be adapted to that end. Besides, it must be considered that it is only at a large depot, like Montreal, a shipper may make a proper selection of his cargo, and give that personal inspection of his business which is necessary.

J. W. Winn, Montreal.—Believes that the deepening of the Upper St. Lawrence navigation to 16 feet would be so enormously costly as to be practically impossible, and offers no advantage commensurate with a tenth part of the cost.

G. E. Jaques, Montreal.—Does not think it advisable to deepen the St. Lawrence Canals to 16 feet for ocean vessels, as their form and build are not suitable to our rivers and lakes.

A. R. McGibbon, Montreal.—Would allow the passage of sea-going vessels drawing 16 feet ; of steamers, 225 feet and 50 feet beam over all.

D. E. McLean & Co., Montreal.—It will not pay ocean-going vessels to pass above Montreal. Therefore, answers question in negative.

Board of Trade, Toronto.—Recommend deepening Canals to 12½ feet for reasons set forth in a report of a special Committee on the subject. This Committee are satisfied that the great bulk of the trade with the Maritime Provinces would then be carried without breaking bulk from the lakes to the ocean, creating thereby a reciprocity of interest and connecting our several Provinces more closely. As an investment to realize annually a certain amount of capital invested, the enlargement is not likely to prove satisfactory; but the Committee do not hesitate to say that these works, in such an event, are much more likely to prove remunerative than they are at present. If the Dominion desires to keep pace with the neighboring republic as a mercantile community, it must be prepared to compete with the latter for the carrying trade of the great West to the ocean, which is yearly becoming more important and requiring greater facilities of transport. The larger the trade attracted through our Canals, the greater the number of transatlantic vessels that will be required—in this way our tonnage will be increased, the revenue materially benefitted, and the general prosperity of the Dominion greatly enhanced.

Corn Association, Toronto.—Also advocate deepening to admit vessels of 12½ feet, and in doing so refer to the advisability of encouraging trade between the West and the Maritime Provinces as essential to the success of the scheme of Confederation. Thus far they say in consequence of our inadequate water communications and the uncertainty which exists as to the nature and extent of these contemplated improvements, we have been almost entirely dependent on railway carriage which, although adapted, but at greater cost to the transportation of flour, cannot be made available on account of the expense for return cargoes of coal, fish or oil or other products of the Maritime Provinces. Hence, that Reciprocity of trade upon which we have counted as the only basis of legitimate commerce, and the one great means of uniting the Provinces in the strong bonds of mutual interest, remains undeveloped, and will continue so until our water communications shall have been permanently established, on such a scale as to induce the building of vessels suitable at once to the navigation of the lakes, the Canals and the ocean. Nor, while aiming at the development of our internal commerce, do they lose sight of the immense trade which the enlargement of our water channels, from the lakes to the ocean, would attract from the West, and the wonderful stimulus which such a diversion would give to our commercial marine, as well as to the general commerce of the Dominion.

Board of Trade, Ottawa.—As a general rule nothing would be gained by enlarging the canals to admit ocean vessels, because, to say nothing of handling such craft in a limited space, the difference of density in salt and fresh water would seriously affect the stability of the vessel by altering her trim, straining her when loaded, and increasing the tendency to refuse her helm in the narrow channels through which she would have to steer.

Board of Trade, Kingston.—Answer in negative.

G. Fellers, Mayor of Sandwich, for D. Stuart, of Detroit.—No present necessity for over 14 feet of water—there being no harbor on the Western lakes with a greater depth, while the St. Clair Flats will have no more.

Board of Trade, Toledo.—Answer in affirmative.

Arthur Harvey, W. H. Howland, Toronto.—Earnestly believe they should be deepened to admit vessels drawing 12 feet—a draught which the principal harbors on Lake Ontario would or could at a trifling cost, be made to admit.

Town Council, St. Catharine's.—Think it should not be done.

W. H. Smith, Master Mariner, Owen Sound.—Same answer.

London Board of Trade.—Recommend improvement of navigation to a sufficient capacity for the passage of ocean-going vessels with full cargoes.

Board of Trade, Windsor, O.—Answer in negative—corresponding with D. Stuart.

