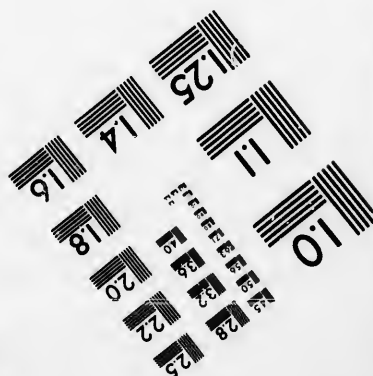
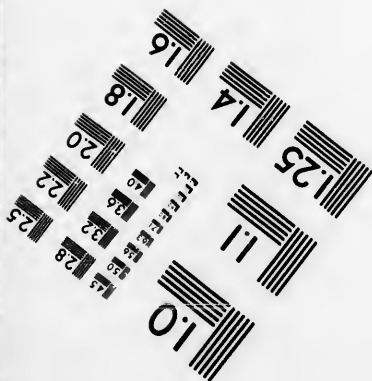
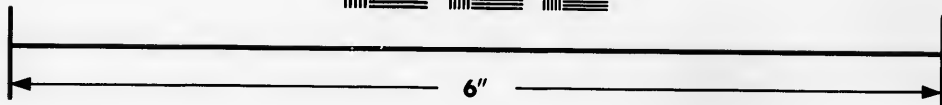
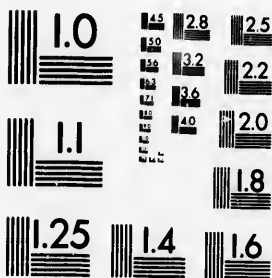


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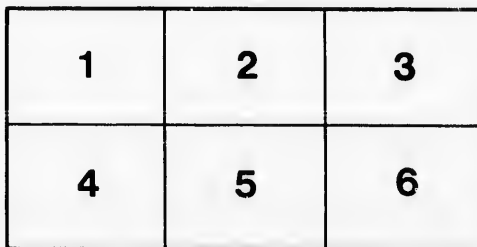
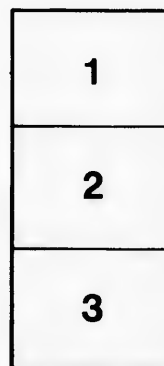
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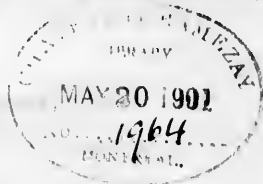
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THE "ICE-BRIDGE" AT QUEBEC.

OFFICE BOARD OF TRADE,

Montreal, 28th July, 1884

JOHN KERRY, Esq., *President,*

AND

THE COUNCIL of the *Montreal Board of Trade* :—

GENTLEMEN,

Herewith please find Report relating to the Ice-Barrier at Quebec and Cap Rouge. Let me say that but for the valuable aid obtained from gentlemen besides those mentioned in it, it could not have been so serviceable as I now think it will be.

Hoping this investigation may answer the purpose of the Council,

I am, GENTLEMEN,

Your obedient servant,

(Signed,) WM. J. PATTERSON,

Secretary.

REPORT

RELATING TO

THE "ICE-BRIDGE" BETWEEN QUEBEC AND LEVIS.

The following is a true copy of sub-sect. 78, Sec. 29, of 29 Vict., c. 57 :—

"To prohibit any person from preventing, in any manner whatever, the ice from stopping and forming a bridge on the River St. Lawrence, from Montmorency River, as far as and comprising the place called *Cap Rouge*, on the said river, or from breaking, shattering, or damaging in any manner whatsoever, all such ice or ice-bridge formed or stopped in

“ the said limits, and to punish by a penalty, not exceeding eight hundred dollars, all infringement of any of the provisions of all by-laws passed to that effect; which said penalty shall belong to the corporation of the said city, and may be sued for in a summary manner before the Recorder’s Court of the said city; and in default of payment of the said penalty and the costs, the defendant shall be imprisoned at hard labor for a time not to exceed three months, unless the fine and costs and those of imprisonment be sooner paid; and to that end the said Court has the power to summon the transgressor, although he may reside without the limits of its jurisdiction, to appear before the said Court to answer to the charge brought against him, to defend and be judged in conformity with the law which governs the said Court.”

