ANNUAL REPORTS

OF THE

HARBOUR COMMISSIONERS

OF MONTREAL

FOR THE YEAR 1888.

Commissioners:

ANDREW ROBERTSON, Esq. CHAIRMAN.

EDWARD MURPHY, Esq.
HENRY BULMER, Esq.
VICTOR HUDON, Esq.
J. O. VILLENEUVE, Esq.

HUGH McLENNAN, Esq.
CHARLES H. GOULD, Esq.
HON. J. J. C. ABBOTT, Q.C., MAYOR.
ANDREW ALLAN, Esq.

ALEXANDER ROBERTSON, SECRETARY.

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Harbour Commissioners of Montreal.

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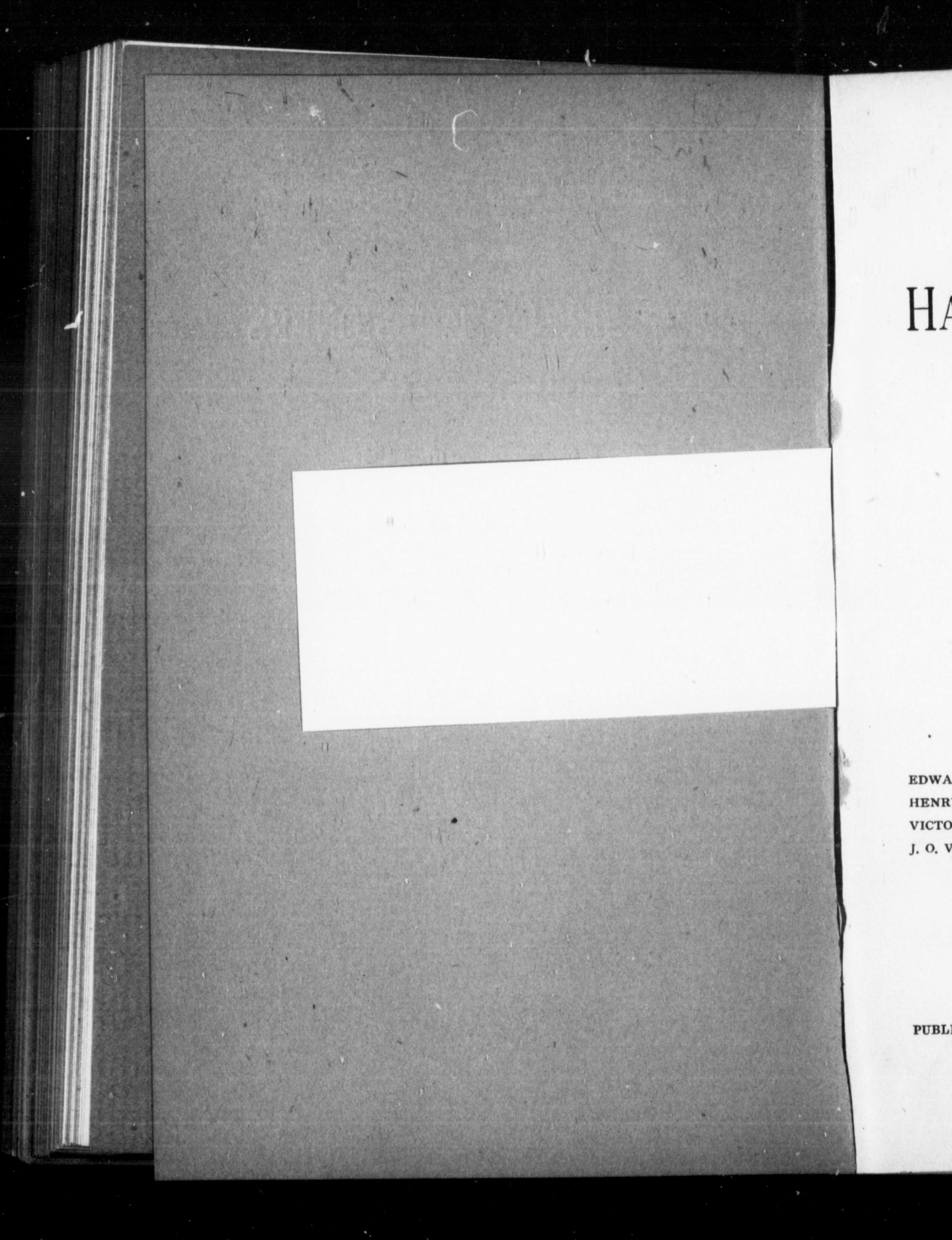

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STATEMENT

MADE BY

MR. ANDREW ROBERTSON, CHAIRMAN,

HARBOUR COMMISSIONERS OF MONTREAL,

ON THE

Business of the Port for the year 1888, *and other matters connected with the Trust.*

AT THE PUBLIC MEETING OF THE BOARD, HELD ON 29TH JANUARY, 1889.

GENTLEMEN :—

Last year has been an eventful one in the history of the Harbour Trust. During the last session of Parliament an Act was passed which assumed the Lake St. Peter Debt, and relieved the Board of interest on the expenditure made on the deepened channel.

This enabled us to give a Free ship, that is to say no Tonnage dues are levied, so that the Harbour of Montreal, in so far as the ship is concerned, is free to vessels from all parts of the world, as well as to our inland navigation.

The next most important event of the year was the opening of the Ship Channel on the 7th November, to 27½ feet, at which we had the presence of the Hon. Sir Hector Langevin, Minister of Public Works and the Hon. C. H. Tupper, Minister of Marine and Fisheries.

I do not know that I can say anything more in regard to this subject than I said on that occasion, and which, for the sake of keeping a record of the fact in our Report, I take the liberty of repeating here :

"Gentlemen, six years have passed away since I had the honor of proposing the toast of Her Majesty's Min-

siters, when our channel was carried down to 25 feet. I am proud to have the honor of again proposing it after six years of steady and difficult work. I may recall to your recollection what I then said, namely, that in 1850 our channel was only 11 feet on Lake St. Peter; three years after, in 1853, 16 feet was obtained; in 1859, two feet more had been added, making 18 feet; in 1865, we reached 20 feet; in 1878, 22½ feet; in 1882, 25 feet, and now we have brought down the channel in the river and Lake St. Peter to 27½ feet, and at *Cap à la Roche* to the same depth at half tide. You are no doubt aware that the water falls in the river as the season progresses. There is generally plenty of water in May, June and July. I have taken off a list of the deepest draft vessels this year, and find that the greatest depth was in July, when a vessel, drawing twenty-five feet nine inches, was taken down. The deepest laden vessels each month from May to November, have practically averaged 25 feet and it is satisfactory to state that during the year, there has been no serious accident. It gives me great pleasure to congratulate you on this occasion on the near completion of a work that has been going on for over forty years. The channel has now two and a half times the depth it had in 1850. I have also to congratulate the Government on the wise policy they have shown in the assumption of the debt. We are now enabled to give a Free ship, no tonnage dues being levied, thereby benefitting the whole people of Canada by inducing more ships to come to the St. Lawrence, and thereby reducing the rate of freight. It has cost about three millions of dollars to deepen the channel from 20 to 27½ feet. I think the people of Canada must recognize that it is a very cheap work, nearly 40 miles of dredging from 20 feet to 27½ depth."

"The last time I spoke on this subject I stated that I believed no expenditure that has been made on railways, canals, or other public works, has been, or will be, of such

vital importance to the Dominion, as a whole, or will yet show such splendid results for the amount expended as that upon this work, which we have this day met to see officially opened by the Minister of Public Works, the Hon. Sir Hector Langevin. I am glad to have this opportunity of saying that that gentleman has always taken a lively interest in this important work. Since the assumption of the debt by the Government, the work has been carried on by the Harbor Commissioners under his direction. We all know the interest he has taken in the public works of the Dominion, and I am sure it will be a source of gratification to him that he has been present on this occasion to declare the channel finished to 27½ feet at the lowest water in the channel and at half tide at Cap à la Roche."

