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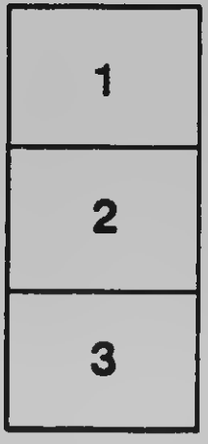
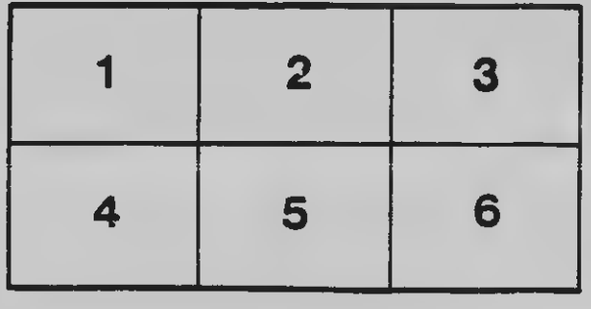


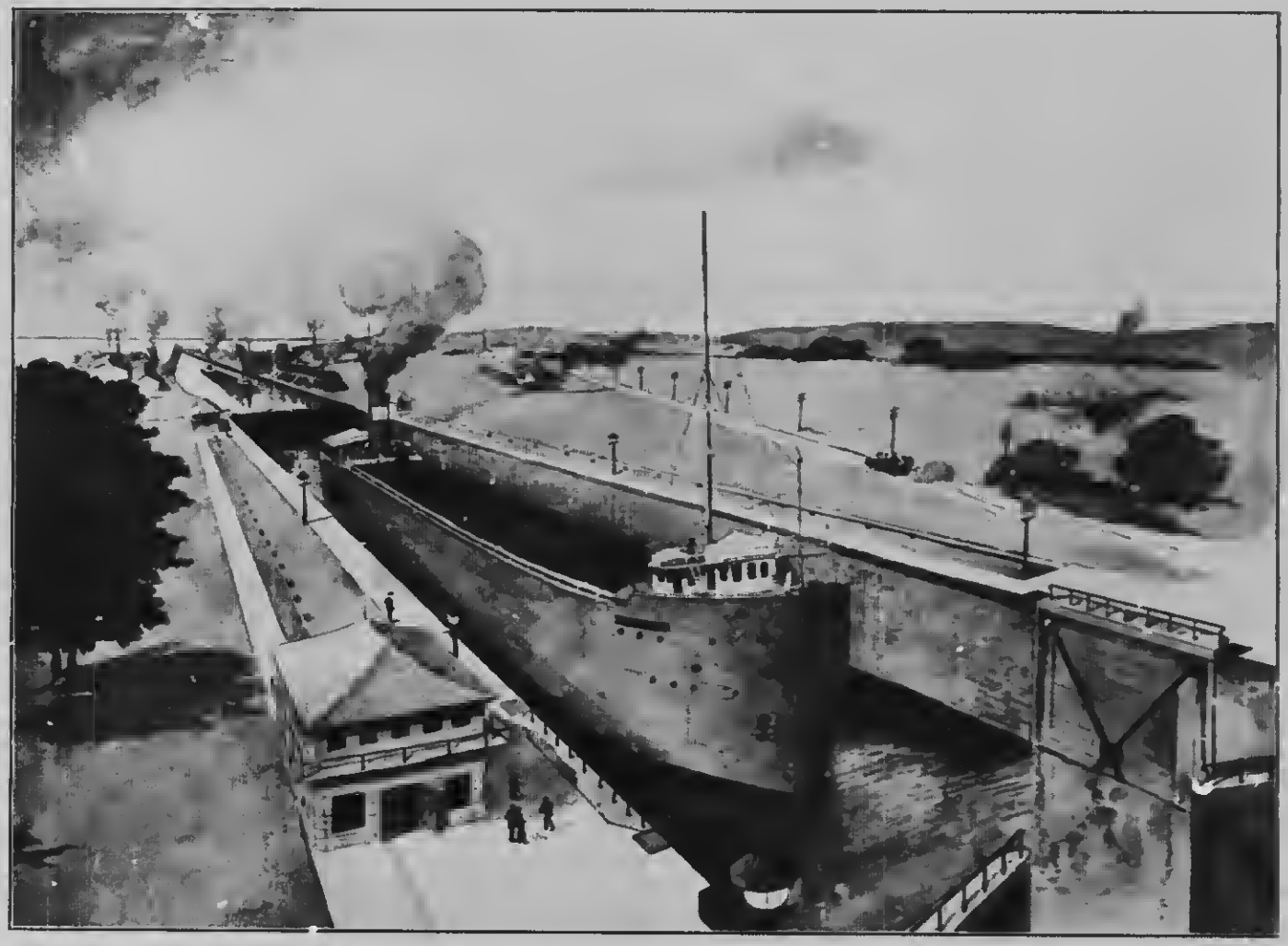


FROM THE GREAT LAKES

ATLANTIC

THE MONTREAL OTTAWA AND GEORGIAN BAY CANAL COMPANY.

BENALLACK LITHO. & PRINTING CO. LIMITED
MONTREAL



VIEW OF TYPE LOCK, MONTREAL-OTTAWA & GEORGIAN BAY CANAL

MEMORANDUM

ON

THE MONTREAL-OTTAWA AND GEORGIAN BAY CANAL

PREPARED UNDER THE DIRECTION OF THE

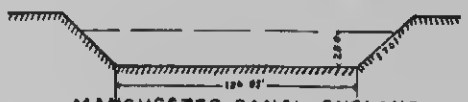
MONTREAL-OTTAWA & GEORGIAN BAY CANAL COMPANY

HEAD OFFICE:

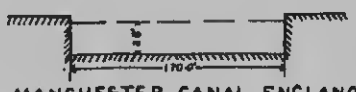
193 Sparks Street, - OTTAWA, CANADA

CROSS-SECTIONS OF NOTED CHANNELS

PROPOSED MINIMUM, M.O. & C. BAY CANAL.

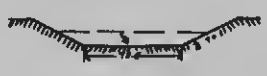


MANCHESTER CANAL, ENGLAND

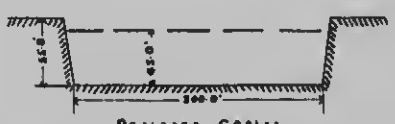


MANCHESTER CANAL, ENGLAND

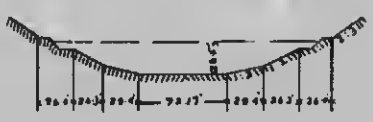
ST. LAWRENCE CANALS



ERIE CANAL



PANAMA CANAL



NORTH SEA BALTIC

NORTH SEA AMSTERDAM

SUEZ CANAL, EGYPT

THE TRAFFIC ON THE GREAT LAKES AND THE PROPOSED MONTREAL-OTTAWA & GEORGIAN BAY SHIP NAVIGATION.

"Of all inventions, the alphabet and the printing-press alone excepted, those inventions which abridge distance have done most for civilization."

—*"Macaulay."*

FROM the time of the arrival of the first French explorers on the Great Lakes, in the seventeenth century, until the present, the utilization of the great waterways through these lakes as a means for the development of new commerce has been a prominent factor in the commercial progress of the whole North-American Continent. It was only 230 years ago that the first sailing vessel was launched on the Upper Lakes, since which time, the birch bark canoe has been transformed into the steel freight steamship of 13,000 tons capacity, and an annual freight traffic of 62,000,000 tons built up by the development arising from the natural resources of the country which is tributary to the waterway system of these Lakes.

Without the facilities for easy and cheap transportation afforded by these waterways, the Lake cities would never have reached their present importance, and without the commercial and manufacturing requirements of these cities the unprecedented growth of the Lake commerce would not have occurred.

The St. Lawrence and Hudson Rivers are the natural gateways of commerce on the North American Atlantic Coast, and to connect these rivers with the Great Lakes by a waterway of suitable dimensions to transport with economy the traffic arising in the country tributary to them is a problem which has for many years claimed the most careful attention of the Governments both of Canada and the United States.

Two systems of canals have been constructed to secure through water navigation from the Great Lakes to the Atlantic, one by the Canadian Government to Montreal to overcome the rapids and obstructions in the Niagara and St Lawrence Rivers, the other, known as the Erie Canal, by the State of New York from Lake Erie at Buffalo and Lake Ontario at Oswego to the Hudson River at Albany. Both of these systems were inadequate for the demands of commerce when completed The Canadian system has been enlarged three times and the Erie Canal once, with the second enlargement now partially completed; and still, like a narrow guage railroad, their dimensions are too small to form a satisfactory or even approximately adequate link between the larger transportation routes which they connect. When the construction and enlargement of these canals was undertaken the enormous and rapid growth of the commerce on the Lakes was not foreseen, nor its possibilities realized, or at any rate not sufficiently so as to warrant their construction of such capacity as even to accommodate the actual traffic requirements at the time when the works were completed. No systematic attempt appears to have been made to determine the channel dimensions which would ultimately be required to form a through transportation route from the Lakes to the Seaboard without the necessity of transferring freights at intermediate ports.

The present dimensions of these canals, more especially as regards depth, do not meet the requirements of the modern economic Lake freight carrier, and such requirements can only be obtained by constructing a waterway of dimensions which will conform to the depths and widths of the controlling channels on the Great Lakes themselves.

On the channels in the Lakes the improvement of dimensions has been a gradual one; and unlike the construction of existing canals, the money expended on such work has not been lost, because it has always remained a necessary expenditure in relation to future enlargements.

When the Erie Canal was first opened, Thomas Jefferson declared that the project was a hundred years ahead of its time, yet within ten years afterwards it became necessary to commence enlargements, which cost fully as much as if no work had been done.

The Erie Canal was completed in 1825 with a depth of 4 feet, and in 1831 steps were taken to enlarge it to give a depth of 7 feet. This enlargement was carried on in the face of financial and other difficulties and completed in 1860. After numerous surveys and proposals a second enlargement was commenced in 1906 to give a depth of water on the lock cills of 11 feet, with a channel of sufficient dimensions to allow of from 4 to 6 one thousand ton barges being moved as one tow.

The Welland Canal was opened in 1829, and the St. Lawrence River Navigation completed in 1847 to a depth of 8 feet. In 1871 it was decided to enlarge this latter system of canals to give a depth of 12 feet throughout, but before this scheme was completed the project was modified so as to provide a depth of 14 feet with locks 270 feet long and 45 feet wide, and this is the capacity of the St. Lawrence River Canals as they exist to-day. The maximum size steamer which these locks will accommodate is 2,000 tons.

The St. Mary's River is the only waterway from Lake Superior to the Lower Lakes, and, before improvement, was obstructed in many places by boulders and rapids, the principal fall being at Sault Ste. Marie of 19 feet. In 1855 the first canal and lock to allow vessels to pass these rapids was constructed by the State of Michigan with a depth of 11½ feet on the lock cills.

Soon after the completion of this canal it was found that it was inadequate to accommodate the growing traffic on Lake Superior, and in 1870 the United States Government commenced to deepen the canal to 16 feet and to construct a new lock, now known as the Weitzel Lock, of larger dimensions than the then existing one, which this new Lock replaced.

In 1884 the commerce between Lake Superior and the other Lakes reached such proportions that a proposal for another lock was projected, and in 1896 the Poe Lock, 800 feet long, 100 feet wide and 21 feet deep was completed, the canals having also been deepened to give the same depth. Notwithstanding the above provision of two large locks on the United States side it has been found that further lockage provision is necessary to handle the great increase of traffic and at the present time, 1911, the United States Government are therefore building a third lock of still larger dimensions; namely, 1,000 feet long, 80 feet wide, with a depth of water on the cill of 25 feet, the approach canals being formed to give the same depth. The Canadian Government on their side completed a Canal and Lock in 1895 the lock being 900 feet long, 60 feet wide, and 20¼ feet deep on the cills, but to-day there are a large number of vessels on the lakes which have too great a width to use this lock.

The steady increase in the size of vessels navigating the Great Lakes is notable. The following table shows this increase in average size of vessel in registered tons passing through the Soo Locks for 5 yearly periods, from 1884 up to the present time:—

1884	527 registered tons
1889	754 "
1894	904 "
1899	1,084 "
1904	1,511 "
1909	2,434 "

This table shows an increase of 44% in 1899 over 1889, and 125% in 1909 over 1899, or over 200% in 20 years.