The Act is intituled “ An Act to amend and consolidate the provisions contained in the Acts and Ordinances relating to the incorporation of, and supply of water for the City of Quebec.”

The subject of procuring the repeal by Parliament of the foregoing sub-section was brought under the consideration of the Council of the Montreal Board of Trade, on the ground that it provides for a very serious obstruction to the navigation of the River St. Lawrence, which has been detrimental to trade and commerce,—and the following questions arose:—

1. Can the River St. Lawrence, between Quebec and Levis, be kept open during Winter by Steam Ferry Boats?
2. What influence has the ice-barrier (the so-called ice-bridge) at Quebec upon the ice formation at Cap Rouge?
3. Can the ice-barrier at Cap Rouge be destroyed in Spring so as to admit of navigating the River at an earlier date than is usual?
4. To what extent does the ice-barrier at Quebec retard the opening of River navigation?

With these queries in view, the Secretary was instructed to investigate the subject and report, so that the results may be submitted to Government, if such action is deemed expedient.

In endeavoring to perform the duty assigned, he presents as the basis of subsequent remarks and deductions the following

STATEMENT.

Showing dates of arrivals at Quebec of the first Ship from Sea, and the first Steamboat from Montreal, during each of fifty-five consecutive years (1830 to 1884, inclusive),—those in bold-face figures indicating the existence of an Ice Bridge between Quebec and Levis.

YEARS.	FROM SEA.	FROM MONTREAL	YEARS.	FROM SEA.	FROM MONTREAL
1830....	April 26.	April 17.	1858....	April 29.	April 18.
1831....	April 16.	April 21.	1859....	April 29.	April 22.
1832....	May 4.	April 29.	1860....	April 25.	April 26.
1833....	May 10.	April 18.	1861....	April 22.	April 26.
1834....	May 2.	April 18.	1862....	April 16.	April 30.
1835..	May 6.	May 4.	1863..	May 4.	May 4.
1836..	May 11.	May 11.	1864....	April 27.	April 21.
1837....	April 29.	May 1.	1865....	April 29.	April 21.
1838....	May 3.	April 28.	1866....	April 28.	April 26.
1839....	May 8.	April 21.	1867..	April 17.	May 3.
1840....	April 25.	April 29.	1868....	April 23.	April 28.
1841....	April 29.	May 1.	1869....	April 27.	April 30.
1842....	May 3.	April 21.	1870..	April 16.	April 25.
1843..	April 18.	May 5.	1871....	April 22.	April 18.
1844....	May 3.	April 24.	1872..	April 30.	May 6.
1845..	May 1.	April 25.	1873....	April 28.	May 2.
1846....	April 24.	April 17.	1874..	April 28.	May 10.
1847..	May 8.	May 8.	1875..	April 29.	May 9.
1848..	May 1.	May 6.	1876..	May 6.	May 9.
1849....	April 28.	April 25.	1877....	April 25.	April 26.
1850..	April 28.	April 25.	1878....	April 20.	April 21.
1851....	April 20.	April 22.	1879....	April 29.	May 2.
1852....	April 15.	April 30.	1880....	April 30.	May 1.
1853....	April 24.	April 23.	1881....	April 28.	April 27.
1854..	April 29.	May 5.	1882..	May 5.	April 28.
1855..	May 6.	May 6.	1883..	May 1.	May 6.
1856....	April 20.	April 27.	1884..	May 1.	April 30.
1857....	April 28.	April 17.			