Sir Hector Langevin followed, paying a tribute to the men who had foreseen the necessity of this channel, even before he was born. He had, perhaps, lost some of his popularity in advocating the channel deepening, but if a man could not risk some local unpopularity in order to benefit the whole country, he was not fit to be Minister of the Crown. He took no special credit, but had done his simple duty. The credit belonged to those far-seeing men who had thought out the project—a project that had enabled them, when threatened by retaliation, to feel that they could carry their merchandise through their own waters to that great railway which transported them to the shores of the Pacific, independently of their neighbors. He congratulated them upon the depth reached, and on the country recognizing it as a national work. He had no doubt they would put in his hands enough of money to round the corners, and widen the narrow parts of the channel. It had been a source of great pleasure to him to stand and see three ocean steamers, two side by side, and the third passing them on the outside, and all with plenty of room. This work would

help the whole country. Here Sir Hector paid a compliment to the great city of Quebec and to the enterprise of Three Rivers, and thanked the merchants present for their kindly reception of him.

Hon. C. H. Tupper responded, and in the course of some remarks spoke of the greatness of this work in comparison with the deepening of the river Tees in England, which had been increased from four and a half to nineteen feet. How much greater was the work they were now celebrating, done by a people of only five millions. He argued that this work was an advantage not only to the cities mentioned by Sir Hector, but to the Maritime Provinces, because down there they built ships, owned and manned them. Therefore they, too, were interested in its completion.

On the 31st December last we handed over the Channel Fleet and appliances for further deepening of the Channel, to the Public Works Department, who propose to finish Cap-a-la-Roche, and make certain improvements necessary in widening and straightening a few points in the Channel.

From the Harbour Master's Report it will be seen that 655 seagoing vessels arrived in port during 1888, of the aggregate tonnage of 782,473 tons, showing a decrease as compared with 1887, of 112 vessels and 88,300 tons.

Of Inland Vessels there arrived in Port 5,500 vessels of an aggregate tonnage of 863,014 tons showing an increase of twenty vessels, and in tonnage of 71,562 tons.

The total number of vessels of all classes was 6,155 and 1,645,487 tons in tonnage, showing a decrease in tonnage of all vessels of 16,738 tons or about one per cent.

The tonnage of vessels was in

	Ocean.		Inland		Total.
1887.....	870,773	.....	791,452	.. ...	1,662,225.
1888.....	782,473	.....	863,014	.....	1,645,487.
A decrease of	88,300	Increase	71,562	Decrease	16,738.

FINANCE.

You are aware that in 1881 a reduced Tariff came into operation which was twenty to thirty-three per cent. of a reduction on the Tariff of 1880. During the seven years for what may be considered the Harbour proper we received for

Imports of goods	$738,673
Exports of goods	405,532
Local Traffic	288,006
Or in all	1,432,211

Our expenditure for the Harbour was as follows :

Harbour Interest		804,191
Repairs		343,146
Management, &c	$237,811	
		1,385,148
Surplus in seven years		47,063
		$1,432,216

During the same septennial period, from 1881 to 1887, we received from

Tonnage Dues on Shipping, Ocean and Inland	$318,733
And we paid interest to the Government in seven years	538,219
Showing a deficiency of	219,486
	$318,733
During the same time we expended on Buoys and Beacons the sum of	$ 62,794
And received from Government	35,000
Or a loss of	27,794
To which add deficiency on the shipping	219,486
	$247,280

irrespective of the loss of interest which would bring the amount to nearly $300,000 which has had to come out of the Harbour resources.

During these seven years very much has been done in enlarging the size of the Harbour, and much more, in enlarging its working capacity. There has been built 4776 feet (or nearly a mile) of deep water wharves, abolishing 3419 feet of shallow or otherwise unsuitable wharves, thus giving a net increase of 1357 feet of wharf frontage, all of which is for large vessels.

With this increase of front there has also been added to the area of wharf space 324,000 square feet or 7¼ acres. Nearly the whole central part of the Harbour has also been deepened from its former depth of 20 feet or less, to its present depth of 27½ feet, so as to keep pace with the deepening of the ship channel.

It must not be forgotten that we have expended nearly $200,000 in deepening the channel in the Harbour to 27½ feet.

This year we sold $150,000 Harbour Bonds "Series G" at 4% at par, being four per cent. more than last year, showing that our credit is greatly improved since the last Act enabling us to borrow at or under par instead of par or over.

The Debentures outstanding in 1879 were....$1,905,887
and the interest on the same was..... 112,721
The Debentures outstanding now amount to. 2,155,000
increase of practically $250,000, and the interest
payable this year will be..... 112,405
or $300 less than ten years ago.

1887 AND 1888 CONTRASTED.

It is, under the altered circumstances of *no* tonnage dues this year as *against* tonnage dues last year, rather difficult to make an accurate comparison, but for the Harbour Revenue I put it down last year as $225,000, and for this year at $218,000, a difference of $7,000 less this

year than last, but for the break in the Cornwall Canal which took place on the 12th October, and was only repaired on 15th November, say nearly five weeks, I feel confident our Revenue would have been equal to that of 1887.

I am happy to state that last season has been singularly marked by the absence of casualties of any importance on the river.

It is with deep regret that I have to chronicle the death of the Honourable Senator Rolland, our confrère on this Board for many years, and who died on March 22nd, 1888.

Mr. J. O. Villeneuve, a well-known Member of the City Council, was appointed by the Government to fill his place.

Mr. Allan's term of office having expired on the 6th August, he was again unanimously elected by the Shipping Interest, to act as their representative on this Board for another term of four years.

On the 11th January, 1888, we sent a memorandum to the Government regarding the maintenance of the Buoy and Beacon Service, a copy of which is hereto appended, and which explains itself.

During the last season, I made four trips on Ocean Vessels between Montreal and Quebec, and Quebec to Montreal, to enable me to see personally how the largest ships got along in the Channel, and which I found most satisfactory, in so far as my knowledge went. The Pilots seemed capable, earnest and anxious in their work.

When in Glasgow, which has a Trust, the Clyde Trust, similar to our own, I learned that the deepest draft vessel that ever left Glasgow was the "Lord Chamard," on 2nd November, 1887, drawing 25 ft. 2 ins. The SS. "Carthegenian" on which I came out, left drawing 24 ft. 6 ins. We left at high tide, but got aground before we

reached Port Glasgow, and had to wait there for the next tide.

At low water in the Clyde it is 17 feet, and at high water or spring tides it is 28 feet. I learned that about one fifth of the steamships are obliged to use Tugs to get them down the river to deep water.

Their pilotage dues are not so great as ours, as they have only 22 miles to go, but their dues on goods may be estimated at about 75% higher than ours.

The following table gives a list of the deepest draft vessels which have arrived and departed through the Channel during the seven months from May to November:—

May	Vancouver	25.0
June	"	25.8
July	Pomeranian	25.9
August	Sarmatian	25.0
September	Quebec	24.8
October	Gerona	24.10
November	Sarnia	25.3

It will be seen that the deepest draft was 25.9 and the lowest 24.8 which was simply because they could not get dead weight enough, at that time the average draft being 25ft. 2 inches.

The following resolutions were passed by the Board on the 13th November.