Chamber of Commerce, Milwaukee.—Think present ocean vessels are not adapted to Lake trade.

Allan Gilmour, Ottawa.—Probably practicable, but not advisable.

Board of Trade, Chicago.—Hardly think it advisable.

Adam Brown, Hamilton.—Answers emphatically in the affirmative.

Board of Trade, Hamilton.—Believe it to be practicable but not advisable, because, to say nothing of the cost of such a work, there are no harbors with a sufficient depth of water on the Upper Lakes to admit such a class of vessels.

Edsall & Wilson.—Answer in negative.

Canadian Navigation Co.—Ditto.

L. H. Masson, M.P., Soulanges.—Answers this question emphatically in the affirmative and adds—

All the experienced pilots agree in saying that they would have no fears now in piloting a vessel drawing from 14 to 15 feet of water from Cornwall to Coteau landing upon Lake St. Francis, and from the Lachine Rapids on Lake St. Louis.

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8. Are there many vessels carrying Canadian products, drawing 16 feet or less, employed in the transatlantic trade, and is the number of such vessels increasing or diminishing, if either, from what cause?

T. Rimmer, Montreal.—States that a good many vessels engaged in the trade draw 16 feet or thereabouts, but the quantity of grain they carry is only a small proportion of the total export. These small vessels are such as are engaged in the fruit trade, and despatched homeward to look for orders. This class is very expensive, and would not go into a Canal, to be thumped by barges or rubbed against stone walls.

Board of Trade, Toronto.—There are few vessels drawing 15 feet, unless in the transatlantic trade, and the number is diminishing in consequence of larger vessels being able to do the trade cheaper.

Town Council, St. Catharine's.—None at present—as a general rule, the trade was found unprofitable.

A. M. Delisle, Montreal.—Majority of vessels draw 16 feet, and are increasing. Tonnage of this class, from 500 to 700 tons burden.

W. H. Smith, Owen Sound.—Two or three drawing less than 16 feet, not on the increase, on account of want of fitness for sea voyages.

Edsall & Wilson.—No vessel of 16 feet; two of 12 feet when loaded at Montreal—worked at a loss.

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9. Can vessels adapted for ocean navigation compete successfully with barges and other vessels usually employed in the carrying trade on the Lakes, Canals and Rivers?

J. Winn, Montreal.—Says that vessels adapted for ocean are to heavy, too costly, and in many other respects wholly unfit for economically navigating Canals, Lakes or Upper St. Lawerence.

T. Rimmer, Montreal—See answer to question 7.

A. R. McGibbon, Montreal.—Says that much depends on future commercial treaties between the States and the Dominion. Return freights from Europe will be an important element in the consideration of this question of Canal enlargement.

D. E. McLean Montreal.—Is of opinion that sea-going vessels cannot compete with barges.

Board of Trade, Toronto.—Negative answer.

Board of Trade, Ottawa.—Ditto.

Board of Trade, Kingston.—Ditto.

Board of Trade, Toledo.—Answer in affirmative, provided depth of water is sufficient.

Arthur Harvey, W. H. Howland, Toronto.—As soon as Canals are enlarged, suitable vessels will be built to compete successfully with barges and the present plan of transhipment. To prove this they state that grain from Lake Ontario ports is never or seldom transferred at Kingston, but is carried through at lower rates than by transhipping. Rates from Toronto on grain through to Montreal are from 5½c. to 6½c., and 6½c. to 8c. by barge and vessel. This, too, despite the fact that barges are to a certain extent sustained by the towage subsidy providing power for them at less expense than it could be afforded by purely private enterprize, so that barges have really an assistance which steamers have not. If this were removed, steam vessels going through, not only to Montreal, but to ocean ports, would have an advantage over barge transportations, especially as even at equal cost they would be preferred, as not subjecting the cargo to the damage and delay consequent upon transhipment. These two gentlemen also lay before the Commissioners various considerations connected with the question:—Commerce between Nova Scotia and Ontario only awaits the removal by art of the natural obstructions to the St. Lawrence navigation, to assume at once much greater importance than it now possesses, though it is already great and is fast developing.