Although these figures show the rate of increase in average registered tonnage they do not give an accurate idea of the character of that change While it has been on the whole a continuous increase, it has been greatest when large additions were made to the depth of navigable water in the channels connecting the Lakes and the principal Lake harbours. In 1870 freight through the Soo Canal was carried mainly in sailing vessels of from 300 to 400 tons net register, handling cargoes of 600 to 700 tons on a draft of 11 feet of water, which was then the limiting depth. During the next 11 years the deepening of the connecting channels to 16 feet was in progress, but was not fully available until the opening of the Weitzel Lock in 1881. This period was marked by the introduction of freight steamships each towing one to three sailing barges. The net registered tonnage of these ships was in most cases less than a thousand tons, but a few were built of about 1,500 tons, the newer ships being designed to draw from 14 to 15 feet when loaded, in anticipation of the greater depth of water which the channels and lock then under construction would afford. With the opening of the Weitzel Lock in 1881 the building of small sailing vessels was checked, and after four or five years ceased almost entirely. The old vessels became unprofitable and during seasons of low freight rates were put out of commission. The building of a larger class of ships from 1,700 to 1,800 tons register was taken up and this class of vessel carried a constantly increasing proportion of freight.

The Canadian Lock was opened in 1895, and the United States Poe Lock in 1896, giving a depth of water of from 20 to 21 feet on the lock cills. As in 1881, the increased depth provided by these locks had to some extent been anticipated by the building of vessels which could be loaded down to this full draft as soon as these locks were opened, several of which exceeded 2,000 tons and a few 2,500 tons.

The vessels had been designed with a freight tonnage capacity of about twice the registered tonnage, but could not load up to their maximum until the opening of the two larger locks in 1895-1896. During the next two years about thirty ships were built which slightly exceeded 3,000 tons register and with the larger locks and channels then in use the maximum cargo rose to 6,244 tons.

The following table gives the increase in the maximum freight cargoes carried through the Soo Locks since 19 :—

	Largest Single Cargo, Freight, Tons.
1900	8,462
1901	8,222
1902	8,444
1903	8,914
1904	11 56
1905	12. 8
1906	13,2
1907	13 8
1908	13,978
1909	13,644

The economy of transportation in these large vessels has been so marked that the building of ships of less registered tonnage than 2,000 for through freight business from Western Lake to Lake Erie Ports has practically ceased. The largest ships now in use on the Lakes have a length of 607 feet over all, with a beam of about 60 feet. Considering how rapidly the cost of a ship increases with its length and how difficult it is to secure structural strength without increase of draft, it seems reasonable to conclude that no further very marked increase will take place. The deepening of the channels and harbours to accommodate vessels of greater draft than 21 feet would entail an enormous expenditure, and although the new Soo Lock will have a depth on the sill of 25 feet and the new channels at the West Neebish and Detroit are being constructed with this depth, it is very improbable that vessels of greater draft than those at present in use will be constructed, and without this greater draft increased length and beam are practically impossible.

These facts, therefore, support the view that the limit of size of large Lake freighters has been reached unless the channels and harbours on the Lakes are made deeper.

Waterways to connect the Lakes with the seaboard, of greater depth than those now in existence, have been under the consideration of the United States Government and the State of New York for many years past. Numerous surveys were carried out from the years 1835 to 1896 for canals of varying depth from 10 to 14 feet.

In 1895 the importance of this transportation question was so far realized that in February of that year a resolution passed the Senate and the House of Representatives authorizing the President to appoint a Commission.

> "To investigate and report whether it is feasible to build such canals as shall enable vessels engaged in ocean commerce to pass to and fro between the Great Lakes and the Atlantic Ocean, where such Canal can be most conveniently located, and the probable cost of the same."

Such a Commission was appointed, and in January, 1897, issued its report entirely in favor of the project under consideration recommending that a technical board of engineers should be authorized in order to further investigate their conclusions and report on the probable cost of a ship canal from the Great Lakes to the Atlantic Ocean at New York.

The Report of this Commission contained the following extract, dealing with transportation conditions:—

> "The most profound economic changes of modern times have been brought about by the improvements in transportation. The railroad of to-day bears about the same relation to the transportation of thirty years ago as that did to the stage-coach and freight-wagon of the first quarter of the century."

> "In the first half of the century each nation practically depended upon its own agriculture for the subsistence of its people. States or communities isolated by distance or mountain ranges might suffer from famine. A bushel of wheat raised far west of the shore of Lake Superior, and now consumed by cotton spinners of Lancashire, 5,000 miles away from the field of its growth might have its value exhausted by a wagon haul of 100 miles. Now the combined stock of the world is the daily visible supply: its amount is known in every city, and its accessibility is fully understood."

"In 1869 occurred the opening of the Suez Canal, which brought the East into competition with western civilization by reducing a voyage of 6 to 8 months to 30 days, making it necessary to readjust ancient systems of distribution. A part of the effect of this rearrangement of the world's commerce upon the business of this country may be seen in the reductions of the freights upon grain about 75%. The magnitude of commercial change or disturbance in reduction of value may be estimated from the fact that five years after the opening, the trade of India with foreign countries had so increased in volume as to employ an increase of 25[illegible]000 tons of steam shipping, an equivalent of 500,000 tons of sail."

"The limit of reduction in railroad freights seems to have been reached; it remains to be determined if it is not possible to extend Lake navigation to the ocean by a practicable ship canal. Although the development of our natural waterways is but little advanced beyond the bounty of nature, and is capable of immediate and vast extension, the effect of the little we have done has been enormously profitable."

"The chain of Great Lakes with a water surface of 95,965 square miles, gives us a deep fresh water navigation, the extent of which cannot be accurately stated, so rapidly does it increase. If it is over-estimated in enthusiastic estimate, the calm statistics soon overtake the exaggeration."

"At Buffalo bulk has to be broken, the grain elevated and transferred to cars or canal boats, and the same thing, with equal expenses, is repeated at New York. The lake freight from the farthest shore of Lake Superior and of Lake Michigan to Buffalo is from 1 to 1½ cents a bushel; the ocean freight from seaboard to Europe, 3 cents. The whole cost, however, from Chicago or Duluth to Europe is from 9 to 10 cents; therefore, more than half the cost goes to railway or canal freights, commissions and elevator charges, to which must be added the item of waste. It costs twice as much to carry a barrel of flour from Duluth to New York, as it does from New York to Europe, though the latter distance is twice as great as the former."

The Board of Engineers was in due course appointed by the President of the United States, and consisted of the three most prominent waterway engineers in that country; Mr. Alfred Noble, of Chicago; Mr. Geo. Y. Wisner, of Detroit; and Major Charles W. Raymond, Corps of Engineers, U.S. Army. This board [illegible] the year 1900 published the most complete report which has probably ever been m[illegible] this or any similar project, in which they stated that such a project was entirely [illegible]le for either a 30 foot deep or 21 foot deep waterway. They were also asked to compare the cost and relative advantages of these two waterways, which would allow of the largest ocean steamers entering the lakes, in reply to which their recommendation was:—

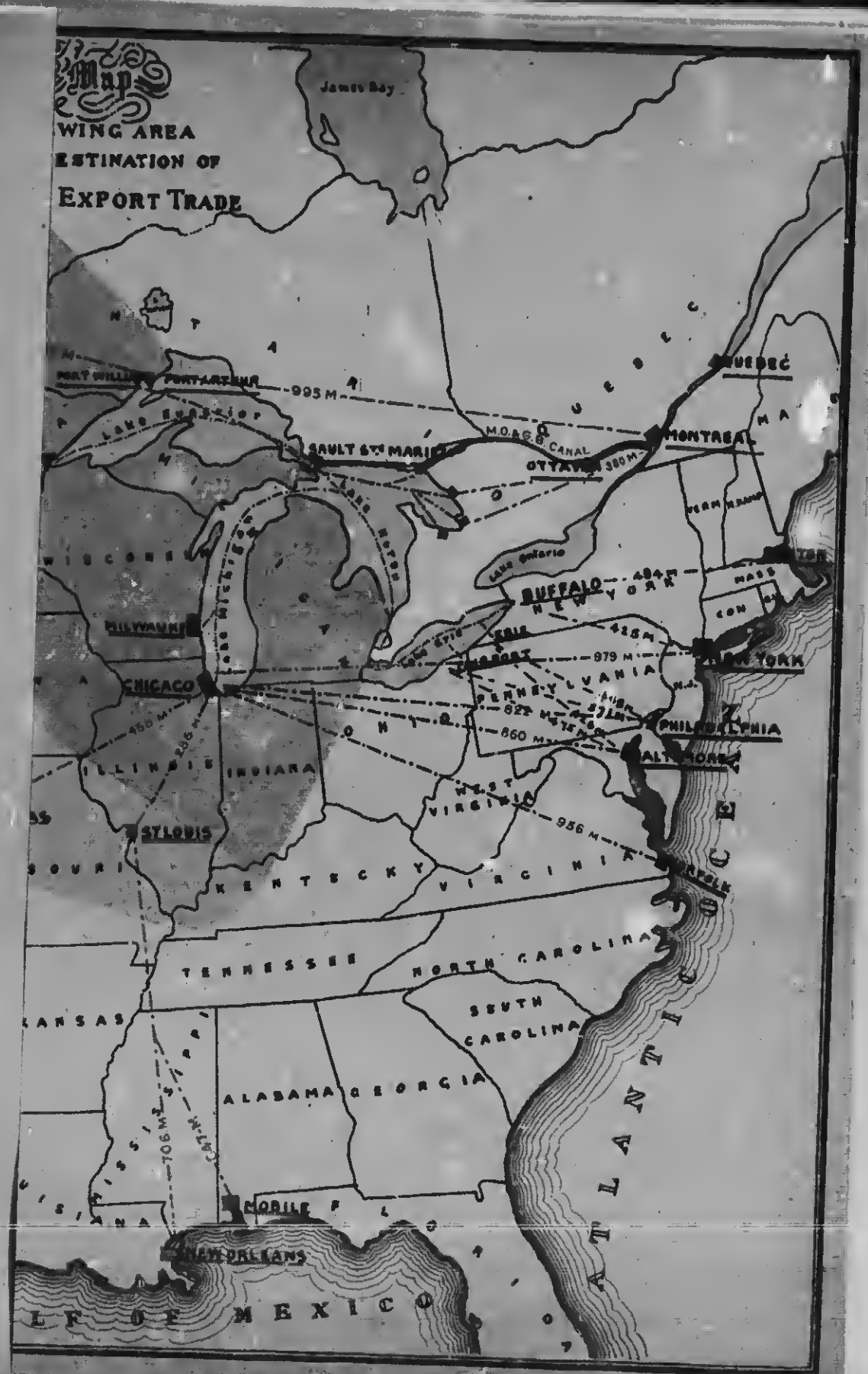
"For depths of over 21 feet the interest on cost of construction exceeds the decrease in transportation rates, due to the use of deeper draft carriers, and that the 21 foot waterway promises a much greater return of value relatively to its cost than a 30 foot waterway which would allow of the entrance to the Lakes of large ocean-going steamers."

The estimated cost of such a waterway was $206,000,000 for the 21 foot scheme and $317,000,000 for the 30 foot. The construction of this United States waterway has not yet been commenced owing primarily to the enormous cost entailed, and also to the opposition of vested interests at the Lake Erie Ports to any scheme which would abolish transhipment of cargoes at these points.