It was resolved that the thanks of the Board are due and are hereby tendered to Messrs. H. & A. Allan, for the use of the S.S. "Sardinian" of the Allan Line of Royal Mail Steamships, on the occasion of the official opening of the 27½ feet Ship Channel between Montreal and Quebec on the 7th instant, also that the Board desires to thank through them the Captain, his Officers and crew, and the Chief Steward and his Staff for the courtesy and attention shown by all of them during the trip, to the Com-

missioners and their numerous guests, and that the Secretary send them a copy of this resolution.

It was also resolved that the thanks of the Board are due, and are hereby tendered to Captain Joseph Ritchie, Commander of the S.S. "Sardinian," when used for the Official Opening of the 27½ feet Ship Channel between Montreal and Quebec on the 7th instant, as he also was Commander ofthe S.S. "Peruvian," when used for the Official Opening of the 25 feet Channel on the 3rd October, 1882, and that the Secretary send him a copy of this resolution.

NEW PLANS FOR HARBOUR EXTENSION AND IMPROVEMENTS.

You will no doubt remember that I have repeatedly said that until the Government assumed the debt incurred for the 27½ foot channel, we could not go into any extensive scheme of improvements in the Harbour proper. When, however, the debt was assumed, we opened communication with the City Council as to co-operating with us in a scheme which would provide an increase of the Harbour accommodation, and at the same time secure the city from inundations. A committee of three was appointed, viz:—Messrs. McLennan, Bulmer and myself for the Harbour Board; while Alderman Jacques Grenier, chairman of Finance; Alderman Laurent, chairman of the Road Committee; and Alderman Wilson were appointed by the city. When the two committees met, we instructed our Chief Engineer Mr. Kennedy, and Mr. St. George, City Surveyor, to take the subject into their consideration in all its various phases, and to devise some plan which would cover the ground as already mentioned. They have been all last season at this work besides attending to their respective daily duties, and they have just sent in six alternative plans which, with their report, are now on the table for your inspection.

You will thus see that so soon as it was practicable, we made a movement to go a step forward by getting the plans prepared, and so soon as the City Council have had laid before them the report, I think the Engineers' joint report should be printed, and all who are interested should have an opportunity of expressing their opinions before any plan is decided upon.

It would also be highly desirable that the Railway Companies should confer and see what can be done for their interest.

The main features of the plans have been submitted to the Flood Commission who have so far approved of the general plan as to say, that it would not increase the inundations.

I am sure that you will agree with me when I say that it is the heartfelt wish of this Board to do all we can to further the Trade of the City of Montreal, by doing all in our power to advance the Shipping and Railway Interests in our Harbour.

HARBOUR COMMISSIONERS OF MONTREAL.
SECRETARY'S OFFICE,
MONTREAL, January 11th, 1888.

Memorandum to the Honourable the Minister of Marine, from the Harbour Commissioners of Montreal, regarding the maintenance of Buoys and Beacons on the Ship Channel between Montreal and Quebec.

For several years past the maintenance of the Buoys and Beacons on the Ship Channel has been carried on by the Harbour Commissioners in connection with their work of deepening the Ship Channel. Certain officers and steamers have, from time to time, been detailed for the Buoy service, and for surveying and general attendance upon the dredging fleet, aud when not needed in one service their time has been utilized in the others.

The tugs acting as tenders to the dredges working at different points along the River, have also been always available and often close at hand in emergencies. In Spring and Fall, for instance, when the Buoys have to be placed and taken up rapidly throughout the whole Channel, or during summer, when buoys at different places happen to be simultaneously deranged, the requisite number of boats have been taken and assigned to different sections of the work.

The system has the advantage of promptness and large resources for emergencies, and it is economical because only the time in which the boats are actually engaged in buoy and beacon work is charged to the service. On the other hand there is the disadvantage of having no steamer properly built and equipped for rapidly handling buoys, and the want of experiences which would come from a boat's crew always being engaged at work.

But in any case the system cannot be continued beyond the early part of next summer, when the Channel will be completed above Cap-a-la-Roche, and the dredging fleet hitherto scattered along the River will be concentrated below.

It is therefore necessary that other provisions be made for the maintenance of the buoys and beacons in future, and not only for this, but for other services pertaining to the navigation and maintenance of the Ship Channel. It will, for instance, be necessary that the bottom of the Channel be systematically tested, from time to time, with special testing apparatus, attached to a steamer, in order to detect filling up, and the deposit of dangerous obstructions, such as boulders, anchors, &c.

Parts of the River which are changing or suspected of becoming shoal will have to be surveyed, vessels which ground or meet with other accidents will require to be visited, and their positions and the condition of the River bottom accurately ascertained.

These and other services can only be efficiently done by means of a steamer specially designed and built for the purpose.

The Commissioners have hitherto accomplished the different services only by selecting from their fleet the most suitable boat for each particular duty, and yet have laboured under much disadvantage. The ordinary tugs, for instance, have no space for stowing buoys, and therefore have to take along with them a scow, provided with a crane. This answers fairly well for calm weather, but is unmanageable in any wind. An ordinary paddle steamer affords the necessary stowage space, and also accommodation for officers, but at the best is somewhat unhandy for setting buoys, and unless provided with independent paddle engines she is entirely useless for setting buoys during wind or for surveying and Channel-testing in any weather.

A boat to be suited for the service requires to have large deck and hold space for stowing buoys with their ballast, anchors and chains; she needs to be seaworthy in rough weather in Lake St. Peter, and below Platon, and yet of moderate size so as to be economical in working and maintenance. She needs to have twin propellors so as to be under thorough control, and requires to be fitted with steam cranes and other appliances for handling heavy buoys rapidly, and with few men.

Plans for a new steamer, 117 feet long and 18 feet beam combining these requirements as far as practicable have been drawn out, and are herewith submitted. The estimated cost, if well but plainly built is about twenty-five thousand dollars.

As to the management of the service in future, the Commissioners believe that it should continue in the hands of the Government primarily and that the immediate administration should be in the hands of the

Commissioners as at present. They believe that the service is one which would not be satisfactorily performed by contractors. The public interest obviously requires that the buoying be as nearly perfect as practicable, at any cost, while a contractor's interest would certainly be to perform the service as cheaply as possible.

The public interests at stake in this case are too enormously great to be placed in jeopardy in this way, and the Commissioners therefore submit that the contract system for the maintenance of buoys is not applicable upon this part of the St. Lawrence. On the other hand there are important considerations showing, as the Commissioners think, that the buoying should be continued under their supervision.

The interests of the Commissioners and the Public would be identical, and all in the direction of securing the highest efficiency in the buoying. The supervision and maintenance of the Ship Channel, the jurisdiction over the pilots and the oversight of navigation matters on this part of the St. Lawrence with which the Commissioners are charged, will always require that they have an efficient surveying and cruising boat under a proper officer in their service. This and the buoy service are of such a nature that they can be appropriately combined. A steamer suited for buoy work will also be suited for the other: the officer in charge aboard would need very much the same information and equipment for the different duties, and in going over the river for one he could often economize his own time and the boat's in attending to the others. All the work could be done under the supervision of the same officer of the Commissoners at headquarters. One boat and one supervision would in this way do for all purposes.

For these and other reasons which will suggest themselves, the Commissioners believe that both economy and

efficiency would be best secured by their carrying on the maintenance of the buoys and beacons in connection with their other work.

As to the cost of the service it is somewhat difficult to make an estimate under future conditions materially differing from those of the past or present. The continued deepening of the Channel and the larger and faster vessels which navigate it have necessitated a more costly buoy service. Not only has the number of buoys been much increased, but they have to be larger and better, and must be kept in position with more accuracy and promptness than formerly.

The larger and more powerful steamer needed, and its employment exclusively upon this and other services immediately connected with navigation matters, will also be a new condition.