The Trade of the West must soon assume very different proportions from the present, and will flow where greater facilities are given. Duluth must soon ship as much as Chicago, and it is not much further from Montreal than the latter city. Our own North West Territory must shortly send its millions of bushels towards the sea-board.

We should be ready for this commerce, which is even now bursting upon us; we should offer by our route, low freights, quick despatch, and delivery to tide water without transhipment.

Town Council, St. Catharine's.—Think they cannot compete with such vessels.

A. M. Delisle, Montreal.—Similar answer.

F. S. Holcomb, Toronto.—As a carrier of some thirty years' experience, believes craft can be built suitable for the different classes of ocean, river and lake navigation, and especially adapted for each. For instance, a vessel can be built to navigate the lakes and make Kingston a point of transhipment at a cost, say $1 per bushel, carrying capacity. A barge can be built to take that cargo from Kingston, better adapted for the trade, at about half the cost. This craft meets the ocean vessel at Montreal, the latter being of any size according to the requirements of the trade, and on the score of expense, can be manned and equipped for half the cost attending the schooner. This also applies to ocean vessels attempting the route, and if a Canal is built of any capacity, these different craft can be built for the various routes and compete successfully with any vessels constructed for a through trade. He does not wish to be understood to say that a class of steam propellers could not be built to run to great advantage to Montreal, and compete successfully with the description of craft named above, but then the size and importance would depend altogether upon the facilities afforded for the navigation of the route in question.

W. H. Smith, Owen Sound.—Answer in negative.

Board of Trade, Windsor O.—Answer in negative.

Chamber of Commerce, Milwaukee.—Ditto.

Allan Gilmour, Ottawa.—Thinks that sea-going vessels would not only cost too much, but would be heavy in frame, masts and rigging, and too difficult to move and control in the rapids, and in entering and passing through the Canals.

Board of Trade, Chicago.—Do not think they can.

Adam Brown, Hamilton.—Vessels can be constructed (on the composite principle) so as to combine ocean and lake navigation, passing from port to port direct, and they ought to carry cargoes at less cost than any system of transhipping involving delays, deterioration, breakage and labor. Emigrants for the west could come by such, and thus lessen rates of freights. Importers in Ontario could get their goods delivered at their own ports at a great saving of expense.

Board of Trade, Hamilton,—Answer in negative.

Edsall & Wilson.—Answer in negative.

A. Wright M P.—Ditto.

Canadian Navigation Co.—Ditto.

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10. Is it your opinion that schooners or other vessels, built to navigate the Lakes or inland waters of the Dominion, can compete successfully in trade to Europe with vessels specially adapted to ocean navigation?

J. W. Winn, Montreal.—Believes that vessels built for inland navigation are quite unfit for ocean traffic. The attempt has been often made, but resulted in so many disasters, detentions, damage to cargoes, &c., as to prevent mercantile men again trying the experiment. He writes from personal experience.

A. R. McGibbon, Montreal.—Says that one benefit of Canal extension would be that lake vessels could find employment elsewhere during the winter season as they could pass through.

Trinity House, Quebec.—Negative answer.

Board of Trade, Toronto.—Ditto.

Board of Trade, Ottawa.—Ditto.

Board of Trade, Kingston.—Ditto.

G. Fellers, Mayor of Sandwich, for D. Stuart, Detroit.—Ditto.

Arthur Harvey, W. H. Howland, Toronto.—Vessels now built for lake traffic are not suitable for ocean navigation, except under favorable circumstances, as to weather, &c. In case Canals are sufficiently deepened, vessels built after such enlargement would be so constructed as to be efficient on the lakes, and in at least the ocean-coasting trade of the Continent. Even under existing circumstances lake schooners have made profitable trips to ports on the seaboard: and in some few instances these voyages have not been very long. Last summer, lake schooners were sent from Toronto to Halifax and Pictou, and realized a good profit to owners and charterers both.

Town Council, St. Catharine's—Are confident they cannot.

A. M. Delisle.—Occasionally cases have happened of vessels from the lakes proceeding to Europe, but in very few instances, and he may fairly assume that the attempts were not profitable since they have not been repeated.

F. S. Holcomb, Toronto.—See page 91.

W. H. Smith, Owen Sound.—Answer in negative.

Board of Trade, Windsor O.—Answer in negative.