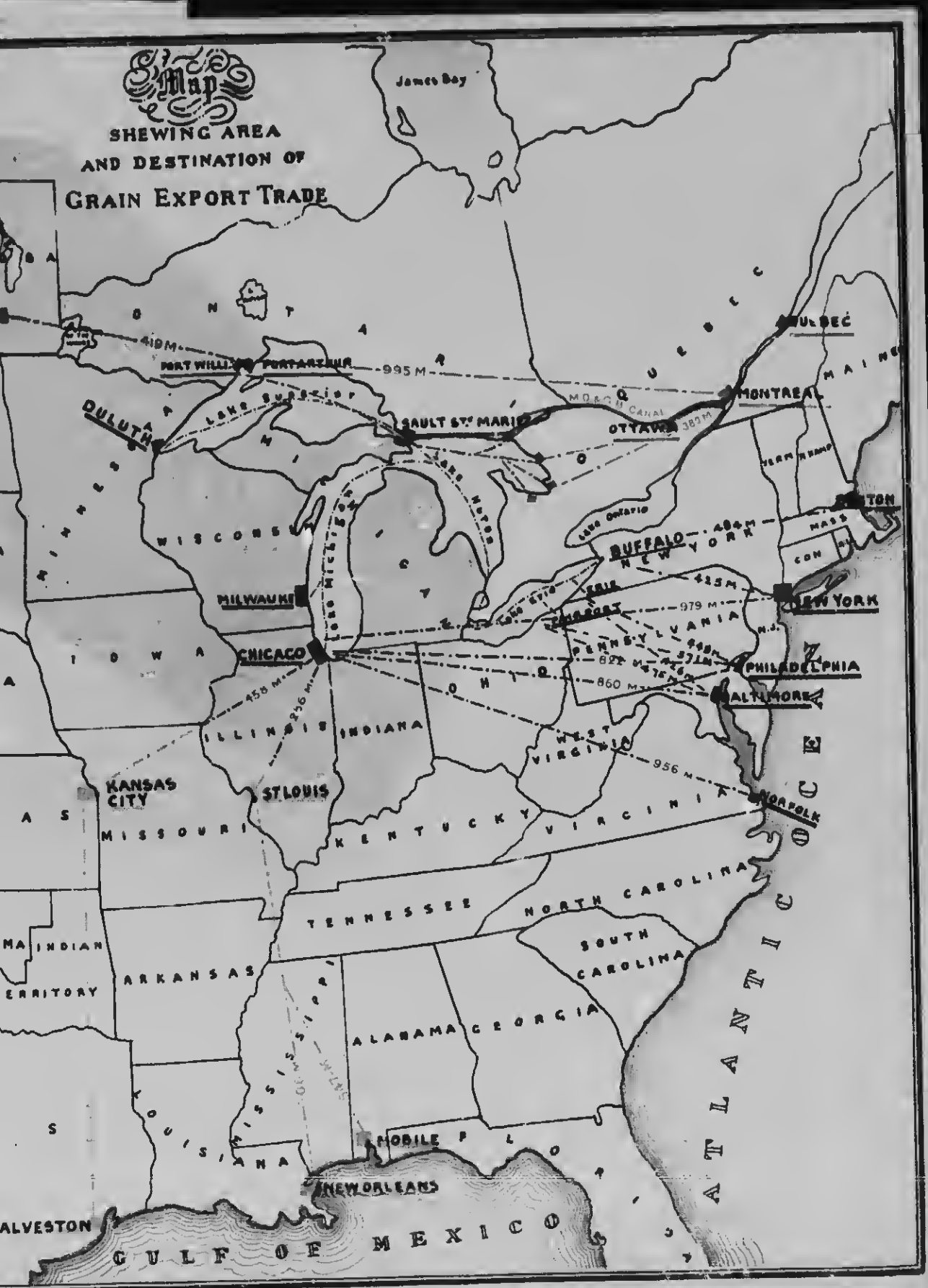
In the course of the past year or two, however, this scheme has been again actively put forward, and the Superintendent of Public Works of the State of New York in his annual report for 1908, strongly recommends that the State Senate,

> "Should without delay memorialize Congress to join with the State of New York in making that portion of the Barge Canal Route from the Hudson River by way of the Mohawk River, Oneida Lake and Oswego River, a Ship Canal of the type contemplated in the Government surveys of 1900, and that this memorializing of Congress should be followed by such pressure from those interested within our State as may not be ignored, to the end that the plans suggested may be accomplished."

The foregoing considerations and conclusions, arrived at after much investigation and study, demonstrate conclusively the necessity of a ship canal from the Great Lakes to the Seaboard and fix the required depth of such a canal not only for the present but also the future.


Map
WING AREA
ESTINATION OF
EXPORT TRADE
James Bay
QUEBEC
MONTREAL
SAULT STE MARIE
M.C.R.R. CANAL
OTTAWA
BUFFALO
NEW YORK
ERIE
CHICAGO
PHILADELPHIA
ST LOUIS
WEST VIRGINIA
KENTUCKY
VIRGINIA
TENNESSEE
NORTH CAROLINA
SOUTH CAROLINA
ALABAMA
GEORGIA
MOBILE
NEW ORLEANS
GULF OF MEXICO
ATLANTIC OCEAN
995 M
484 M
425 M
979 M
822 M
660 M
956 M
450 M
709 M


AREA 1288000 SQUARE MILES
POPULATION 26,400,000
GRAIN PRODUCTION
1909 3,386,000,000 BUSHELS
ALBERTA
SASKATCHEWAN
MANITOBA
WINNIPEG
MONTANA
NORTH DAKOTA
IDAHO
WYOMING
SOUTH DAKOTA
NEBRASKA
UTAH
COLORADO
KANSAS
ARIZONA
NEW MEXICO
OKLAHOMA
INDIAN
TERRITORY
TEXAS
GALVESTON


Map
SHEWING AREA
AND DESTINATION OF
GRAIN EXPORT TRADE
James Bay
ONTARIO
QUEBEC
MAINE
MONTREAL
QUEBEC
OTTAWA
380 M
SAULT STE MARIE
MICHIGAN
LAKE SUPERIOR
DULUTH
419 M
PORT WILLIAM
PORT ARTHUR
995 M
WISCONSIN
MILWAUKEE
CHICAGO
IOWA
ILLINOIS
INDIANA
458 M
256 M
KANSAS CITY
ST LOUIS
MISSOURI
KENTUCKY
OHIO
860 M
WEST VIRGINIA
956 M
VIRGINIA
NORFOLK
TENNESSEE
NORTH CAROLINA
SOUTH CAROLINA
ARKANSAS
INDIAN TERRITORY
ALABAMA
GEORGIA
LOUISIANA
MOBILE
NEW ORLEANS
GALVESTON
GULF OF MEXICO
ATLANTIC OCEAN
LAKE ONTARIO
BUFFALO
NEW YORK
484 M
ERIE
425 M
979 M
PENNSYLVANIA
PHILADELPHIA
BALTIMORE
NEW YORK
MASS
CONN
N.J.
MOSES CANAL

THE ACTUAL TRAFFIC NOW EXISTING, AND ITS BEARING UPON THE PROPOSED MONTREAL-OTTAWA GEORGIAN BAY SHIP NAVIGATION.

"Canals are to the inhabitants of a country what seas are to nations; they equally serve to assist the wants of society and benefit commerce."

—"Crevy."

The Trade.

THE area of the industrial and agricultural district affected by the transportation system of the Great Lakes is that stretch of country having its apex at Chicago and St. Louis in the United States, and at Fort William and Port Arthur in Canada, stretching back to the West and the Northwest, covering an area of over 1,250,000 square miles and comprising the States of Michigan, Indiana, Missouri, Illinois, Kansas, Nebraska, Iowa, Wisconsin, Minnesota, the Dakotas, and the Provinces of Manitoba, Saskatchewan, Alberta and part of New Ontario.

It has a population of 26,400,000 and ten years ago had only 22,600,000. It is the finest grain growing country in the world, and in 1909 produced 3,386,000,000 bushels of Wheat, Barley, Oats, Corn and Rye. It is the distribution of a portion of this grain, together with the movement of iron ore, that has given the impulse to Lake shipping which has brought it to its present magnitude and perfection of economical transportation.

A glance at the map will show the present position of this trade. The points of assemblage for this enormous traffic are, in the United States, on the one hand Kansas City and St. Louis, and on the other Chicago, Milwaukee and Duluth; and in Canada at Winnipeg, Fort William and Port Arthur. In these centres the grain is sorted, cleaned, classified and prepared for shipment, and from them it is sent for export either South to the Gulf Ports of New Orleans and Galveston, or East to Baltimore, Philadelphia, New York, Boston, Portland and Montreal, or to immediate points for distribution in the densely populated areas of the East.

Conditions which govern Rates.

In considering the conditions which govern rates it is instructive to study how the route of the grain for export has shifted during the last 10 years. Taking wheat as an example the following table shows the ports through which the bulk of the export trade passed in 1899 and 1909:—

	1899	1909
GULF PORTS.		
New Orleans and Galveston.....	26,038,000	4,826,000
ATLANTIC PORTS.		
Baltimore, Philadelphia, New York, Boston and Portland.....	49,302,000	59,495,000
Montreal, St. John and Halifax....	9,852,000	21,516,000
	85,192,000	85,837,000

This table shows, notwithstanding the fact that the gross totals in each year are practically the same, that the exports from the Gulf Ports have decreased, and those from the Canadian Ports increased in a most remarkable manner.

The explanation of this is as follows :—

In th year 1899 Canada was raising in the Northwest 34,800,000 bushels of wheat a year and exporting across the Atlantic 10,300,000 bushels or an extremely small proportion compared with the United States, not sufficient to enter into serious competition with them.

The result was that the bulk of the carrying trade for this commodity was in the hands of the railroad companies running South and East from the great distributing centres of St. Louis, Kansas City and Chicago. In those days the great fight for this traffic was between the railway companies for carrying practically an entirely United States product and rates were fixed by them, being cut so fine that $\frac{1}{16}$th of a cent a bushel was sufficient to swing the traffic from one rail route to the other. The lake route to Buffalo and rail haul from thence to the seaboard was only of importance in helping the roads running east in their fight to keep their all rail rate as low as possible, the result being that the Gulf Ports were able in 1899 to carry 26,000,000 bushels out of a total of 85,000,000.

In 1909, however, conditions had entirely changed, the Canadian Northwest had grown up into an important factor, and in that year sent 49,038,215 bushels of wheat to the East for export across the Atlantic, out of a total crop of 91,144,239 bushels. This enormous increase has led to Canadian transportation facilities being built up to such an extent that they now exert a considerable influence in the fixing of rates and in handling this traffic; terminal elevators of the latest design have been built at Fort William, Port Arthur, the Georgian Bay Ports and Montreal Harbour; lake carriers of the largest type have been put into commission and the connecting railroads improved, with a view to keeping the carrying trade of Canada's Northwest products in Canadian channels. As was to be anticipated the United States transportation interests began to cut into this traffic, and a rate war ensued, which, in 10 years, has reduced the minimum rate for carrying grain on the Lakes from 1¼ cents to ¾ of a cent a bushel. At the same time the minimum rail rate to New York from Buffalo, and from Georgian Bay Ports to Montreal has been correspondingly reduced.

It followed that very soon, instead of the all-rail rate from Chicago to the Atlantic or from St. Louis and Kansas City to the Gulf Ports being the basic rate, the Lake and Rail Rate from Chicago to New York via Buffalo became the standard, and with the advantage of the long water haul which the East Coast Route had, depositing the grain at Buffalo only 404 miles from New York, *the Gulf Port all rail haul of from 800 to 900 miles was unable to keep up the fight and has practically dropped out of the running as a competitor to the other routes* as shown in the table already given.

To-day the fight is between the Canadian and the United States routes to the Atlantic and under existing conditions the former are unable to compete very effectively with the latter, as is shown by the fact that in 1909 out of 54,500,000 bushels of wheat, oats and barley exported from Canada across the Atlantic, only 23,400,000 were shipped from Canadian Ports, leaving 57% to go through United States Ports.

The chief Canadian route which competes with the United States is by lake to Georgian Bay Ports and thence by rail to Montreal, as against the United States Lake and Rail Route via Buffalo to New York; and at the present time, as has been shown, this latter route can so cut its rates as to attract a very large bulk of the Canadian Export Trade.

Both countries have their separate all water routes; Canada the Welland and St. Lawrence River Canals; and the United States the Erie Canal. Neither of these routes, however, are looked upon as important factors in handling the traffic under consideration. The railway companies ignore them and let them carry what ever they can. In 1909 out of a total of 65,237,138 bushels of grain sent out from Fort William and Port Arthur only 9,673,740 were consigned through by the Welland and St. Lawrence Canals route to Montreal, representing about 15% of the total. Both all-water routes are practically out of date and exert little or no controlling influence on the rate from the head of the Lakes to the Seaboard.