The cost to the Harbour Commissioners under the present arrangement has been as follows:—

Year.	Total Cost to Commissioners.	Amount allowed Commissioners by Government.	Days Service of Steamers.	
1884	8199	7,000	113	
1885	10337	7,000	83	
1886	7624	7,000	70	
1887	13669	7,000	116	
	39829	28,000		

Average $99.57.

The annual cost, it will be observed, varies much, arising from variations in the work done. In 1885 for instance, a number of large steel buoys were made and placed at important places.

In 1887 an additional number were made, and the greater part of all the spar buoys were taken up and replaced by larger ones, with new and improved ballast weights.

Under the proposed future arangements, with exclusive service of a boat, the average yearly cost will of course be increased, and may be estimated at about $12,000.

Upon this point however, the Commissioners suggest, that it would be preferable for a year or two that the work be carried on as economically as possible, and the Commissioners refunded the actual cost upon detailed statements rendered to the Government: after which it might be continued, either in the same way or under a fixed yearly grant, the amount of the grant being based upon the experience by that time gained.

Extract from the Minutes of a Meeting of the Harbour Commissioners of Montreal, held on 20th November, 1888.

Resolved: That in view of the changed conditions under which the Buoys and Beacons between Montreal and Quebec must hereafter be maintained, owing to the completion of the main part of the channel and the assumption of the dredging fleet, and the work by the Dominion Government, the attention of the Honourable the Minister of Marine be directed to the matter, and that he be respectfully requested to consider the representations made by this Board to his Department in a Memorandum on this subject, dated the 11th January last.

Further that this Board desires to again express its opinion on the importance of having a boat specially adapted for the Buoys and Beacons' service, and also to draw the Honourable Minister's attention to the fact that the yearly appropriation of $7,000 hitherto made by the

Government for the same has been insufficient, and that in future the cost of maintenance will be greater than in the past when the Channel Fleet was distributed at different points.

Also that the Honourable the Minister be asked to consider the Board's request of 24th January last, that Lights be placed by which deep-draught vessels may be able to pass the St. Croix and Point aux Trembles Shoals by night; which, at certain states of the tide would avoid the loss of a whole day in a vessel's time between Montreal and Quebec, and is therefore of very great importance in the interests of Navigation.

STATEMENT

OF

GENERAL RECEIPTS AND DISBURSEMENTS

OF THE

HARBOUR COMMISSIONERS OF MONTREAL,

FOR THE YEAR 1888.

HARBOUR COMMISSIONERS OF MONTREAL,

Secretary's Office,

MONTREAL, March 22nd, 1889.

WILLIAM SMITH, Esquire,

Deputy Minister of Marine,

OTTAWA.

SIR,—

I have the honour, by direction of the Harbour Commissioners of Montreal, to forward herewith, for the information of the Honourable the Minister of Marine Statement of the General Receipts and Disbursements of the Trust for the year ended 31st December, 1888.

Leaving aside Tonnage Dues, which were abolished by the Act 51 Vic., cap. 5, from 23rd May, 1888, the ordinary Revenue shows a decrease, as compared with 1887, of about $7,000 or 3$\frac{1}{5}$ %.

The following Departmental Reports have already been forwarded you, namely: the Chief Engineers's on the Harbour Works; the Harbour Master's, with comparative statements of the Trade of the Port; the Chief Engineer's on the Maintenance of the Buoys and Beacons on the River; and the Report on matters relating to the Pilotage District under the jurisdiction of the Commissioners.

From the Harbour Master's Report, it will be seen that there was a small decrease in the business of the Harbour during the past year; Sea-going Vessels being fewer by 112 in number and 88,300 tons, while Inland Vessels increased by 20 in number and 71,562 tons, the difference being a decrease of 16,733 tons or about one per cent.

The usual Report on the deepening of the Ship Channel between Montreal and Quebec to 27½ feet at low water, for the last Fiscal year, was duly furnished the Department of Public Works.

The 27½ foot Ship Channel having been fully deepened, except at Cap à la Roche, was officially opened on the 7th November last, when the Commissioners had the honour of being accompanied by the Honourable the Minister of Public Works, and the Honourable the Minister of Marine.

On the 31st December all the Channel plant was handed over to the Department of Public Works which then assumed the immediate direction of the further improvement of the Channel.

I have the honour to be, sir,

Your obedient servant,

ALEXANDER ROBERTSON,
Secretary.

HARBOUR COMMISSIONERS OF MONTREAL.

STATEMENT OF GENERAL RECEIPTS AND DISBURSEMENTS FOR THE YEAR ENDED 31st DECEMBER, 1888.

RECEIPTS.		REVENUE.	CAPITAL.
Balance at 31st December, 1887.			
Cash on hand and in Bank of Montreal	$ 1,219 58		
Cash in Mr. Wm. L. Scott's hands at Sorel	103 35		
Sundry Accounts due (Less Coupons, &c. due, and Outstanding	11,389 26		
Macadamizing Stone and Timber on hand	4,786 32		$17,498 51
Dominion Government of Canada, on account of Ship Channel			197,848 90
Do. do. under Act 51 Vic., Cap. 5, Sec. 2			37,405 00
Department of Marine, Grant for Buoys and Beacons for 1887			7,000 00
Department of Railways and Canals, Rent of Offices in Building		$1,250 00	
Collector H.M. Customs, Montreal.			
Wharfage on Goods, Inwards	$127,491 95		
Do. Outwards	62,557 06		
Tonnage Dues on vessels (to 22nd May, inclusive)	4,289 41		
		194,338 42	
Local Traffic.			
Wharfage on Goods, Inwards	$ 8,625 95		
Do. Outwards	1,290 05		
Tonnage Dues on Barges (to 22nd May, inclusive)	864 35		
Do. Steamers (do. do.)	305 07		
Commutation of Harbour Dues on Steamers	10,200 00		
Rentals of Spaces for Lumber	2,325 00		
Do. Coal	1,800 70		
Do. Small Offices	925 65		
Do. Scales	1,000 00		
Do. Firewood	524 85		
Do. Phosphate	150 61		
Revenue from Penalties	10 00		
		28,022 23	
Grand Trunk Railway Company, Wharfage on rails landed		234 65	
Cooper, Fairman & Co., Wharfage on fish plates landed		61 05	
J. & H. Taylor, for removal of rails to order, and ground rent on same		116 45	
Can. Pacific R'y Co. do. do. do.		1,138 79	
John Lee & Co., for rental of portion of Harbour Yard		250 00	
Sundry Old Material sold for account of New Channel Operations			866 58
Sundry Work performed for account of Harbour Dredging			2,184 79
Sundry Amounts received do. Electric Lighting		350 77	
Do. do. do. Harbour Expenses		319 81	
Pilots' and Apprentices' Licenses, &c., for account of Pilotage Expenses		119 00	
Harbour Debentures Sold.			
Series F 4 per cent. (par value) to redeem Series L	$ 63,000 00		
Do. G 4 per cent. sold at par for New Works	150,000 00		
			213,000 00
Accrued Interest on the above $63,000		488 21	
Montreal Decayed Pilot Fund.			
Capital at 31st December, 1887			45,266 22
Trinity Dues (5 per cent. of all Pilotage Dues)	$ 2,307 06		
Interest on Investments and on Cash in Bank	2,444 31		
			4,751 37
			525,821 37
			226,689 38
			752,510 75