Chamber of Commerce, Milwaukee.—Think not.

Board of Trade, Chicago.—Same reply.

Allan Gilmour, Ottawa.—Answer in negative.

Board of Trade, Detroit.—Think vessels adapted to the enlarged Canals could compete with vessels especially adapted to ocean navigation.

Adam Brown, Hamilton—Screw vessels could compete from Liverpool to Chicago direct, and *vice versa*, provided the Canals are enlarged.

Board of Trade, Hamilton.—Answer in negative.

Erie & Ontario Ship Canal Co.—If the Welland and St. Lawrence were enlarged, large vessels would be built for that purpose.

Edsall & Wilson.—Answer in negative. The larger the ship, the less expense in proportion to tons carried.

Canadian Navigation Co.—Answer in negative.

11. Are there any Harbors on Lake Ontario which have sufficient water to accommodate ocean-going vessels drawing 16 feet of water or over?

Board of Trade, Toronto.—Answer in affirmative.

Board of Trade, Ottawa.—Answer in negative.

Board of Trade, Kingston.—Only know of Kingston.

Town Council, St. Catharine's.—None.

F. S. Holcomb, Toronto.—Oswego, about 11 feet, and, with the exception of Toronto, Niagara, Hamilton and Kingston, 10 feet may be considered the average capacity of harbors.

W. H. Smith, Owen Sound.—None.

Board of Trade, Chicago, and Erie & Ontario Ship Canal Co.—Sackett's Harbor and Niagara River. (Latter quote report of Mr. Shanly M. P. on the subject of Niagara.)

Board of Trade, Detroit.—Not at present; but the St. Clair Flats are about being deepened to accommodate vessels of 16 feet. The harbors must soon be improved to same extent.

Adam Brown, Hamilton.—Hamilton can accommodate vessels drawing up to 20 feet, provided Burlington Bay Canal is dredged.

Board of Trade, Hamilton—None with the exception of Kingston.

Edsall & Wilson.—No artificial harbor of 16 feet. Canadian side, two of 10 feet. American side, three of 14 feet.

Canadian Navigation Co.—12 feet maximum. Vessels drawing only 10 feet should enter in stormy weather.

LACHINE CANAL.

12. Do you find the lower entrance lock from the Canal Basin sufficient for the purposes of the trade, or is it attended with delay—and, if so, to what extent?

T. Rimmer, Montreal.—The lock is altogether inadequate to the requirements of the trade. Last month (November) it was not uncommon to find grain detained between the warehouses and harbor of Montreal for several days—sometimes as long as it is required to bring it from Kingston to Montreal. For example, a barge delivered her load in the harbor, and was sent to the warehouse for another load; locking up, loading, and locking down would take three days—a difficulty that should be remedied *at any cost.*

J. W. Winn, Montreal.—Entrance insufficient, and often causes delay; the growing trade makes need for improvement constantly greater.

G. E. Jaques, Montreal.—Lock insufficient; usually takes 6 or 8 hours instead of 30 minutes.

A. M. Delisle, Montreal.—Thinks entrance sufficient, but not used as it should be. Chief cause of delay is time taken to haul vessels in and out, and it frequently arises from fault of craft. Large vessels of 18,000 or 20,000 bushels are as heavy as a sea-going vessel, and yet they only carry two or three men as crew. During a high wind they can only be managed with difficulty. Facilities, either steam or water power, or horses are required to haul in and out. In this way present capacity would be largely increased. Fault is often on part of lockman also in refusing to lock a single vessel.

Board of Trade, Windsor.—Recommend that the Lachine be enlarged to the same dimensions as the Welland—14 feet × 45 × 275.

Board of Trade, Hamilton.—Believe the lower entrance lock to be wholly insufficient. Great delay is occasioned by barges being drawn by hand in place of horse power; with proper arrangements for passing the barges through the two lower locks, steam vessels might go through in 30 minutes, in place of taking, as at present, from two to three hours and upwards.

Edsall & Wilson.—Sufficient under existing circumstances, but another entrance requisite in case of the enlargement of the Welland.

A. Wright, M. P.—Says that the removal of a shoal at the lower entrance is advisable.

Canadian Navigation Co.—In its present condition it is altogether inadequate to the trade. Corroborate what Hamilton Board of Trade say respecting Mills.