The facts given previously show that when the Lake transport route with its large bulk freight carriers became a predominating factor in carrying grain to the East, the Gulf Port all rail haul route to the South immediately became too costly, even at minimum rates, to offer any resistance against the Eastern route consisting of about one-half water borne traffic and one-half rail borne, and at the same time, even the small Canadian and Erie through waterways could not effectually enter into competition with such a combination owing to their limited capacity.

This being the case it is obvious that if the large bulk freight carriers were enabled to reach the Ocean Ports by a deep water route through Canadian territory, such a route with its corresponding decrease in cost of carriage would as effectually supercede the existing Lake and Rail Route as that route did the all rail one to the South.

As against Buffalo's 113,415,000 bushels of grain received in 1909, Montreal received 37,612,000 bushels, of which the greatest portion was taken there by rail from the various Georgian Bay Ports. Yet the economy of water transportation as compared to rail is so well established that it needs no discussion. It may, however, be seriously handicapped by circumstances and in this case the outlet from the Lakes affects the whole position.

It must also be remembered that in about 3 years the New Erie Canal is expected to be in operation and it is anticipated that, with its large capacity, it will be able to cut the existing rate from Buffalo to New York in half, in which case the existing Canadian routes will be in a very much worse position for retaining this traffic than they are even now, and much more so if the United States Deep Waterway also projected is carried out.

Conditions necessary for cheap transportation.

We have shown that in the last decade a notable reduction in transportation rates has taken place both on railways and ships. The most important factors that have contributed to this are *size* and *time*. In the case of railways the cars have been made to carry nearly three times the amount they used to and the more powerful engines take at least twice the train load. On the Lakes the sizes of the steamers have been increased so that instead of only carrying up to a couple of thousand tons as they once did, they now have a capacity up to 13,000 tons. This is the greatest factor in cheap transportation and this is what the existing all water route to Montreal via the Welland and St. Lawrence Canals is deprived of, owing to the size of such canals and more especially of their locks being too limited, and, therefore, this route is put out of the running in competition with other more economical routes.

The only reason why the United States and Canadian Railways utilizing the lake and rail routes cannot only compete with but take away the traffic from the existing all-water routes is because they can avail themselves of this great improvement in Lake transportation. The economy effected by the use of large steamers enables them to cut the water transportation so low that there still remains something over worth their having.

The advance in cheap transportation both by water and rail has gone ahead a great deal faster than the canals could be deepened and the locks on them enlarged. The late Mr. George Y. Wisner in a paper read before the American Society of Civil Engineers in October, 1900, referring to the St. Lawrence navigation, dealt with this point as follows:—

> "The expectations relative to the volume of traffic that would be developed have not been realized, and it is extremely improbable that the small type of steamer which can pass the locks will be able to compete with the large lake freight carriers even when handicapped with excessive transfer charges at Buffalo. The small freighters of the lakes must go out of business and make way for the more economical type of carriers."

> "The decline of traffic on the Erie Canal since 1880, and the failure of the 14 foot Canadian Canals to divert commerce from the lake and rail lines indicates that a waterway of less depth than required for the passage of the best type of lake freighters cannot materially modify the transportation rates over existing routes."

> "The St. Lawrence navigation will prove a failure only in so far as expecting it to divert traffic from the present lake and railroad lines, or to materially modify freight rates on such lines. These canals are achievements that their projectors may well be proud of and in the future as in the past will continue important factors in the transportation of Canadian products and manufactures which are almost certain to largely increase in the near future."

There is a limit to the expansion in size of freight carriers, both on the railways and on the Lakes and in both cases it has about been reached. As regards railways this is fixed by the conditions of practical economics in the handling of larger cars and locomotives on existing roads, and at existing terminals, and on the Lakes it is settled by the depth of water in the lake channels and harbours.

There is also a limit to the rate at which either railways or vessels can carry freight, and at the same time make a reasonable profit, and when another route is opened which by reason of its better facilities either owing to decrease in time or increase in the size of units of traffic which it can accommodate, thereby carrying freight at a lower rate than the older route, this older route has to give way and surrender its traffic to the newer one, as has been previously shown in the case of the all rail route to the Gulf Ports.

This rate limit on the Great Lakes appears to be about ¾ of a cent for a bushel from Chicago to Buffalo, a distance of 889 miles, which is equal to a rate of 25 cents a ton for wheat, or .275 mills per ton mile, and even when lack of freight offering causes this low competitive rate to prevail many of the shipowners prefer to lay their vessels up rather than run them at what is practically cost price.

On the railways from Buffalo to New York the lowest rate which has ever prevailed has been 4 cents a bushel for wheat, equal to 3 mills per ton mile. Competent authorities state that under most favourable conditions the lowest rail rate possible is 2½ mills per ton mile, or 3⅓ cents a bushel, but such a rate has never yet been reached. Comparing this lowest possible rail rate of 2½ mills per ton mile, with the lowest lake rate previously given- 275 of a mill, it will be seen that on this basis one ton can be carried 900 miles on the Lakes at the same price as for 100 miles on the railways.

As regards the all-water route to Montreal via the Welland Canal, the lowest general competitive rate is about 4 cents a bushel, and although a rate of 3½ cents has prevailed for short periods, shipowners state that this involves a considerable loss on every 2,000 ton ship which handles freight at such a rate.

On the Canadian lake and rail route the lake rate which prevails to Georgian Bay Ports is generally the same as to Buffalo, or a minimum of ¾ of a cent a bushel, whilst the lowest rail rate up to the present has been 5 cents a bushel on wheat for export.

The above-mentioned rates give what are practically the lowest limits to which rates for a bushel of wheat from Western Lake Ports to New York and Montreal can be forced by severe competition on existing routes and may be summarized as below:—

		Total from terminal to terminal per bushel.
To Buffalo by lake	¾ cent	
To New York by rail	4 cents	
To Montreal by water		4¾ cents
To Georgian Bay Ports by lake		4 cents
To Montreal by rail	¾ cent	
	5 cents	
		5¾ cents

The above rates show those that the Montreal-Ottawa and Georgian Bay Canal will have to compete with and will be referred to again when this question in regard to that route is under consideration.

Can the above rates be further reduced?—It is most improbable. As regards the Lake traffic any reduction would apply equally well to Georgian Bay Canal route. On the railways it is admitted by the companies that the limit has been reached and detailed evidence to this effect supported by proof was given before the Interstate Commerce Commission in 1910, when an attempt was made to put the rail haul from Buffalo to New York on a lower basis.

In view of the fact that the cost of labour and materials is constantly increasing any further decrease in this portion of the existing rates must be considered out of the question. There only remains the existing all-water routes to consider and although it has already been shown that they enter very little into serious competition with the other routes, yet at the same time it is obvious they also have reached their limit as regards rates.

The late Mr. Thomas Monro, M. Inst. C. E., has written:—"The fleet that can navigate the St. Lawrence to the greatest advantage has yet to be built,"—and although it is some years since this statement was made yet experience has proved that it is still true to-day. But can this fleet ever be built, and if so will it pay to build it? The answer to this is found in the history of this route. It is now 30 years since this navigation was ready to receive the constantly increasing volume of trade seeking an outlet at an Ocean Port, and although many expedients have been tried, the solution of successfully meeting the competition of other routes has not yet been discovered. And it may be said that the transportation interests who are operating on the St. Lawrence River Route have so far decided that it is to-day obsolete that they are urging the construction of a larger Welland Canal to allow the passage of the large freight carriers into Lake Ontario.

Three fundamental and controlling elements in the advantage of a deep waterway have been laid down by Mr. Sweet, M. Am. Soc. C. E.:—

(1) The elementary physical law that the resistance to motion in vessels of like model varies directly as their immersed surfaces, while their tonnage varies as the cubic contents of their immersed section, thus ensuring enormous economy in large boats.

(2) The obvious and controlling advantage of passing from terminal to terminal without transfer of cargo.

(3) A large fleet adapted to the navigation of the deep waterway already exists while to put the smaller canals into effect operation a new marine equipment must be created for which there would be little use elsewhere.

Mr. W. H. Hunter, M. Inst. C.E., Chief Engineer of the Manchester Ship Canal, in dealing with this subject after referring to the necessity of improved transportation owing to the rapid increase of population and production says:—"If this were admitted and its significance realized proposals for the construction of large canals or even ship canals of insignificant depths between the Atlantic seaboard and the Lakes which form the natural centre of one of the greatest food producing districts on the earth, would drop into the limbo of "lost causes," the insufficiency of either the one or the other would become so manifest."

Transfer charges are only the smaller part of the cost incurred on account of such transfer.

Transfer versus *Transit* means all the difference between slow and inefficient service and quick, safe and reliable service at such low cost as to be beyond the reach of railway competition either in speed or price.

To-day such conditions of cheap transportation exist only in connection with railway termini on Lake Huron or Lake Erie, and the Lake terminus at Port Colborne, but not beyond. That is why the existing water route can make no impression on the lake and rail routes. The facts therefore justify the conclusion *that any waterway which does not admit of steamers passing direct between Lake Ports and the seaboard is not likely to prove a successful competitor of the railroads, and that any material reduction in transportation rates can only be obtained by constructing waterways on which quick trips can be made and all necessary transfer and terminal charges eliminated.*

THE PROPOSED MONTREAL-OTTAWA & GEORGIAN BAY CANAL.

"Of famous cities we, the founders, know,
But rivers, old as seas to which they go,
Are nature's bounty; 'tis of more renown
To make a river than to build a town."
—"Waller."

The Scheme.

THE Montreal-Ottawa & Georgian Bay Canal will be a deep waterway from the Great Lakes to the Sea capable of accommodating the largest type of lake freight carrier or ocean-going ship drawing up to a maximum of 20 feet of water. From previous considerations it is clear that a canal of a less depth than will allow of the largest type of lake freighter to pass from the Lakes to the Seaboard would be of little use in influencing traffic, and on the other hand it would be of no practical value to construct a canal of greater depth than existing channels and harbours on the Great Lakes.

This waterway will pass from Lake Huron at the north-east corner of the Georgian Bay, and following the French River, Lake Nipissing, Mattawa and Ottawa Rivers, enter the St. Lawrence River at Montreal. In this manner connection will be made between the Great Lakes and the Atlantic Ocean for large vessels up to 13,000 tons capacity. It will be 440 miles long, 22 feet deep, with a minimum width in the bottom of 200 feet. The natural rise and fall of land will be overcome by 25 locks, each 650 feet long, 65 feet wide and 24 feet deep on cills, so located that they can be duplicated in the future when necessary.

Such a canal will take any steamer, that can be made to profitably navigate the Lakes, right down to the seaboard without any transhipment or obstruction. In the whole 440 miles of the waterway there are only 28 miles of real canal with a minimum width in the bottom of 200 feet, all split up into short lengths distributed along the route, with 66 miles of dredged channel, leaving 346 miles of wide and deep river navigation, thus enabling vessels to travel at full speed for over 80% of its length.

The route will be fully protected by buoys, light houses and leading marks to steer by, so that it will be as safe to navigate both by day and night as the existing St. Lawrence Ship Channel between Montreal and the Sea, or the continuous channels of 58 miles at the St. Mary's River and 97 miles at the Detroit River and Lake St. Clair.

The time of transit throughout its whole length from the Georgian Bay to Montreal will amount to 70 hours, and the average speed at which a vessel will travel exclusive of time lost by lockage 8½ miles per hour.

The length of the season of navigation will be governed by the conditions on Lake Nipissing and the Summit Level. A very careful examination shows that this will extend over about 220 days during the year, from April to December, and will practically be the same as the Sault Ste Marie Canals and Montreal Harbour.

The time which the construction of this undertaking will take would be at its maximum 10 years. Owing to the fact that the whole route is fairly accessible from existing railroads it would be possible to commence operations along the whole route simultaneously, in which case the time given above might be considerably reduced.

Advantages of such a Canal.

This Canal will have five chief advantages over any other route which can be possibly opened up: —

(1). It is the shortest route by which it is possible to construct a deep waterway from the head of the Great Lakes to tidewater, either through Canadian or United States territory, having an advantage of 270 miles over any other possible route. An examination of the map will show this at once. There are only two other routes by which such a waterway can be built; namely, in Canadian territory via the Niagara Peninsula from Lake Erie down Lake Ontario and the St. Lawrence River to Montreal, and in United States territory from Lake Erie to Lake Ontario and from that lake via Oswego, Oneida Lake and the Mohawk Valley to the Hudson River, and thence to New York.