DISBURSEMENTS.		REVENUE.	CAPITAL.
New Channel Operations, Wages and Material used			$178,415 96
Buoys and Beacons, Maintenance of			6,344 09
Harbour of Montreal (Construction Account).			
Section 25, Closing up the Basin	$11,400 14		
Do. 41-46, Levelling Dredgings deposited	1,221 35		
Do. 44, Culvert for Ruisseau Migeon	881 92		13,503 41
Real Estate (Harbour Yard) Surveying	25 00		
Fitting up Shed and Fence	1,382 00		1,407 00
Harbour Dredging, New Work, Deepening Basins, &c			39,409 65
Sections 18, 19, and 12-14, Cleaning out sand, bricks, &c		$798 33	
Electric Lighting, Additions to plant			3,915 81
Do. lighting of Harbour during season		3,727 77	
Harbour Survey		2,382 39	
Refund and Rebate of Wharfage for years 1886 and 1887 on rails, &c	$8,344 88		
For year 1888 on Sugar, &c., &c	663 77		
		9,008 65	
Removal of rails, consigned "To Order," from Wharves		941 65	
Mrs. John Young, Annuity		600 00	
Sundry Accounts written off		573 55	
Legal and Notarial Expenses		155 00	
Travelling and Incidental Expenses		302 70	
Printing, Advertising, and Stationery		2,421 40	
Harbour Expenses and Management		28,793 00	
Harbour Repairs		49,519 75	
Pilotage Expenses		913 50	
Harbour Interest, paid on Debentures	$110,995 00		
Discount and Brokerage on $63,000 4 per cent. sold	2,437 50		
Bank of Montreal for Loan	776 71		
		114,209 21	
Montreal Decayed Pilot Fund, Pensions	3,647 81		
Audit for 1887 and New Cash Book	108 60		
16 per cent. Premium, 1¼ per cent. Brokerage, and 116 days' accrued interest on two $500, 6 per cent. Harbour Bonds (due 1906)	181 57		
11¾ per cent. Premium, ¼ per cent. Brokerage, and 160 days' ac. int. on one $1,000, 5 per cent. (due 1915), Harbour Bond	141 92		4,079 90
Harbour Debentures, Series L 6½ per cent. paid off			90,000 00
Balance at 31st December, 1888, made up as follows :—			
Cash on hand and in Bank of Montreal	$ 7,664 14		
Special Deposits in B. of M. at interest	140,000 00		
Sundry Accounts due for Wharfage, &c. $4,936 80			
Less Harbour Coupons outstanding 42 50			
	4,294 30		
Macadamising Stone, Coal, and Timber on hand	3,191 90		
Montreal Decayed Pilot Fund (held in Trust for).			
Montreal Harbour Debentures $40,000 00			
Do. City Consolidated Fund 5,000 00			337,075 82
Do. City and District Savings Bank (Deposit account) 937 69			214,346 90
	45,937 69		201,088 03
			752,510 75

HARBOUR COMMISSIONERS' OFFICE,
MONTREAL, 22*nd March*, 1889.

Verified
RIDDELL & COMMON, *Auditors.*
MONTREAL, 22*nd March*, 1889.

ALEXANDER ROBERTSON,
Secretary.

WESTERN CHAMBERS,
22 St. John Street,
MONTREAL, March 25th, 1989.

The Chairman
of the Harbour Commissioners of Montreal,
MONTREAL.

SIR :—

We beg to report having completed the audit of your Secretary Treasurer's books for the year ending 31st December, 1888, and that we have found everything correct and in good order.

At the beginning of the year, entries were made incorporating the Assets of the Decayed Pilot Fund, as at 31st December, 1887, in the books of the Trust : in which all receipts and disbursements in connection with this Fund during the year have been recorded.

The Balance Sheet as at 31st December, 1887, statements (1) of General Receipts and Disbursements, and (2) of Cash Receipts and Disbursements, for the year, herewith submitted, bearing our certificate, are correctly drawn up from the books of the Trust.

Your obedient servants,

RIDDELL & COMMON,
Auditors.

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REPORT

OF THE

HARBOUR MASTER OF THE PORT OF MONTREAL

FOR THE YEAR 1888.

CAPTAIN THOMAS HOWARD, *Harbour Master.*

HARBOUR COMMISSIONERS OF MONTREAL,

HARBOUR MASTER'S OFFICE,

MONTREAL, January 4th, 1889.

ALEXANDER ROBERTSON, ESQ.,

Secretary,

Harbour Commissioners of Montreal.

SIR :—

For the information of the Board of Harbour Commissioners, I beg to submit the following as my Annual Report for the year 1888, with comparative statements showing the number, tonnage, classification, nationality, greatest number of vessels in port at one time, number and tonnage of sea-going vessels consigned to the different agents, with statements showing the number and tonnage of inland vessels, and the greatest number in port at one time during the past ten (10) years.

Six hundred and fifty-five (655) sea-going vessels arrived in port during the past season, of the aggregate tonnage of 782,473 tons, of this tonnage 59,176 passed into the canal, showing a decrease of one hundred and twelve (112) vessels and 88,300 tons in tonnage, as compared with the year 1887. Of these vessels, 514 were built of iron of an aggregate tonnage of 734,854 tons, and 141 built of wood of an aggregate tonnage of 47,619 tons.

Of inland vessels there arrived in port 5,500 of an aggregate tonnage of 863,014 tons, showing an increase of twenty (20) vessels, and in tonnage of 71,562 tons and a total of 6,155 vessels of all classes, and 1,645,487 tons in tonnage, showing a decrease in tonnage of vessels of all classes of 16,738 tons.

Lumber.—There were shipped during the season to the United Kingdom, 106,090,160 feet, to South America, 14,184,814 feet, to Australia, 704,907 feet; total shipments, 120,979,881 feet, showing an increase of 5,131,191 feet over the previous year.

The Coal Trade.— During the season we had from Great Britain 40,379 tons, showing a decrease of 1,968 tons, and 2,010 tons of coke; from the United States, 186,016 tons, showing a decrease of 10,039 tons, and 1,757 tons of coke. From France, 569 tons of coal, making a total of 230,731 tons; from the Maritime Provinces, 402,724 tons, showing an increase of 34,657 tons over the previous year, and a grand total of 633,455 tons.

Phosphate.—During the season we had shipped to Great Britain 14,957 tons, and to Germany 1,176 tons, making a total of 16,133 tons, showing a decrease of 4,464 tons as compared with 1887.

The Grain Trade.—There were shipped from this port during the season 2,033,325 bushels of wheat, 2,721,282 of corn, 895,314 of peas, 3,484 of oats, 4,822 of barley,

making a total of 5,658,227 bushels, and a decrease on the previous year of 5,714,562 bushels.

The Cattle Trade.—There were exported to Europe during the season 61,003 head, and 46,223 sheep, a decrease of 3,904 head of cattle, and an increase of 11,051 sheep.

Apples.—There were shipped during the season to Great Britain 258,403 barrels, and to other countries, 5,710 barrels, making a total of 264,113 barrels. The great increase in the quantity of apples shipped, made up, in a great measure, for the deficiency in grain.

Wharf Accommodation.— During the past season the basin between section 24 and 25 has been filled in, and made flush with the front of the wharf. This improvement provides a berth of 300 feet frontage, I trust that next season the extension of the wharves at Hochelaga will be pushed forward with energy, as wharfage accommodation is much needed in that locality.

Weather Report.

January, 1888.—1st, Sunday 8 a.m. tem. 8 above zero, ice shoved in the afternoon, water five feet over the docks, 7 p.m. west wind, rain, tem. 40 above; 2nd, fine and mild, tem. 8 a.m. 28 above, 11 a.m. 22 above, sleighing good; 3rd, fine morning, water down 8 inches, ice opposite the city stationary, tem. 12 above; 4th, west wind, tem. 8 above, fine day; 5th, delightful weather, sleighing good, tem. 8 above; 6th, south-west wind, tem. 5 above; 7th, east wind, tem. 10 above, disagreeable day with sleet, crossing at Longueil; 8th, fine morning, west wind, tem. 10 above; 9th, tem. zero, west wind, fine day; 10th east wind, snow storm, 7 a.m. zero, road made to St. Lambert's, teams crossing; 11th, cold west wind, tem. 5 above zero; 12th, north-west wind, tem. at 8 a.m. 8 below zero, clear weather; 13th, south-west wind, tem.