The foregoing comprehensive tabulation of facts, from reliable sources, is valuable and suggestive. The formation of the ice-barrier is shown to be not of constant occurrence; for it has only happened about one-third of the time during the long period of fifty-four years. The statement also establishes that, when the ice-barrier existed at Quebec, vessels from sea arrived at that Port before navigation was open to Montreal, as follows:—

In 1835.....	2 days earlier	In 1872.....	7 days earlier
1843.....	17 "	1874.....	12 "
1848.....	5 "	1875.....	10 "
1854.....	6 "	1876.....	3 "
1867.....	15 "	1883.....	6 "
1870.....	9 "		

Whilst only on four occasions did a vessel from Montreal arrive at Quebec before any arrival from sea, viz. :—

In 1845.....	6 days earlier	In 1882.....	7 days earlier
1850.....	3 "	1884.....	1 "

In the years 1836, 1847, 1855 and 1863, the arrivals from Montreal and from sea were simultaneous.

Contrariwise, the table establishes that in the 38 years when there was no ice-barrier at Quebec, the first arrival at that Port was of a Steamer from Montreal 20 times, and a Vessel from Sea 16 times,—on two occasions arrivals both ways being simultaneous.

Let it be borne in mind that navigation is not considered open until a vessel has come down to Quebec from Montreal, and the importance of the facts summarized in the "Statement" becomes more apparent; for, in point of time, the arrivals from Montreal when there was no ice-barrier at Quebec, occurred in the month of April 35 times out of 38,—the opening of navigation being in May 14 times out of 19, when the ice-barrier existed between Quebec and Levis.

It is worth while, also, to particularize that, in the years when there was no ice-barrier at Quebec, the Montreal steamers plied between the two Ports before the arrival of the first vessel from sea, as follows:—

In 1830.....	9 days	In 1853.....	1 day.
1832.....	5 "	1857.....	11 "
1833.....	22 "	1858.....	11 "
1834.....	18 "	1859.....	7 "
1838..	5 "	1860.....	2 "
1839.....	17 "	1864.....	6 "
1842.....	12 "	1865.....	8 "
1844.....	9 "	1866.....	2 "
1849.....	3 "	1871.....	4 "
1850.....	3 "	1881.....	1 "
Total.....		156 days.	

On the other hand, when there was no ice-bridge, vessels from sea came up to Quebec before the arrival of any of the Montreal steamers, as follows:—

In 1831.....	5 days	In 1868.....	5 days
1837.....	2 "	1869.....	3 "
1840.....	4 "	1873.....	4 "
1841.....	2 "	1877.....	1 "
1851.....	2 "	1878.....	1 "
1852.....	15 "	1879.....	3 "
1856.....	7 "	1880.....	1 "
1861.....	4 "		
Total.....		59 days.	

Another result shown in the foregoing "Statement" is, that between 1830 and 1884, in the years when there was no ice-barrier at Quebec, navigation between that City and Montreal was opened as early as the 17th day of April,—the average of the years being the 24th day of that month; whereas, when the barrier did exist, the opening of navigation was retarded until the 11th day of May, the average opening being on the 8th of that month,—or an average retardation of fourteen clear days annually.

It seems clear, therefore, that if the ice formation between Quebec and Levis were prevented, the opening of navigation between Quebec and Montreal would, on the average of years, occur at least a fortnight earlier than when the ice-bridge, so-called, is in existence.

The following extracts from a diary show very strikingly what was the experience at Quebec, in two seasons *without* an ice-barrier, and in a recent season *with* the obstruction :—

- 1877—April 10. Several schooners in Port from below.
 “ 13. Light-ships out and ready for below.
 “ 20. Summer ferry-boats running.
 “ 24. Ship at Metis.
 “ 25. First ship arrived.
 “ 30. Allan Steamship arrived.

The Winter Ferry-boats had run all Winter.

- 1878—April 2. Pilot Schooners out and ready for below.
 “ 8. Boat from Island of Orleans.
 “ 10. Two small Steamers from Montreal.
 “ 13. Light-ships ready for below.
 “ 15. Ten Ships at Fox River and Metis.
 Five Schooners arrived in Port.
 “ 18. Summer Ferry-boats running.
 First Ship from sea.
 “ 21. First Steamer from Montreal.
 “ 24. Allan Steamship in Port.

Winter Ferries had been running all Winter.