The following table shows in geographical miles how the distances compare from Chicago to Montreal, New York and Liverpool, for these three routes. —

	MONTREAL, miles	NEW YORK miles	LIVERPOOL, miles
Georgian Bay Canal -	972		4,161
St. Lawrence River -	1,242		4,431
Hudson River - -		1,356	4,927

This table shows conclusively that the Georgian Bay Canal is 270 miles shorter to Montreal or Liverpool than the next best Canadian route, and that the distance to Liverpool by it is 766 miles less than via the United States route. Comparing the Canadian routes only, this saving is equal to 22% of the St. Lawrence route, which advantage is obviously a most important one.

(2). It will be the quickest route to navigate from the Great Lakes to an ocean port by 26 hours.

Let us examine this statement, because it is quite possible for a route to be the shortest and yet take longer to navigate than others, owing to natural obstacles to be overcome. A very careful estimate of the time which would be taken for the same vessel to navigate the routes already dealt with in the last paragraph shows as follows: —

Georgian Bay Canal,	Chicago to Montreal	114 hours
The St. Lawrence River,	"	140 "
Hudson River,	Chicago to New York	144 "

And in making such a comparison it must be remembered that the Georgian Bay Canal, although called a canal, has, as previously stated, 80% of its length consisting of large and commodious channels through which a vessel could pass at full speed, whereas the St. Lawrence route would necessitate a vessel passing along the 97 miles of densely crowded channels of the Detroit River and St. Clair Lake, together with the 72 miles of the Welland and St. Lawrence River Canals with their 35 locks, or an aggregate of more canal and a greater number of locks than on the entire Georgian Bay Canal route.

(3). It is the cheapest route by which freight can be carried from the Great Lakes to the seaboard.

This advantage is obviously a natural sequence to the first two paragraphs already considered. If the Georgian Bay Canal route is the shortest and the quickest to navigate no proof is required to show that it must also be the cheapest.

The Georgian Bay Canal route, with its paramount advantages of *size* and *time* which have already been shown to be the two chief factors necessary to cheap transportation, will be able to compete so successfully with any other existing route or any route which can possibly be constructed, that on its completion it will be able

to hold its own for all time against any other competitive route. Being an all water route it is superior to either an all-rail route or a water and rail route combined, and any improvement which may take place in the freight carrier of the future will apply equally to its transit down the Canal as it will either on the Lakes or the Ocean.

(4). This route will open up for development more natural resources than any other route.

This advantage is dealt with in greater detail under the heading of the traffic available. Inasmuch as this route passes through a territory, between Ottawa and Georgian Bay more especially, which is only waiting to receive the stimulus of cheap transportation for development, together with the country lying away to the north of it, it will be seen that the opportunities for this development are far greater on this route than in the more thickly populated and already developed districts through which the St. Lawrence River or United States route would run. Adjacent and tributary to the route of the Georgian Bay Canal there lies in Ontario and Quebec a vast area of undeveloped agricultural and forest land which by the construction of this canal would be brought near to a system of cheap transportation. These areas have been computed to include 18,000,000 acres of fertile clay lands, 50,000 square miles of forest areas and timber limits, apart from the 3,000,000 acres of land in the Ottawa Valley itself.

(5). It is the only route through Canadian Territory which cannot be used by the United States to assist in their canal schemes for capturing Canadian traffic.

It has already been shown that the United States transportation interests have a strong hold on the carrying trade of Canadian products from the northwest and that their schemes for the improvement of their own routes include the retention of this Canadian trade.

Under existing treaty agreements the United States and Canada have equal rights on any canals constructed in either country adjacent to and through the waters of lakes and rivers forming the international boundary, under which United States vessels may enter Lake Ontario and pass down the St. Lawrence River, so that if Canada constructed such a route the United States interests would have free use of it. The same would apply if Canada built the new enlarged Welland Canal between Lake Erie and Lake Ontario, and thus the United States freighters could pass through Canadian territory into Lake Ontario and from thence via Oswego and the Hudson River to New York, down the Deep Waterway which is now under consideration along that route. On the other hand the construction of the Georgian Bay Canal would permit of no such possibilities. It starts and finishes entirely in Canadian territory and in no way makes it possible for the United States to construct any supplementary works for their own benefit to the disadvantage of Canada.

On this route no new vessels will be required to obtain the best result, as it will be constructed to accommodate those already in commission on the Lakes, and a canal with locks of the size already mentioned will take any steamer on the ocean except the largest liners. This has reference principally to what are known as "Ocean Tramps" which have come into being since the opening of the Suez Canal and draw up to 24 feet of water. They would lighten at Montreal or Quebec to pass through the Canal, and after their trip to Lake ports would again fill up at the same places loading down to their proper depth for crossing the Ocean. This procedure would put them in a no worse position than they are to-day, because this class of vessel trading at ocean ports, generally has to proceed from one port to another to obtain freight before she is fully loaded. The advantage of this is important. First, it prevents the Lake tonnage being limited, as should the demands of an unusually large accumulation

of freight require more tonnage, such could be introduced via the canal; and secondly, it would enable the large and valuable Lake steamers to be employed outside, when Lake navigation is closed, thus utilizing for profitable use in trading along the Atlantic Coast an enormous amount of capital which is now locked up.

The cost of internal transportation in the United States being about twenty times as much as that for the foreign trade, a large part of the traffic of this navigation will probably be between Lake ports and the Atlantic Coast harbours of the United States.

It is of course recognized that to-day the large Lake freight carriers are not designed as ocean-going vessels and are probably not of sufficiently strong construction to weather the conditions which prevail in the North Atlantic during the winter months, but experience has shown in the past that when new conditions arise by the use of which the cost of transport and other economic values can be materially improved, such conditions are met by the provision of suitable facilities to enable a full advantage to be taken of them. An illustration may be seen of this on the Manchester Ship Canal where specially constructed ocean-going ships were built to overcome the peculiar conditions prevailing on that route, which ships now trade all over the world carrying their freight through the Canal right into the centre of the City of Manchester. Or, to come nearer home, the existing freight carriers themselves on the Lakes are entirely a product of the necessity which has arisen for their employment, and competent authorities who have studied the question assert that there are no practical difficulties in the way of designing a ship of such structural character as will operate with equal economy and safety on the Lakes and on the Ocean.

Freight Rate by this Route.

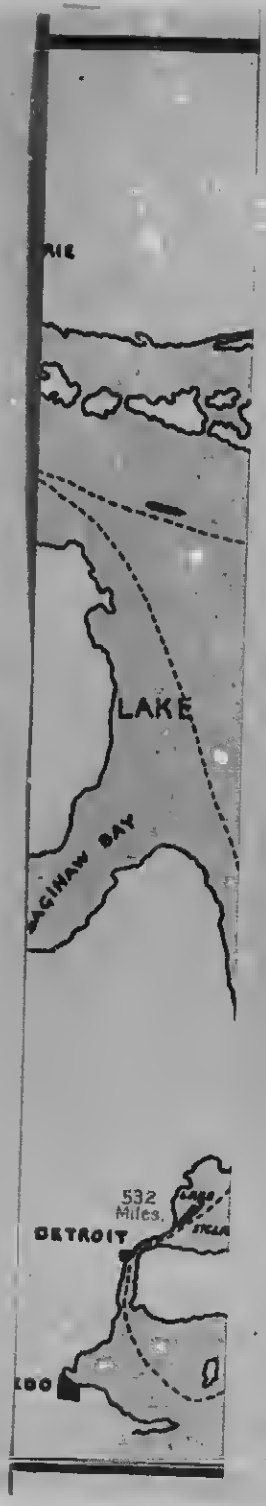
The all important factor by which the Georgian Bay Canal route must stand or fall is that of *cost of carriage*. If, without question, it can show a superiority in this regard over any existing or possible route the case for its construction is complete. It has already been proved that it is the *shortest* in distance and *quickest* in time over any other route and it now remains to show that it can carry freight at such a reduced cost over these routes as will justify its construction.

The following remarks are based on a general rate of one cent a bushel for wheat from Chicago to Buffalo by lake, a rate which has been a prevailing one for many years on that route.

An examination of the map will enable the following data to be readily understood.—

Supposing two steamers of the largest class and of the same speed were to leave Chicago at the same time, they will run together till a little past the Straits of Mackinaw or Sault Ste Marie. They then part company, one going to Buffalo and the other to Montreal via the Georgian Bay Canal. The distance between Chicago and Buffalo is 889 miles, and between Chicago and the entrance to the Canal at French River 532 miles, so that when one ship arrives at the entrance to the Canal the other has 357 miles still to go to reach its destination. Allowing for detention at 12 locks we find that the vessel on its way to Montreal will have got within 162 miles of Ottawa and 284 miles of Montreal when the other has arrived at Buffalo.

This means that for the same expenditure of time and cost required for one ship to reach Buffalo the other will nearly reach Ottawa. Assuming the rate to Buffalo to be one cent per bushel, the cost to near Ottawa will be one cent also. For the remaining 284 miles and 16 locks to reach Montreal, or 17 hours, one-half cent will be ample addition.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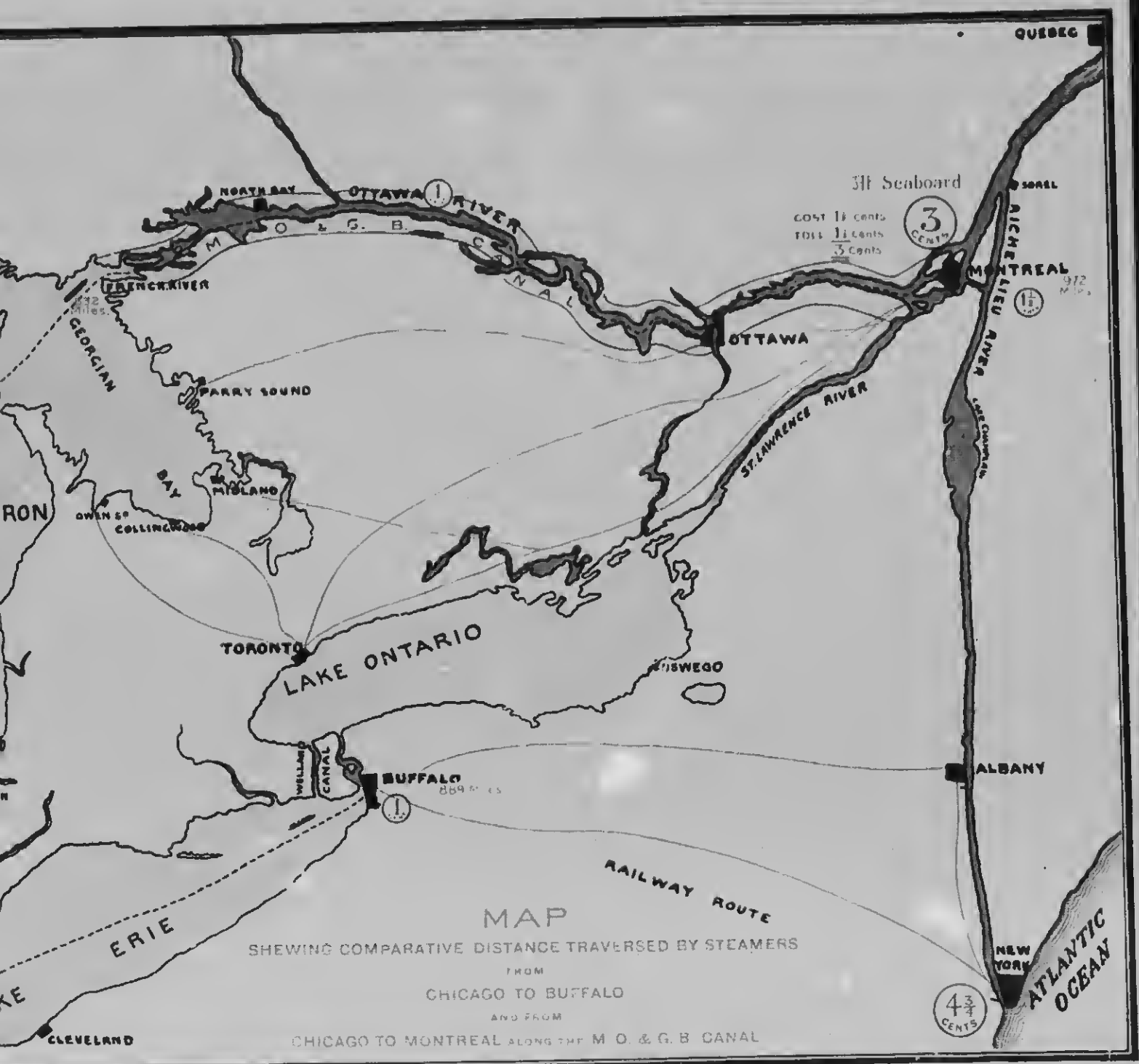

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The grain, therefore, can be delivered at Montreal, exclusive of course of any toll, for 1½ cents a bushel and *it is not possible to question such a conclusion*

In dealing with existing routes and their minimum rates of carriage it was shown that the lowest rate at which grain had ever been carried to Montreal was by the all-water route for 3½ cents a bushel, but that this entailed a large loss to the shippers, and that the prevailing minimum rate is 4 cents a bushel.