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13. Would it be advisable that the former entrance to the Canal should be re-opened, and the locks enlarged so as to admit a second entrance to the Canal?

J. W. Winn, Montreal.—Re-opening old entrance of Canal, with enlarged locks, would be of great advantage, especially if the Canal were continued therefrom through the

space now vacant in centre of unfinished wharf (Windmill Point Wharf) to the lower end thereof. This would give on each side wharfage of great length, admirably adapted both for use of vessels navigating Canal, and for discharging the numerous barges and schooners bringing fish, coal, salt, &c., from Quebec to the lower ports, which now at times grievously overcrowd the ship harbor. The Harbor Commissioners would doubtless construct the necessary wharves and deepen the channel between them, so that the new locks would alone create expense in connection with Canals.

J. E. Jaques, Montreal.—Answers in affirmative.

A. R. McGibbon, Montreal.—Always thought it a mistake to have closed former entrance, and recommends that it be re-opened, if only for small craft.

D. E. McLean & Co., Montreal.—Says there ought to be another entrance—one to let down and another to lock up, and adds that the Canal accommodation above Black's bridge is far too small.

Board of Trade, Ottawa.—Answer in affirmative.

Hugh McLennan, Montreal.—Ditto.

Town Council, St. Catharine's.—Ditto.

Hamilton Board of Trade.—Recommend enlargement of locks, as the present Canal is too small for the increasing want of traffic. The locks should be of the same size and depth as the Welland, and enlarged to the extent of three times its present width, or another Canal built. The stone pier outside the Canal at Lachine should be extended a 1,000 feet to render the approach to the Canal as safe as it ought to be. Mill owners should be compelled to find motive power elsewhere. Slack water navigation is requisite for Canal.

A. Wright, M. P.—Favors enlargement of locks.

Canadian Navigation Co.—Recommend re-opening of old Canal and enlarging locks, besides other improvements.

In reference generally to the St. Lawrence Canals.

G. E. Jaques, Montreal.—After giving answers to many queries, goes on to say that there are other improvements needed to retain or extend the Western trade by the St. Lawrence route. The insufficient space for receiving from the city, or Atlantic shipping, merchandize for the West, as well as for landing freight from the same has been severely felt for years; and yet the Board of Works has given no attention to this all important question. Some years ago a tract of land below the Wellington Bridge on the north side of the Canal, was bought from Hon. J. Young, expressly for extended accommodation for freight; but most unaccountably it has not been made use of, though the outlay of a few thousand dollars would have achieved the object in view. The want of this accommodation has been severely felt by vessels carrying rolling freight, as they lose some two days when they ought to be only four hours discharging—in this way at least 30 per cent. being added to the expenses of the trip.

T. Rimmer, Montreal.—At close of letter, insists on the great difference between the Buffalo and Oswego requirements on the one hand, and those of Montreal on the other. In the former everything goes into store; in the latter the bulk of the grain goes aboard ship, and barges must be adapted to that end. This quite alters the nature of the business and the style of the craft required.

Montreal Corn Exchange Association.—Refer emphatically to the great advantages which the improved navigation of the St. Lawrence would present—the lower rates of freight, and shorter route to a seaport which it affords to the Western grain trade, as compared with the route via Buffalo or Oswego.

Hon. R. B. Dickey, Amherst, N. S.—See answers to questions respecting Bay Verte.

Board of Trade, Toledo.—Regard the efforts of the leading men of the Dominion to enlarge their transportation routes as of the greatest importance to all the States bordering on the chain of Lakes; as an indication of the amity which should exist between different sections of the continent, which it is for the interest of all to strengthen And while wishing abundant success to such efforts, they do it all the more earnestly because they see as likely to grow out of these exertions a friendship of a commercial and social character, which may, at no distant day, bind together as one all the States of the Union and Dominion.

Town Council, St. Catharine's.—Suggest to the Commissioners in concluding their letter, that the improvements required for the development of the trade of the great West with the seaboard are questions of the highest importance to the Dominion, and should be prosecuted at the earliest possible period that the state of the finances permit. With the Welland enlarged, and the St. Lawrence deepened to 12½ feet, the wants of our trade would be satisfied without the construction of new works of doubtful utility.