- 1883—Jan. 8. Ice formed at Cap Rouge.
 Feb. 3. Ice formed opposite Quebec to lower end of Indian Cove,
 five or six miles below the City.
 “ 8. First freight carted across,—five days' detention.
 April 10. Schooners at lower edge of ice,—cannot get into Port.
 “ 14. Schooners loading at edge of ice,—five miles down—
 charge for cartage, \$1.00 per small load.
 “ 16. Ice dangerous ;—carting ceased.
 “ 23. Ice-bridge gave way opposite town.

- May 1. Steamship "Ontario" arrived at Indian Cove.
 " 2. Steamship "Concordia" arrived at Indian Cove.
 " 3. Steamships "Scotland," "Grecian," "Lake Champlain"
 and "Scandinavian" arrived at Indian Cove.
 " 4. Ice at Cap Rouge gave way.
 " 5. The above-mentioned Steamships left for Montreal.
 " 6. In the evening,—first Steamer from Montreal.

If, in view of what has been advanced in the foregoing "Statement" and analysis, it may at any time be determined upon to endeavor to make available the advantages expected to accrue from the removal or prevention of the ice-barrier between Quebec and Levis, the initial obstacle will be the subsection of the Act recited at the beginning of this Report. That its achievement is possible is the deliberate opinion of many of the best informed observers. Among others whose views might be quoted, special reference may be made here to the opinions of Mr. J. U. Gregory, Agent at Quebec of the Department of Marine and Fisheries, which have been submitted to experienced and aged navigators, whose lives have, for the greater part, been spent at or in connection with the Port of Quebec, and approved of by them. The replies to the subjoined queries embody the opinions of Mr. Gregory, as recently expressed by him:—

1. With existing means, could the ice be prevented from forming, under ordinary circumstances, both opposite to Quebec and at Cap Rouge?

Ans. Yes, at Quebec;—but at Cap Rouge ice is very much packed or jammed,—do not think it could be kept open without a suitable boat, kept constantly at work, breaking the ice in the channel,—and this is doubtful.

2. In the interest of the trade of the country, and the reputation of the River St. Lawrence, is it more desirable to have an ice-bridge at Quebec than open water all Winter?

Ans. In the interest of trade, it is decidedly an advantage to have the river open;—for navigation below Quebec is quite as safe in March, or earlier, as in April or May.

3. Which means of crossing the River St. Lawrence at Quebec in Winter is the safer and cheaper (on the whole,)—the Steam Ferry or the horse sleigh ?

Ans. The Steam Ferry is cheaper, and on the whole safer.

4. If some extraordinary circumstance (such as a heavy storm, or oppressive cold) should occur to make it impossible to prevent the formation of an ice-bridge,—when such influence has ceased, would it be possible and advisable to at once break up the bridge and restore navigation ?

Ans. Yes, decidedly,—as the wharves cannot be used ; and it is quite possible to break up ice just formed by the present Ferry-boats.

5. Does the existence of an ice-bridge at Quebec retard the opening of navigation?—if so, about how many days ?

Ans. I believe that it retards navigation. As to number of days, that can only be estimated according to the date of sailing for this Port,—which, I believe feasible very much earlier than at present,—say March.

6. Suppose the ice to have formed at Cap Rouge—can it be broken up by blasting ? If so, at what period after its formation should blasting be resorted to ? and would it be an expensive operation ?

Ans. Early in March, when no bridge opposite Quebec, as ice does not form much after that. Cannot estimate expense ; but probably from \$1,000 to \$2,000 should be sufficient to make a fair trial.

7. Have ice-bridges at Quebec, in the past, caused any loss of life or of property ?

Ans. Yes,—very serious loss of property, especially in 1874, when the Government steamer "Napoleon III." and several other vessels were wrecked by the ice-bridge giving way. Many persons have lost their lives by venturing to cross the bridge late in Spring. This season, goods for the Lower Ports were sent *via* Montreal, on account of the dangerous crossing, for several days.