It may therefore be accepted as a fact that the cost of carriage from Chicago to Montreal by the Georgian Bay Canal will amount to not more than three-eighths of the lowest existing rate.

This saving of 2½ cents a bushel or 83½ cents a ton over the minimum present cost of transport from the Lakes to the seaboard at Montreal, it is not proposed at present to give entirely to the trade, but at first to share it with them, gradually reducing it as the traffic increases. Besides the reduction which this route will give, the trade obtains the enormous advantage of time and transit without transfer. It is therefore proposed that at first a toll of 1½ cents a bushel or 50 cents a ton shall be levied, to pay the cost of interest on construction and maintenance. Such a toll is a very moderate one and compares very favourably with similar charges on other canal systems such as that of $1.80 per ton on the Suez Canal. It will be a matter of detail as to whether this toll should be levied in one direction only, when it would be 50 cents and the vessel allowed to return free of toll or charged both ways. These matters however are ones which can only be settled by a careful study of the conditions which may arise when the canal is open for traffic.

The cost of transit plus the toll would make the total through rate from Chicago to Montreal 3 cents a bushel on wheat, or $1.00 a ton, and this figure would give ample profits to the shippers as well as paying the interest on cost of the works and maintenance, neither of which three important factors apply to the competitive routes which are in existence to-day. It is only the higher rates which prevail at certain seasons of the year when freights are plentiful that enable existing routes to be run at an average profit to their operators. That the above mentioned cost of transit of 1½ cents a bushel is not a visionary one is settled by many independent experts who have studied this question, amongst others Captain Norcross who is in charge of the fleet of vessels owned by Messrs. Wolvin, of Duluth, and whose opinions on matters referring to Lake transportation carry great weight. In his evidence before the Department of Public Works Georgian Bay Ship Canal Survey Board in 1906 he stated his opinon as follows:—

> "Taking as a basis wheat in 1905 the through sum of rate from the head of the Lakes to the Seaboard via New York Central lines from Buffalo was five cents and via canal from Buffalo five and three-eighths cents. This is the lowest freight of the season. In the fall it went as high as ten cents via railroad lines and ten and one-half cents via canal routes. The reason for the preferential in favour of the canal route was the assurance of no storage charges and the almost impossibility of securing cars from the railroad lines to deliver grain to the seaboard in time to make connections with the ocean sailings. These rates include all charges against the grain except when held at Buffalo in elevators for more than 10 days, then the charge is one-quarter of a cent in addition for every 10 days or portion thereof. I might say here that the shortage of cars at Buffalo in the fall of the year is a very great inconvenience to the shipper on account of his not being able to always make connections with his ocean space. This would be practically eliminated if the Georgian Bay Ship Canal was in operation. If the Georgian Bay Ship Canal were completed and capable of accommodating our largest

> and most modern freighters, wheat could be delivered at Montreal for two and one-quarter cents per bushel. This would be allowing the steamer a very good margin of profit. If this canal is built according to the ideas suggested to me, by the engineers, it would be possible for a steamer to make the round trip from Port Arthur, returning without cargo in 15 days, allowing 4 days to discharge at Montreal.
>
> "I am strongly of the opinion that should you construct the Georgian Bay Canal the grain would only be one of a number of products that would be benefitted. The advantages and conditions applying to grain would also apply to all through freights, east and west bound."

The only comment which need be made on Mr. Norcross' evidence is that in 1905 the rate which he takes to Buffalo was 1½ cents a bushel, whilst in 1910 this had dropped to 1 cent, which accounts for the difference between the rate of 2¼ cents a bushel which he puts forward and the 1½ cents a bushel which the calculation previously given shows. That such a rate as 3 cents a bushel would attract a very large volume of traffic is evident when the fact is taken into consideration that producers and manufacturers are continually endeavouring to reduce the price of their commodities in order to compete with other markets.

Messrs. Armour & Company, of Chicago, dealing with this question state :—

> "The rates at present from the west to the seaboard are about as low as the business can profitably be carried. Therefore, an all water route through the channel spoken of (i.e. the Georgian Bay Canal) with a large saving in mileage would mean that the new canal would practically receive all the business it could handle for the next several years, at nearly the present rates. We mean by this within one eighth or one-quarter cent per bushel of what is now paid. Whatever the new route would only have to drop its rate one-eighth to one-quarter cent per bushel below present rates in order to obtain a good share of the business and any such rate as is quoted—3 cents a bushel from Chicago to Montreal—would throw just as much business via that route as it could possibly handle.
>
> "The route proposed would certainly be the shortest and cheapest of any now existing for the transportation of grain from the West to the seaboard."

It is therefore evident, that if a saving of one-eighth or one-quarter of a cent a bushel will throw this traffic into any route which can offer it, the Georgian Bay Canal with a margin of at least one cent a bushel is in a good position to accomplish this. It should be noted however that all this applies to low class freight which cannot bear a high rate for transportation, a traffic which can only be developed by cheap water transport. An increased demand for a higher class of freight will be created by the business which must inevitably follow the construction of a great waterway, and will more than compensate the railways for the loss of the low class traffic. High class freight is package freight, not readily handled by mechanical devices, and therefore not likely to go by water.

Estimate of probable traffic.

The following remarks deal with the traffic which would be available to day if the canal were constructed and in operation. Prophecies of what this would be in ten years time would be liable to be misleading and yet at the same time with the marvellous growth which is going on in Canada it may safely be said that by the time this canal is completed the figures given herein will be multiplied many times. From 1880 to

1890 the tonnage passing through the Soo Locks doubled itself every 5 years, and the same remarkable increase has taken place since then every 10 years, until at the present time this stands at a total of 60,000,000 tons per annum.

It is a part of this traffic together with that from Lake Michigan which the Georgian Bay Canal is expected to participate in. The tonnage using this route will consist chiefly of exports and imports, but at the same time, inasmuch as it will also be the cheapest route by which the food stuffs of the West can come to the East and the manufactures of the East to the West, a very considerable trade of interprovincial character may be anticipated. The export trade in grain alone, from the districts dependent upon Lake navigation, amounted in 1909 to 5,300,000 tons, whilst Eastern Canada took 1,300,000 for domestic consumption. We know from previous considerations the greater proportion of this traffic would find an outlet through the Georgian Bay Canal. Under certain conditions this route would also be the cheapest to bring from the West the food supplies for the densely populated New England States, but at present this traffic is not taken into consideration.

Lumber would produce a large traffic. The pine cut in the Ottawa Valley represents 1,000,000 tons a year. Under present conditions this is nearly all marketed by rail. In 1909 four Lake ports alone imported 850,000,000 feet of lumber, or about 1,400,000 tons. Exports of lumber from Eastern Canada to Europe amounted in 1909 to 1,150,000 tons. At present the Ottawa Valley and Eastern Canada are very much handicapped in getting their produce to the Great Lakes market owing to want of cheap transport. The Georgian Bay Canal would alter all this and open up markets for Canadian lumber both East and West in which the demand is constantly increasing.

Nova Scotia bituminous coal will provide a traffic of at least 3,000,000 tons annually. In 1909 Canada imported 6,855,000 tons of bituminous coal from the United States, practically the whole of which was supplied to Ontario. The quantity of Nova Scotia coal brought to Montreal amounted to 1,020,000 tons, of which only about 150,000 tons went farther West. The reason of this is that transportation rates and facilities west of Montreal are such that this Nova Scotia coal cannot compete in price with the United States product. In 1909, 2,000,000 tons of United States bituminous coal was unloaded at Fort William and Port Arthur, 375,000 tons at Sault Ste Marie and 598,000 tons at Canadian Georgian Bay Ports. The whole of the industries of Ontario are to-day dependent upon a foreign source for their fuel supply, which may be subject to international complications at any time. Canada to day is paying over $13,000,000 annually to United States coal interests, the greater proportion of which could, with cheaper facilities of transportation, be retained in her own country building up Canadian enterprises. The Georgian Bay Canal would enable Nova Scotia coal to be put into Fort William and Port Arthur, or any intermediate point upon its route for distribution, at such a price as to successfully compete with the United States product, and for return cargoes there is no reason why grain should not be taken to Sydney or Halifax, where it could be stored and shipped all the year round and where it would be a thousand miles closer to Liverpool than it would be at New York.

Pulpwood, pulp and other forest products would also be a source of very considerable traffic which is bound to grow as the demand increases in Europe and the United States. The Georgian Bay Canal being tributary to a very extensive forest area would not only be the cheapest route by which these commodities could be shipped out, but it will also provide, owing to its large supply of water power, the most favourable sites for the establishment of mills. Pulp mills in operation to-day adjacent to the route of the Canal have a capacity of 300,000 tons per annum, which, including the raw material, entails the handling of at least 600,000 tons. Cheap

transportation will render merchantable from the whole of this district vast quantities of birch, maple, hemlock, tamarac, ash, oak, elm, etc., which, under present conditions, cannot be moved, and which will find a ready market about and west of the Great Lakes.

Ores, minerals, etc., will give the Canal a traffic the amount of which it is difficult to estimate. The extent of iron ore deposits adjacent to the route of the canal and on the north shores of Lake Superior is very great. These deposits are only waiting for the facilities of cheap transport and cheap treatment, which the Georgian Bay Canal will afford, to expand into an industry of which it is hard to prophesy the extent. Some idea may be gained however by what happened in the United States when the great ore ranges of Minnesota were connected with the coal areas of Ohio and Pennsylvania by the Sault Ste Marie Locks and Canals, whereby a traffic has grown up which in 1909 amounted to 40,000,000 tons. The latest Trade Commissioners' Reports from the iron districts of Great Britain state that the great iron founders there are looking for a further supply to supplement their existing sources and are making enquiries as to the possibilities of obtaining Canadian ores. These Canadian ores can be carried to Europe to meet this demand by the Georgian Bay Canal alone.

Marble of excellent quality exists on the route of the canal near Portage du Fort and Arnprior. Phosphate would in time provide a large traffic. In 1909 the United States imported $15,000,000 worth of Chilian nitrates to re-fertilize her worn out agricultural lands. Canada has fortunately not arrived at the time when it is necessary for her to do this, but in a few years the inevitable law of diminishing returns will begin to act, and this commodity will be required in very large quantities.

Enormous deposits of peat lie adjacent to the canal route. The success of the Government Experimental Plant has shown that peat fuel can be manufactured and used on a commercial basis, only if it can be accommodated with cheap distributing facilities. This the Georgian Bay Canal would give.

Other minerals and their products such as bricks, cement, clay, sand, etc., would provide a traffic of considerable extent.

It is therefore estimated that at the present time ores, minerals and their products would provide a quantity of 2,000,000 tons per annum.

There are other sources of supply from which traffic is sure to come. The export from the United States in 1909 of beef, hog products, etc., amounted to 850,000 tons, of which the bulk originated at Chicago and the district west of the Great Lakes. Cheese and butter would also be handled. This is a high class freight which would have to be carefully dealt with, and there can be no doubt that special steamers would be built for the purpose of this trade and that the cold northern route via the Georgian Bay Canal will be of great advantage and would help to draw the traffic that way.

Miscellaneous merchandise of which the ratio to other traffic on the Sault Canals during the past five years amounted to 6½% would provide 1,000,000 tons per annum.