15 above; 14th, fine weather, tem. at 8 a.m. 18 above; 15th, tem. at 8 a.m. 25 above, snowing, 5 p.m. much colder and fine; 16th, 8 a.m. 5 below zero, west wind; 17th, cold west wind, 8 a.m. 8 below zero, 4 p.m. snow storm, continued till midnight; 18th, fine morning, west wind, tem. 14 above; 19th, west wind, tem. 8 above zero; 20th, west wind blowing fresh, 10 below zero; 21st, west wind, tem. 8 a.m. 14 below zero; 22nd, tem. at 9 a.m. 15 below, at 9 p.m. 2 below; 23rd, south-west wind, tem. 8 a.m. 2 below zero; 24th, fine day, west wind, tem. 2 above; 25th, north-west wind, 12 below zero; 26th, south-west wind, snow storm last night, 8 a.m. 6 above, 2 p.m. 12 above; 27th, west wind, 8 a.m. 7 below zero; 28th, west wind, 8 a.m. 8 below zero; 29th, 8 a.m. 2 below zero, west wind; 30th, south-west wind, 8 a.m. 8 above zero; 31st, south-west wind, tem. 6 above zero.

February.—1st, cold hazy morning, tem. 2 above zero, west wind; 2nd, delightful day, 7 a.m. 3 above; 3rd, north-east wind, 24 above, fine weather; 4th, cold north-east wind, at 8 a.m. 3 below; 5th, snowing in the afternoon, tem. 20 above zero, west wind; 6th, west wind, tem. 15 above, fine weather; 7th, south-west wind, 20 above zero; 8th, west to north-west wind, tem. 15 above; 9th, fine and cold, 8 below zero, blowing a gale in the afternoon; 10th, very cold, 20 below zero in the city during the day, 24 during the night; 11th, west wind, tem. zero; 12th, fine weather, no change in tem.; 13th, tem. 10 above zero, south-east wind; 14th, rain this morning, first thaw this winter, south-west wind, tem. in the morning 38 above, at 5 p.m. north-west wind, tem. 15 above; 15th, fine day, north-west wind, tem. zero; 16th, north-west wind, tem. 15 above at 7 a.m., and at 8 p.m. 10 below; 17th, at 7 a.m. zero, fine day; 18th, cold east wind, tem. zero; 19th, fine day, north-east wind, tem. 10

above zero ; 20th, tem. 20 above, east wind, 10 a.m. rain, 4 p.m. tem. 40 above, rain all day ; 21st, delightful sunshiney day, tem. 30 above, south-west wind ; 22nd, tem. 25 above, west wind ; 23rd, very fine, tem. 27 above, west wind ; 24th, tem. 28 above, west wind, fine weather ; 25th, 8 a.m. fine, 28 above 9 a.m., snowing, south wind ; 26th, tem. 25 above, west wind, fine weather ; 27th, at 8 a.m. tem. 14 above zero, west wind ; 28th, at 7 a.m. 5 below zero, north-west wind ; 29th, fine morning, west wind, tem. at 8 a.m. 3 below zero.

March.—1st, fine morning, tem. at 8 a.m. 15 above, south-west wind ; 2nd, east wind, tem. 5 above, fine weather ; 3rd, west wind, tem. 10 above, snowing ; 4th, cold west wind, tem. 10 above ; 5th, 8 a.m. zero, west wind ; 6th, north-west wind, tem. zero ; 7th, west wind, tem. 10 above zero ; 8th, much milder, tem. 20 above, south-west wind ; 9th, tem. 30 above, west wind ; 10th, south-east wind, tem. 20 above ; 11th, tem. 30 above, snowing most of the day, south wind ; 12th, snowing, tem. 15 above, north-west wind ; 13th, snow storm all night, all railroads blocked, most severe snow storm of the winter, 8 a.m. 10 above zero, blowing a gale ; 14th, north-east wind, 8 a.m. tem. 30 above, fine bright morning ; 15th, north-west wind, tem. 38 above ; 16th, 7 a.m. tem. 28 above, 10 a.m. 35 above, north wind ; 17th, south-west wind, 8 a.m. tem. 10 above ; 18th, fine and cold, west wind, tem. 10 above ; 19th, south-west wind, tem. 12 above ; 20th, south wind, much milder, tem. 36 above, dark morning, rain all afternoon ; 21st, tem. 40 above, south wind ; 22nd, fine and clear, tem. 20 above ; 23rd, cold, tem. 5 above, fine and clear ; 24th, very cold, tem. zero, west wind ; 25th, west wind, tem. 12 above ; 26th, east wind, tem. 15 above ; 27th, south-west wind, tem. 35 above ; 28th, south-east wind, tem. 38 above ; 29th, south-east wind, rain all night, tem. at 8 a.m. 34 above ;

30th, fine day, tem. 40 above; 31st, cold east wind, tem. 30 above.

April.—1st, west wind, tem. 32 above, fine morning, 10 p.m. snow storm; 2nd, east wind, tem. 30, sleighing bad; 3rd, west wind, tem. 27 above, fine day; 4th, fine morning, west wind, tem. 28; 5th, east wind, tem. 32, roads very bad, 2 p.m. rain and snow; 6th, fine and clear, tem. 40; 7th, cold north wind, tem. 25; 8th, very cold, north wind, tem. 20 above; 9th, west wind, tem. 20; 10th, north-east wind, tem. 26; 11th, rain, tem. 32, north-east wind, crossing to St. Lambert's stopped; 12th, dark morning, tem. 36, west wind, crossing on the ice to Longueil stopped; 13th, north-west wind, snow during the night, tem. 30; 14th, tem. 32, south wind; 15th, fine weather, tem. 36, west wind, the ice shoved above the bridge, water not rising; 16th, tem. 36, north-east wind, at noon ice shoved, 3 p.m. channel open from Victoria bridge to St. Lambert's; 17th, tem. 38, fine weather, north-west wind, no change in the appearance of the river; 18th, tem. 40, south wind, ice shoved this morning, water rising; 19th, tem. 42, west wind, channel opposite the city open; 20th, tem. 34, east wind, river blocked with ice, water rose to 34 feet 6 inches; 21st, tem. 38, north-west wind, water rose to 36 feet, no change in ice; 22nd, tem. 40, north-west wind, ice still stationary; 23rd, tem. 40 at 8 a.m., north-west wind, the ice moved at noon; 24th, tem 38, north-west wind, channel open as far as St. Helens Island; 25th, tem. 38, north-west wind, channel open to cotton factory; 26th, tem. 42, fine weather, harbour clear of ice, water falling; 27th, tem. 44, water 3 feet below tops of wharves; 28th, tem. 50, east wind, sheds erecting on the wharves; 29th, navigation open, two schooners arrived at noon; 30th, tem. 50, east wind with rain, steamers Three Rivers, Chambly and Laprairie, arrived in the afternoon.