Regarding Mr. Gregory's reply to the 5th question the Secretary has been favored with the following opinion:—"Navigation below Quebec is always possible after the beginning of February, and quite safe. Petitions have, at different times, been presented to Government, praying for subsidies to help to demonstrate the practicability of winter navigation on the lower St. Lawrence. Whilst no decided attempt has yet been made to prove the theory, there can be little doubt that, if once made it would be successful, and might have the effect of inducing shipowners to dispatch their vessels to the St. Lawrence some weeks earlier than they do at present. No step, however, is likely to be taken in the face of a statutory enactment which makes it a crime punishable by fine and imprisonment at hard labor, to break up the ice obstruction opposite Quebec."

With respect to the answer to the 6th question it may be mentioned here that Lieut.-Col. Cotton, of the Citadel at Quebec, has made some experiments in blasting the ice at Cap Rouge, and in reply to an inquiry he has kindly sent a note as follows:—

THE CITADEL, QUEBEC,

9th June, 1884.

WM. J. PATTERSON, Esq.,
Secretary Board of Trade,
Montreal.

DEAR SIR,

You ask as to whether, in my opinion, keeping the River opposite Quebec open would have any effect in lessening or preventing the formation of the barrier at Cap Rouge.

Although the employment of powerful steam Ferries between Quebec and Levis would, no doubt, to a very great extent, prevent the ice barrier, still, in my opinion, it would not insure it. In the Winter of 1882-83, the barrier was formed at Cap Rouge for some days before the Ferries ceased running opposite Quebec; while in 1883-84 the contrary was the case.

From my experience of the last two Winters' work, I am confident that the removal of the barrier is possible by means of explosives. I was quite satisfied with the result of our work last April. The total cost of the operation was \$144.00, which included travelling expenses of \$37.

Some years ago a pier was built in the River near Cap Rouge, for the purpose of insuring an "ice-bridge," but it was eventually carried away by the ice.

If I can give any further information in the matter, pray command me.

Yours sincerely,

(Signed) W. H. COTTON.

With regard to the influence of the ice-barrier at Quebec upon the ice formation at Cap Rouge, it is most important to consider that the bend in the River St. Lawrence which forms the basin or harbor at that City, extending from above Hadlow Cove to the point called Point Levis,—a distance of about four miles,—diverts the flow of the current nearly at a right angle to its course through the Cap Rouge channel, besides materially checking it, so that in the harbor proper the speed of the current is less than at almost any other point from Lake St. Peter to the sea. It must be evident, therefore, that when the harbor of Quebec becomes frozen over, the ice can only move away when thoroughly rotten, and *must* retard that at Cap Rouge from breaking up. The foregoing tabular Statement [see page 3 of this Report] proves that such is the case, when it shows that, in the 38 years when no ice-barrier formed at Quebec, the navigation between that City and Montreal opened in the month of April 35 times, notwithstanding that the ice must always have "taken" at and above Cap Rouge;—while, when the "bridge" had formed at Quebec, that same navigation had been delayed until well into the month of May.

CONCLUSION.

Having considered the various particulars adduced, it seems to the Secretary as if the questions which were to be kept in view by him might be justly answered as follows :—

1. Can the River St. Lawrence, between Quebec and Levis, be kept open during Winter by Steam Ferry Boats ?

Ans. Yes, with but few exceptions.

2. What influence has the ice-barrier (the so-called ice-bridge) at Quebec upon the ice-formation at Cap Rouge ?

Ans. Undoubtedly a great deal.

3. Can the ice-barrier at Cap Rouge be destroyed in Spring, so as to admit of navigating the River at an earlier date than usual ?

Ans. Yes.

4. To what extent does the ice-barrier at Quebec retard the opening of River navigation ?

Ans. Probably several weeks.

Further,—the Secretary has no hesitation in saying that the important advantages of an earlier opening of navigation on the River St. Lawrence ought to induce the prompt removal of the existing statutory obstacle, which prevents experiments and operations that might be beneficial to the trade of the cities and towns from Quebec upwards, as well as to the foreign commerce of the Dominion.