A very conservative estimate based on existing conditions and the traffic available in 1909 shows that this Canal, if in operation to-day, would command a traffic of 16,000,000 tons per annum, without taking into consideration the growth of the country and what it will provide in 10 years time.

It is sometimes stated that the Georgian Bay Canal Route cannot be successfully operated, because, so it is alleged, that there will be no return freights westward. That this criticism is unwarranted is shown by the fact that in 1909, on the Sault Canals out of a total traffic of 57,895,149 tons, East-bound traffic amounted to 46,379,086 tons and west-bound 11,516,063, or approximately a ratio of 4 to 1. On the Georgian Bay Canal it has already been stated that there will be a west-bound traffic of at least

3,000,000 tons of bituminous coal apart from lumber and other products, which will probably amount to another 1,000,000 tons, so that this route to-day, if opened, might expect an east-bound traffic of 12,000,000 tons and a west-bound one of 4,000,000, or a ratio of 3 to 1, which is a better condition of affairs than now exists in connection with the traffic through the Sault Canals.

Water Powers.

The method which it is proposed to adopt to form a navigable waterway along the existing rivers down which the Canal will pass is to divide these rivers up into reaches by means of dams and locks by which their existing gradients will be raised to form practically level ponds through which a vessel can safely navigate. This will give at each dam and lock a drop of varying depth at which the surplus water not required for lockage purposes can be used to generate hydro-electric power. There will be 18 points along the whole 440 miles of the Canal where this power can be produced giving in the aggregate about 1,000,000 horse power. About one-half of this is located between Montreal and 50 miles west of Ottawa, in the first 175 miles of the route, and thus within easy distance of a territory in which the demand for such power is increasing year by year. The balance is situated on more remote sections, but in time would become more accessible for use. As this power is utilized its sale will form a valuable adjunct to the Canal itself, because the combination of cheap transport and cheap power will provide ideal conditions for the establishment of manufacturing undertakings and in due course the revenue which will accrue from this power should be sufficient to allow the toll which in the early days of the Canal's operation will be necessary to be reduced or abolished altogether.

Surveys and Estimated Cost of Construction.

The surveys and plans upon which the Estimates of Cost of Construction are based, although made at various times, are both complete and exceedingly well done. Probably no scheme of such magnitude has had its route and physical features so thoroughly examined and reported on as the one under consideration, extending over the last 50 years.

An exploration was made by Mr. Shanly, M.I.C.E., of the whole route from Georgian Bay to Montreal in 1856. Actual surveys were made by him from Lake Nipissing to the Junction of the Mattawa and Ottawa Rivers and also from Fort William on the Upper Allumette Lake to the head of the Deschenes Rapids near Ottawa. Upon these, together with plans and surveys of the Ottawa River then in existence, Mr. Shanly based his report and estimate of 1858.

Mr. T. C. Clarke, M.I.C.E., made surveys for all the lock sites from Georgian Bay to St. Annes as well of the reaches from the mouth of the Mattawa River to the Chats. His report of 1860 is based upon this information and Mr. Shanly's previous plans and report.

Mr. E. P. Bender, M.I.C.E., made a survey and reported upon the portion of the route from Georgian Bay to Lake Nipissing in 1879 with plans of the river stretches and lock sites.

The above surveys and reports were all made on behalf of the Government.

In 1898 Mr. T. C. Clarke made a supplementary report to the Montreal-Ottawa & Georgian Bay Canal Company, and in 1899 surveys and estimates were made by Mr. Henry MacLeod, M.I.C.E., on behalf of the Company, of the Summit Section from Lake Nipissing to Talon Lake on the Upper Mattawa River, borings being made to ascertain the nature of the material to be excavated.

In 1901 Mr. MacLeod made surveys and estimates of the whole route for the Department of Railways and Canals.

In the same year the Georgian Bay Canal Company engaged Mr. Geo. [illegible] Wisner, of Detroit, as their Consulting Engineer to prepare complete plans and estimates for the whole route on the basis of a waterway 22 feet deep. A staff of assistant engineers was engaged, including Mr. H. A Purdon, M.I.C.E., Mr. Henry Carre, M. Can. Soc. C. E., Mr. H. G. Stanton, M. Can. Soc. C. E., and others, and in 1907 a complete set of these plans drawn up under the personal supervision of Mr. Wisner was deposited with the Dominion Government.

In 1904 the Dominion Government authorized the carrying out of a survey and the preparation of estimates for this scheme by the Public Works Department. This was completed and published in 1909, and forms one of the most complete reports ever made for the purposes of preliminary estimates on a work of this size.

In 1908 Mr. G. Fitzgibbon, M.I.C.E., prepared on behalf of the Company detailed plans and estimates for the French River Section including a terminal harbour at North Bay. These plans were deposited with the Government in that year.

The older surveys have been amply confirmed by those made under Mr. Wisner's direction for the Canal Company and by the Department of Public Works in 1904-1909, so that there is every information and ample data available to arrive at an accurate conclusion as to the engineering features of this scheme and its cost.

The earlier surveys and reports mentioned above contemplated the construction of shallow draught canals and when in 1898 the Montreal-Ottawa & Georgian Bay Canal Company proposed the construction of a ship canal considerable doubt was expressed as to whether the summit level near North Bay on Lake Nipissing would provide sufficient water to supply the necessary lockage. The survey and investigation of 1899 made by Mr. Henry MacLeod on behalf of the Canal Company, which was taken with extreme care, removed this doubt, and the conclusions of the Company's Engineers were afterwards confirmed by the Engineers of the Department of Public Works who carried out the Government survey of 1904-1909.

The estimated cost of construction for a waterway of the dimensions previously described, based on the plans and surveys is $150,000,000. This figure may be modified somewhat by financial and other contingencies.

Revenue.

It has previously been shown that a conservative estimate for the traffic which this route could command is 16,000,000 tons per annum, and that the toll which such traffic could bear during the first few years of operation would be 50 cents a ton, giving an annual revenue of $8,000,000. The cost of operation and maintenance would amount to $1,000,000 a year, leaving $7,000,000 for interest on cost of construction, equal to 4⅔% on $150,000,000, apart from any revenue which may accrue in due course from the sale of hydro-electric power. If this work were commenced to-day there is a practical certainty that by the time it is opened in 10 years the very modest estimate of traffic used in the above calculation will have materially increased. With the same toll every extra 1,000,000 tons of traffic would give another $500,000 per annum revenue, or about 3/10ths of 1% on the capital cost.

If this ship navigation is constructed the results will be far reaching. No other canal will ever be or can ever be constructed from the Lakes to the Seaboard which can compete with it. The immediate result would however be, that instead of constructing their Deep Waterway through Lake Ontario, the United States would build the

Montreal Lake Champlain-Hudson River route to New York, the whole of the traffic for which would have to pass through the Georgian Bay Canal, thus largely augmenting its traffic and revenue. The volume of traffic would then embrace that for domestic use on the Atlantic Coast as well as for export. With a New York connection the Montreal-Ottawa & Georgian Bay Route would obtain practically the same amount of through traffic that was anticipated over the Lake Ontario-Mohawk Valley Route projected in 1897, and this was estimated then at 20,000,000 tons per annum. The United States Deep Waterway Commission state:—"The Champlain-Hudson Route from Montreal to Lake Champlain and from the head of Lake Champlain at Whitehall to tide water on the Hudson at Troy, sixty-four miles, *is the logical extension of a future Ottawa Route*, should conditions favour a radical development along that line, and it skirts New England."

This would take all the business intended for the Atlantic Coast, and it would probably be found that even the Gulf Coast could be supplied more economically by such a ship canal from the lakes, without transfer, than by the Mississippi Valley or by rail.

The distance to New York from Western Lake Ports via the Montreal-Ottawa Georgian Bay Route would be the same as that via the Erie-Lake Ontario-Mohawk Valley route.

Conclusion.

A deep water outlet from the Lakes to the Ocean is certain to be built on some route or the other in the near future. With the fact definitely established that a waterway of proper dimensions was sure of construction within reasonable time along the Georgian Bay, Ottawa and Montreal Route, it unquestionably would not pay to build a canal on any other route. On the other hand it must be borne in mind that if this great natural waterway is neglected and a ship canal constructed through the United States, the chance of Canada obtaining any increase of export trade is not only gone but the volume she now secures will be taken from her. The Montreal-Ottawa and Georgian Bay Canal once constructed and in operation, the Saint Lawrence River for seven months in the year will become the gateway for the whole of the export and import trade of the richest and largest part of the North American Continent East of the Rocky Mountains. The Dominion of Canada will have a national waterway entirely within her own territory far removed from the International Boundary and free from International complications, a waterway which under no conditions can be used by the United States to assist them in wresting out of Canadian hands the carrying trade of the products of her own Northwest, and it will secure without possibility of competition Canadian traffic for Canadian Ports It will foster existing and create new Interprovincial trade both East and West, thus drawing closer the bonds of Confederation and enormously augmenting the national wealth and power of the whole Dominion.

NOTE

The authorities from which extracts and abstracts have been made are:—The United States Deep Waterways Commission Report, 1897; The United States Deep Waterways Engineers Board, 1900; The Report of the New York Commerce Commission, 1899; The Chicago Board of Trade Report, 1909; The proceedings of the American Society of Civil Engineers, 1900-1901; The Report of the Canadian Government, Public Works Department, on the Georgian Bay Canal, 1909; Papers by Mr. Joseph Mayer, M. Am Soc. C. E., and the Late Mr. George Y. Wisner, M. Am. Soc. C. E., and discussions thereon; together with the annual Reports of the Canadian Government Departments of Railways and Canals, and Trade and Commerce.


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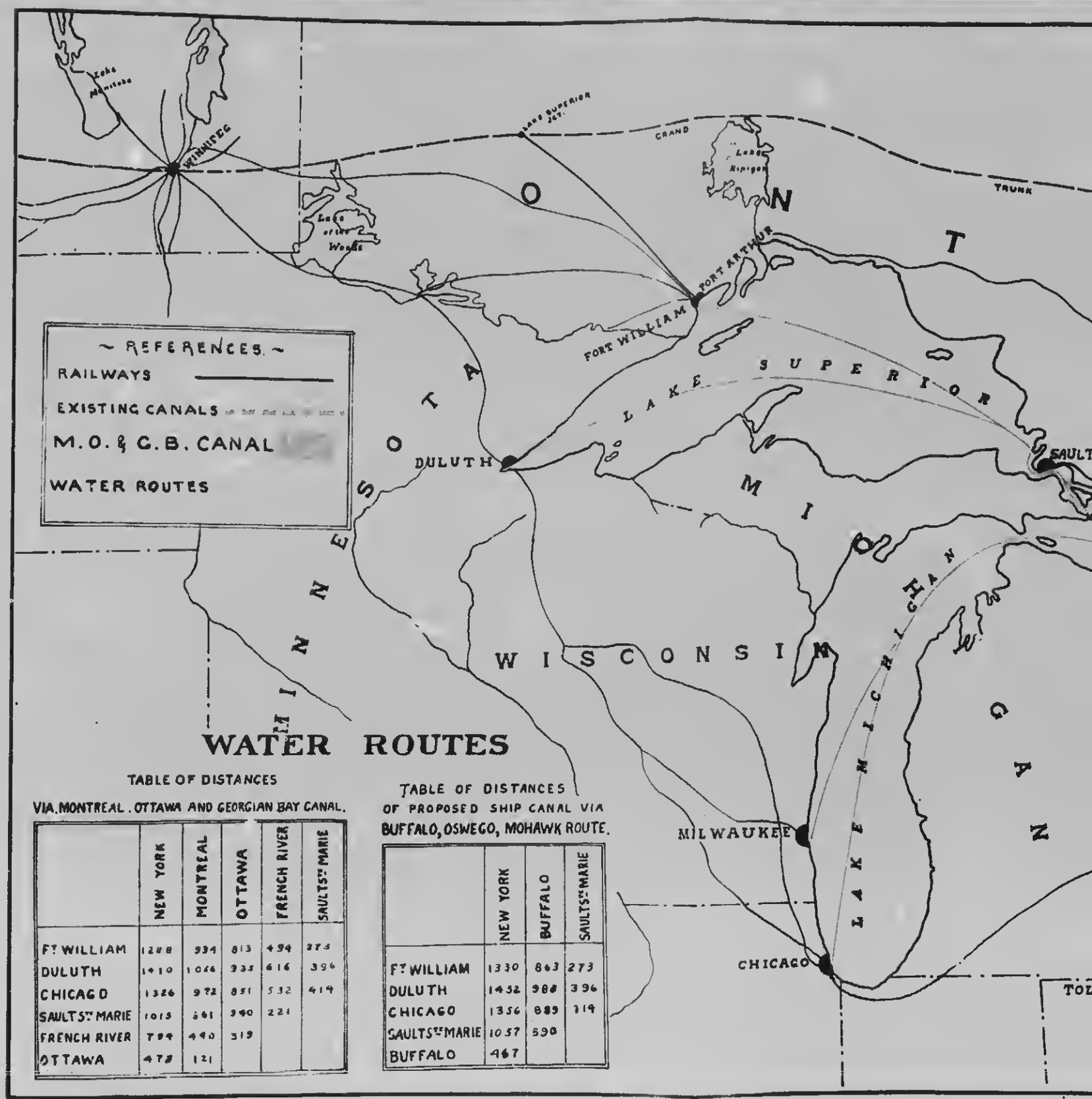