May.—1st, cold morning, east wind, tem. 34; 2nd, fine weather, tem. 38, east wind, steamer "Filgate" arrived at 10 a.m., came down the rapids, first boat; 3rd, tem. 40, east wind, steamer "Bohemian" arrived from Cornwall, and the "Montreal" from Quebec, first boat from Quebec; 4th, S.S. "Vancouver" arrived at 4.30 a.m., first ship from sea, and S.S. "Norwegian" at 5 a.m.; 5th, dark morning, west wind, rain, tem. 48; 6th, blowing fresh, west wind, tem. 50; 7th, fine morning, north-west wind, tem. 50, water rising; 8th, west wind, tem. 50, fine weather; 9th, south wind, overcast, tem. 60; 10th, 7 a.m. thunder storm, heavy rain, tem. 55; 11th, cold east wind, tem. 50; 12th, south wind, tem. 58, rain this mor'g; 13th, north-west wind, tem. 60; 14th, east wind, tem. 55; 15th, dark morning, tem. 50, south wind; 16th, west wind, tem. 50; 17th, fine but cold, tem. 50, west wind; 18th, east wind, tem. 55; 19th, north-west wind, tem, 55; 20th, fine day, north-west wind, tem. 50; 21st, north-west wind, tem. 50; 22nd, west wind, tem. 57; 23rd, south-west wind, tem. 60; 24th, east wind, fine weather, tem. 60; 25th, south-west wind, tem. 65; 26th, south-west wind, tem. 60; 27th, rain last night, tem. 70; 28th, rain this morning, south wind, tem. 60; 29th, fine day, west wind, tem. 68; 30th, tem. 70, west wind; 31st, east wind, tem. 58.

June.—1st, rain last night, tem. 60; 2nd, fine morning, north-west wind, tem. 60; 3rd, tem. 65, west wind; 4th, tem. 65, west wind; 5th, west wind, tem. 60; 6th, fine and warm, tem. 70 at 9 a.m., at noon 80, 2 p.m. thunder storm with rain, doing considerable damage; 7th, east wind, tem. 55; 8th, west wind, tem. 65, fine weather; 9th, tem. 70, west wind; 10th, west wind, tem. 80, rain, at 10 p.m. thunder storm and rain; 11th, west wind blowing fresh, tem. 74; 12th, west wind, tem. 65; 13th, tem. 65, west wind; 14th, dark morning, south wind,

tem. 65 ; 15th, rain storm this morning, tem. 70 ; 16th, north wind, tem. 70 ; 17th, fine and warm, tem. 80, west wind ; 18th, east wind, tem. 70 ; 19th, tem. 70, south wind ; 20th, east wind, tem. at 7 a.m. 66, rain storm this morning ; 21st, rain, tem 65, west wind ; 22nd, rain last night, tem. 75, west wind ; 23rd, west wind, tem. 80, 9 p.m. rain ; 24th, tem. 70, north wind ; 25th, rain last night, tem. 70, west wind ; 26th, fine morning, tem. 75, west wind ; 27th, tem. 65, north-east wind ; 28th, east wind, tem. 65 ; 29th, north wind, tem. 60, fine weather ; 30th, west wind, tem. 65. During the month we had a quantity of rain.

July.—1st, fine weather, tem. 65 ; 2nd, fine weather, tem. 64 ; 3rd, south-west wind, tem. 70 ; 4th, west wind, tem. 75 ; 5th, fine, tem. at 7 a.m. 70, west wind ; 6th, north-west wind, tem. 70 ; 7th, north-west wind, tem. 70 ; 8th, tem. 65, fine weather ; 9th, fine morning, tem. 70, south-west wind ; 10th, north-west wind, tem. 70 ; 11th, tem. 70, west wind, at 7 p.m. rain storm ; 12th, great change in weather, north wind, at 7 p.m. tem. 52 ; 13th, north-west wind, tem. 60 at 7 a.m. ; 14th, fine and clear, north-west wind, tem. 65 ; 15th. fine, north wind, tem. 75 ; 16th, north-west wind, tem. 65 ; 17th, tem. 70, north-east wind ; 18th, tem. 75, west wind ; 19th, tem. 68, south-west wind ; 20th, south-west wind, tem. 70 ; 21st, fine weather, tem. 70, west wind ; 22nd, tem. 80, west wind ; 23rd, south-west wind, tem. 70 ; 24th, tem. 75, rain in the morning ; 25th, very cold last night, tem. this morning 65, north wind ; 26th, west wind, tem. 70 ; 27th, east wind, tem. 65 ; 28th, north-west wind, tem. at 7 a.m. 60 ; 29th, west wind, tem. 70 ; 30th, south-west wind, tem. 70 ; 31st, tem. at 4 p.m. 84, south wind.

August.—1st, north wind, tem. 65 ; 2nd, tem. 70, west wind ; 3rd, very warm, tem. 85, west wind ; 4th, tem. 75, rain this morning from one to 5 a.m. ; 5th, tem. 80, west

wind; 6th, east wind blowing fresh, tem. 70; 7th, 6 a.m. rain, tem. 75, west wind; 8th, tem. 75, west wind; 9th, west wind, tem. 70; 10th, tem. 65, west wind; 11th, fine weather, west wind, tem. 65; 12th, tem. 70, west wind; 13th, east wind, tem. 58, rain storm, blowing fresh; 14th, west wind, tem. at 9 a.m. 65, raining; 15th, north wind, tem. 65; 16th, west, tem. 68, great rain during the night; 17th, south wind, tem. 70, rain this morning; 18th, fine morning, west wind, tem. 65: 19th, west wind, tem. 65, rain in the afternoon; 20th, tem. 62, west wind; 21st, tem. 60, south wind, raining all day; 22nd, tem. 56, north wind, rain all night; 23rd, tem. 62, north-west wind, fine weather; 24th, tem. 65, west wind with rain; 25th, tem. 62, foggy this morning, west wind; 26th, west wind, tem. 70 to 80; 27th, north-west wind, tem. 65; 28th, north-east wind, tem. 60; 29th, north-west wind, tem. 65; 30th, fine morning, west wind, tem. 70; 31st, south-west wind, tem. 68. During the month we had a great quantity of rain.

September.—1st, north-east wind, tem. 58, rain all last night; 2nd, tem. 60, north wind; 3rd, fine and clear, tem. 55, north-east wind; 4th, south wind, tem. 66; 5th, north wind, tem. 55; 6th, east wind, tem. 55, frost last night; 7th, tem. 50, west wind; 8th, south wind, rain, tem. 56; 9th, tem. 70, west wind; 10th, west wind, tem. 65; 11th, tem. 65, west wind; 12th, south-west wind, tem. 65; 13th, north-east wind, tem. 55; 14th, tem. 54, north wind; 15th, south-west wind, tem. 53; 16th, south-west wind, rain all day, tem. 60; 17th, east wind, tem. 60; 18th, rain in the morning, east wind, tem. 65; 19th, tem. 62, south wind and fog; 20th, wet morning, tem. 60, north-east wind; 21st, tem. 60, east wind; 22nd, east wind, tem. 58; 23rd, tem. 60, fine weather; 24th, tem. 58, north-east wind; 25th, tem. 60, south-west wind; 26th, south wind, tem. 58; 27th, 7 a.m. rain storm, west

wind, tem. 57; 28th, tem. 52, north wind; 29th, tem. 40, west wind; 30th, fine morning, west wind, tem. 55.

October.—1st, frost last night, 9 a.m. tem. 45, south-east wind; 2nd, east wind with rain, tem. 40; 3rd, west wind, tem. 42; 4th, tem. 42, west wind; 5th, rain last night, tem. 48, west wind; 6th, frost last night, tem. this morning 40, north-west wind; 7th, tem. 48, north-west wind; 8th, north-east wind, tem. 48; 9th, snow storm, north-east wind, tem. 32; 10th, north-west wind, tem. 38; 11th, tem. 40, north-east wind; 12th, north-east wind, tem. 48; 13th, rain all last night and this morning, east wind, tem. 48; 14th, fine, tem. 44, west wind; 15th, north-west wind, tem. 38; 16th, south-west wind, rain, tem. 42; 17th, tem. 42, south wind; 18th, tem. 44, north-west wind; 19th, south-east wind, tem. 40, rain last night; 20th, west wind, tem. 45; 21st, 9 a.m. snowing, tem 40; 22nd, frost last night, north-east wind, tem. 44; 23rd, frost last night, north-east wind, tem. 35; 24th, north-east wind, tem. 48, rain; 25th, north-east wind, tem. 43; 26th, north wind, tem. 40; 27th, south wind, tem. 45, rain; 28th, west wind, tem. 50, rain; 29th, west wind, tem. 45; 30th, frost last night, tem. 37; 31st, west wind with rain, tem. 45.