Board of Trade, Ottawa.—Are advocates of Canal enlargement, expansion and development, as they are persuaded that these are in reality the true channels through which agricultural produce must pass, and that their tendency is to develope the resources of the countries to which they give access; but are of opinion that attention should be directed to the construction of the *main lines* viz; *Sault Ste. Marie, Ottawa* and *Bay Verte* Canals, before anything in the way of meddling with existing structures is done, and that all these great lines should be made of the capacity laid down as that of the Sault Ste. Marie, except the Bay Verte, which ought to have at least 16 feet on the sills of its locks.

Board of Trade, Hamilton.—After recommending enlargement of Welland and St. Lawrence Canals, go on to say :—

With our Canals thus enlarged steam and sail vessels of correspondingly increased dimensions could engage in the trade between the Upper Lakes and Montreal, and would also at the same time be found admirably adapted for embarking in the trade between the Upper Lakes and the Lower Provinces, carrying flour and provisions on the downward trip and returning with coal, fish, &c.

The capacity of such vessels for the proposed increased sized locks would be similar to those engaged on the American side on the Upper Lakes, viz : 230 to 250 feet in length, 30 to 34 feet beam, with a draught of water of 12 feet, and carrying capacity of 30,000 bushels of wheat. At present first-class propellers of 450 to 500 tons, and carrying 15,000 bushels of wheat through the Welland from Chicago to Montreal can afford to carry at a freight of 12½c. per bushel, and even *do well* at that, and if the locks were enlarged to the suggested dimensions, then steam and sailing vessels of a carrying capacity of 30,000 bushels of wheat, could advantageously engage in the trade between the Upper Lakes and Montreal; and a reduction in the present rate of freight might easily be anticipated to the extent of at least 12½ per cent. By steamers of the proposed size engaging in the trade between Montreal and the Upper Lakes, not only would the large bulk of the produce in the basins of the great lakes find its way to tide water by the St. Lawrence, but return cargoes of iron, salt, crockery and other heavy goods would find their way into the interior by the same route. Iron is now received from ocean ships in Quebec and laid down in Chicago for $3.50 per gross ton by water even with our present imperfect facilities, and when it is understood that the cost of haulage on a railway for the same distance is at least $10 per ton it appears impossible for the rail to compete successfully with water. Indeed it may be laid down as a rule that the two parallel iron bars cannot compete in an economical point of view with our magnificent system of water communication in the carrying of produce and other heavy freight between the Upper Lakes and the natural terminus of ocean navigation in the St. Lawrence—the city of Montreal. In the race of competition which we have inevitably to run, it becomes of paramount importance to avoid all unnecessary transhipments, and by grasping every natural advantage within our power, resolve with heart and hand to place the St. Lawrence route in a position of unquestionable superiority to that of Oswego and New York, and thus render our own unrivalled inland waters the great highway to Europe.

The people of the Dominion owe it to themselves as the guardians of a noble heritage, to see that the American people on the shores of the Great Lakes have every possible facility given them freely, to use the Welland, St. Lawrence and Lachine Canals on the same terms as our own people with a view to assist in developing the enormous produce traffic that annually rolls its increasing volume from the West to the Atlantic. No unwise legislation, should, in imitation of the crude fiscal policy of our neighbors, be permitted to check the growth of a commerce that is destined to eclipse in magnitude and grandeur all the realizations of the past, and all the most sanguine anticipations of the future.

Mr. Patterson, Montreal.—Also refers, like Mr. Jaques, to the want of freight accommodation at Montreal, and makes some suggestions on this point.

Hon. J. Young.—Canada, in creating the Dominion, has assumed a Continental attitude. She desired that her jurisdiction should extend to the Pacific, and a great responsibility is thereby incurred to do her part in developing to the fullest extent the vast water communications from the heads of Lake Superior and Michigan to tide water. Not only should this be done, but a policy should be initiated, by which, within the next ten years, the Eastern Provinces and the Eastern States should be united with the Pacific Coast by a northern route of railway, and thus unite British Columbia at the West with all the British Provinces at the East, under one Government.