WATER ROUTES

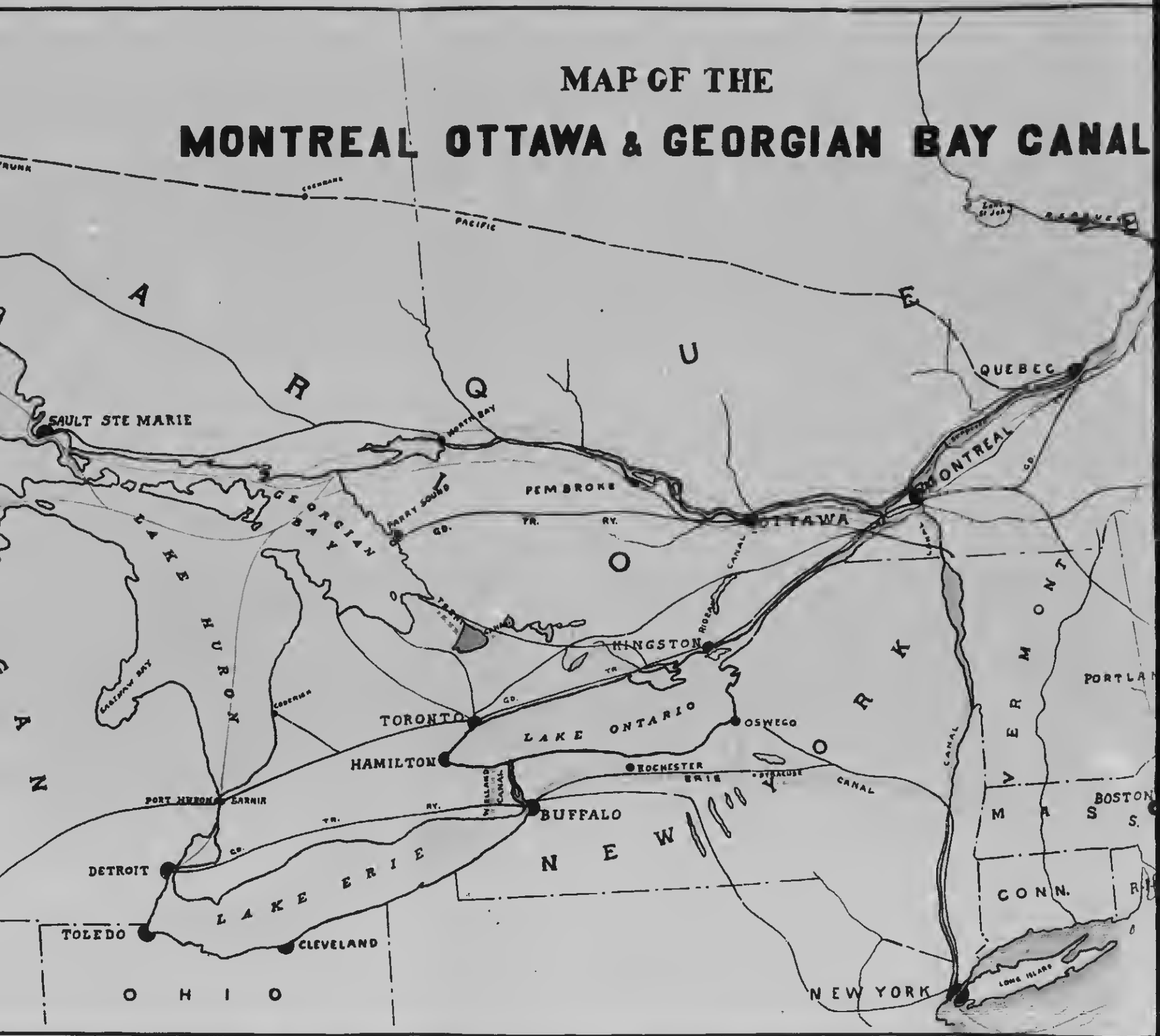
TABLE OF DISTANCES

VIA. MONTREAL. OTTAWA AND GEORGIAN BAY CANAL.

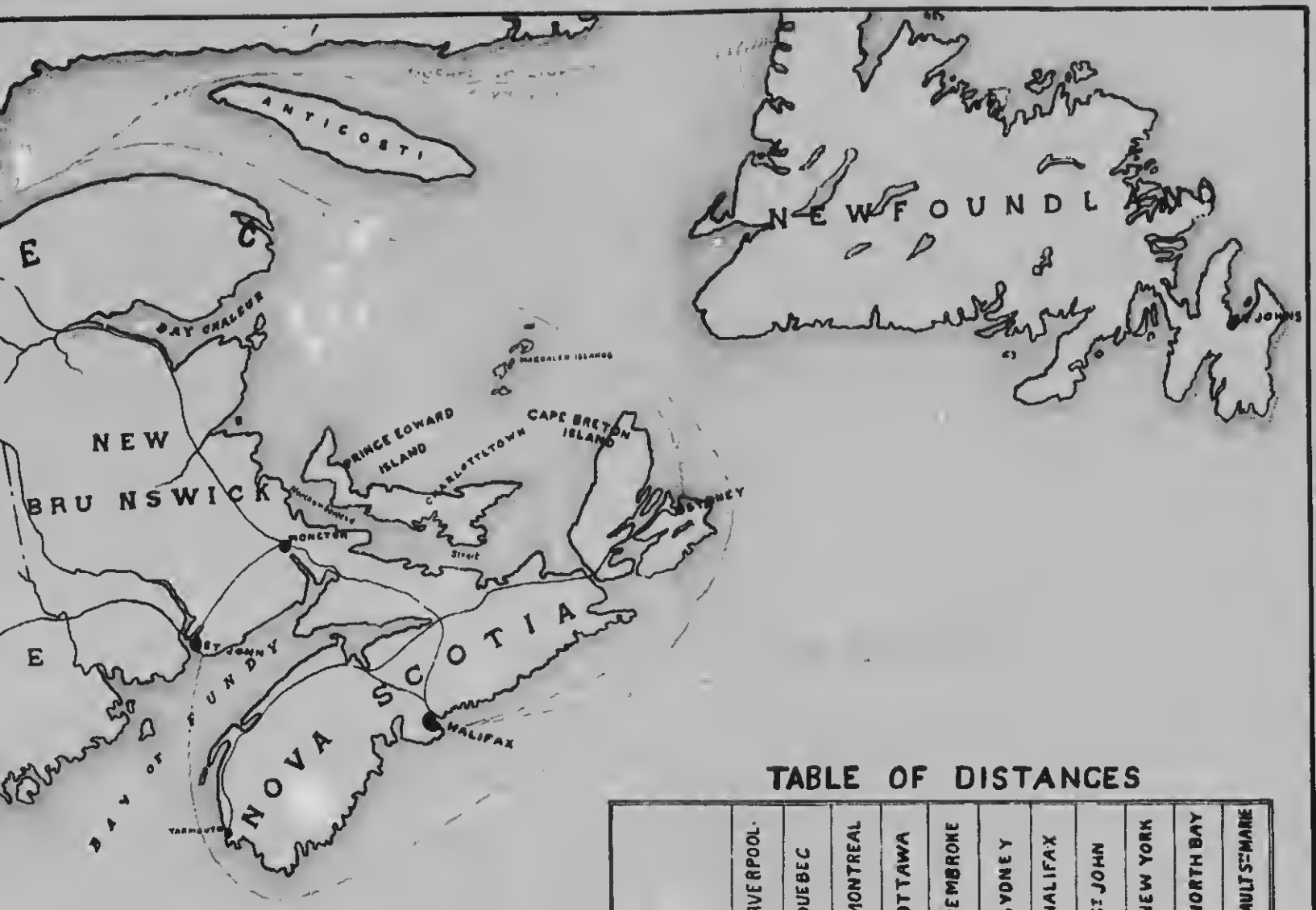
	NEW YORK	MONTREAL	OTTAWA	FRENCH RIVER	SAULTS^TE MARIE
FT WILLIAM	1288	934	813	494	273
DULUTH	1410	1066	935	616	396
CHICAGO	1326	972	851	532	419
SAULTS^TE MARIE	1015	661	540	221	
FRENCH RIVER	794	440	319		
OTTAWA	478	121			

TABLE OF DISTANCES OF PROPOSED SHIP CANAL VIA BUFFALO, OSWEGO, MOHAWK ROUTE.

	NEW YORK	BUFFALO	SAULTS^TE MARIE
FT WILLIAM	1330	863	273
DULUTH	1452	988	396
CHICAGO	1356	889	319
SAULTS^TE MARIE	1057	590	
BUFFALO	467		


MAP OF THE
MONTREAL OTTAWA & GEORGIAN BAY CANAL
PACIFIC
QUEBEC
SAULT STE MARIE
NORTH BAY
PEMBROKE
MONTREAL
OTTAWA
GEORGIAN BAY
LAKE HURON
KINGSTON
TORONTO
LAKE ONTARIO
OSWEGO
HAMILTON
ROCHESTER
ERIE
SYRACUSE
CANAL
BUFFALO
PORT HURON
SARNIA
DETROIT
LAKE ERIE
TOLEDO
CLEVELAND
OHIO
NEW YORK
VERMONT
MASS.
CONN.
BOSTON
LONG ISLAND


MAP OF THE
L OTTAWA & GEORGIAN BAY CANAL
PACIFIC
RIVER ST LAWRENCE
QUEBEC
MONTREAL
PEMBROKE
OTTAWA
KINGSTON
TORONTO
LAKE ONTARIO
OSWEGO
ROCHESTER
BUFFALO
PORTLAND
BOSTON
CONN.
NEW YORK
LONG ISLAND
MAINE
VERMONT
MASS.
NEW YORK



DISTANCES TO CANADIAN SEAPORTS
VIA. M.O.&G B. CANAL ROUTE.

	QUEBEC	SYDNEY	HALIFAX	ST. JOHN
FT. WILLIAM	1095	1768	1832	2094
DULUTH	1217	1890	1954	2216
CHICAGO	1133	1806	1870	2132
FRENCH RIVER	601	1274	1338	1600
OTTAWA	282	955	1019	1281
MONTREAL	161	834	898	1160

TABLE OF DISTANCES

	LIVERPOOL	QUEBEC	MONTREAL	OTTAWA	PEMBROKE	SYDNEY	HALIFAX	ST JOHN	NEW YORK	NORTH BAY	SAULTSTE MARIE
FORT WILLIAM	4123	1095	934	813	709	1768	2019	2276	1621	1293	273
DULUTH	4245	1217	1056	935	831	1890	2136	2398	1743	1415	396
SAULTSTE MARIE	3850	822	661	540	436	1777	2023	2285	1348	1000	
MILWAUKEE	4095	1067	906	785	681	1740	1986	2248	1593	1265	
CHICAGO	4461	1133	972	851	747	1806	2052	2314	1659	1311	
NORTH BAY	3548	520	359	238	134	1011	1257	1519	1046		
NEW YORK	3571	526	457	578	682	910					
ST JOHN	2747	959	1160	1281	1385	508					
HALIFAX	2485	737	898	1019	1023	246					
SYDNEY	2629	991	652	773	877						
PEMBROKE	3414	386	225	346							
OTTAWA	3310	282	121								
MONTREAL	3189	161									
QUEBEC	3028