November.—1st, tem. 50, west wind; 2nd, tem. 57, south-west wind; 3rd, rain all last night, west wind, tem. 55; 4th, tem. 50, west wind; 5th, tem. 44, south wind; 6th, rain all last night, tem. 54, south-west wind; 7th, fine morning, north-east wind, tem. 30; 8th, tem. 32, north wind; 9th, east wind, rain all last night, tem. 38; 10th, east wind, tem. 38; 11th. west wind, tem. 40; 12th, frost last night, tem. 32, west wind; 13th, tem. 30, west wind; 14th, tem. 37, south-west wind; 15th, tem. 45, south-west wind; 16th, north-west wind, tem. 43; 17th, west wind. tem. 35, frost last night; 18th, tem. 30, west wind; 19th, south-west wind, rain, tem. 35; 20th, at 6 a.m. 6

above zero, 10 a.m. 15, north wind; 21st, cold continues, at 9 a.m. 12 above, north-east wind; 22nd, tem. at 9 a.m. 10 above, north-east wind, SS. *Pomeranian* left at 2 p.m., being the last sea-going vessel from this port. She had to remain at Sorel till Sunday 25, and then got to Batiscan, left on 27th, arrived in Quebec same evening. The weather was unusually severe, with a quantity of ice in the river. 23rd, east wind, tem. 8 above; 24th, east wind, 12 above, ice making in harbour; 25th, north-east wind, blowing a gale, tem. 15 above; 26th, tem. 27 above, east wind; 27th, tem. 35, gale continues, north-east wind; 28th, rain, tem. 35, north-east wind; 29th, misty morning, east wind, tem. 35; 30th, dark morning tem. 37, west wind.

December.—1st, fine and cold, north-west wind, tem. 28 above, snowing; 2nd, tem. 34, west wind, fine weather; 3rd, dark morning, tem. 34, west wind; 4th, fine morning, south-east wind, tem. 30 above; 5th, dark morning, snowing, tem. 34, west wind; 6th, tem. 30 above, north-west wind, dark weather; 7th, south-west wind, tem. 26 above; 8th, fine clear morning, tem. 27 above, north wind; 9th, tem. 18 above, west wind, fine day; 10th, dark morning, south-west wind, tem. 30 above; 11th, dark morning, south-west wind, tem. 35 above; 12th, north-west wind, tem. 20 above; 13th, west wind, tem. at 7 a.m. 5 below zero; 14th, west wind, tem. zero, blowing hard and snowing, navigation closed, Longueiul ferry steamer went into winter quarters this afternoon; 15th, 8 above, fine clear weather, west wind; 16th, west wind, tem. 35 above, rain all day and night; 17th, east wind, very disagreeable weather, tem. 35 above; 18th, blowing a gale last night and this morning, tem. 20 above, snowing; 19th, fine and clear, tem. 8 above, first day of good sleighing; 20th, west wind, tem. 3 above, fine weather; 21st, tem. 5 above, north-east wind, snowing; 22nd, north

west wind, tem. 7 below; 23rd, fine and mild, tem. 22 above, west wind; 24th, tem. 42 above, south wind, sleighing bad; 25th, Xmas day, west wind, tem. 42, rain in the morning and afternoon, dark and disagreeable; 26th, weather continues mild, tem. 40 above, snow all gone, water level with the wharves, west wind; 27th, tem. 45, rain all night and this morning, south wind; 28th, fine and clear, north wind, tem. 25 above; 29th, tem. 14 above, west wind; 30th, fine and mild, tem. 30 above, west wind; 31st, rain this morning, very mild, tem. 35 above, west wind, sleighing bad, water level with the wharves, most unseasonable weather.

Yours respectfully,

THOMAS HOWARD,
Harbour Master.

PORT OF MONTREAL.

Statement showing the Nationality and Tonnage of Sea-going Vessels that arrived in Port during the Season of 1888, *that were navigated by* 20,696 *Seamen.*

Nationality.	Number of Vessels.	Tonnage.
British	594	724,546
Norwegian	26	21,047
German.....	19	20,674
French	10	13,510
American	5	1,144
Spanish.	1	1,552
Total.....	655	782,473

PORT OF MONTREAL.

Comparative Statement, showing the dates of the Opening and Closing of Navigation, first arrival from Sea, and the last Departure for Sea, the past ten years.

Years.	Opening of Navigation.	Closing of Navigation.	First Arrival from Sea.	Last Departure for Sea.
1879.....	April 24.	Dec. 19.	May 1.	Nov. 24.
1880.....	" 17.	" 3.	" 2.	" 22.
1881.....	" 21.	Jan. 2,'82.	April 29.	" 23.
1882.....	" 11.	Dec. 9	May 6.	" 21.
1883.....	" 27.	" 16.	" 5.	" 20.
1884.....	" 22.	" 18.	" 2.	" 20.
1885.....	May 5.	" 7.	" 8.	" 20.
1886.....	April 24.	" 4.	April 30.	" 25.
1887.....	May 1.	" 23.	May 3,	" 28.
1888.....	April 29	" 14.	" 4.	" 22.

PORT OF MONTREAL.

Comparative Statement showing the Number and Tonnage of Inland Vessels that arrived in Port the past ten years, with the greatest number in Port at one time.

Years.	Number of Vessels.	Tonnage.	Greatest Number in Port At one time.
1879.....	5,698	817,243	227.....Nov. 6
1880.....	6,489	1,044,380	253.....July 7.
1881.....	6,030	949,380	191.....Nov. 4.
1882.....	5,947	848,780	190.....Sept. 29.
1883.....	5,477	764,721	174..... " 5.
1884.....	4,808	726,015	161.....July 9.
1885.....	5,003	724,975	142.....Oct. 1.
1886.....	5,521	809,819	178.....Aug. 25.
1887.....	5,367	791,452	189.....May 31.
1888.....	5,500	863,014	163.....Aug. 14.

PORT OF MONTREAL.

COMPARATIVE STATEMENT, *showing the Number, Tonnage, and Classification of Sea-going Vessels that arrived in Port from the Maritime Provinces the Past Ten Years.*

YEARS.	Steamships.	Tonnage	Ships.	Tonnage.	Barques.	Tonnage.	Brigs.	Tonnage.	Brigantines.	Tonnage.	Schooners.	Tonnage.	Total No. of Vessels.	Total Tonnage.
1879.....	62	40,686	2	1,733	59	32,271	1	457	16	3,660	80	8,573	220	88,380
1880.....	88	62,688	3	2,492	59	36,294	1	413	17	5,001	68	6,562	236	113,450
1881.....	104	80,040	1	734	44	10,666	2	553	13	2,502	48	4,883	212	99,378
1882.....	168	136,036	....	.....	25	15,574	....	.....	13	2,364	54	5,993	260	159,967
1883.....	191	164,982	....	.....	11	8,066	1	307	6	1,015	54	5,620	263	179,990
1884.....	161	124,377	....	.....	8	5,031	....	.....	1	456	40	3,825	210	133,689
1885.....	142	117,436	....	.....	18	11,997	....	.....	10	2,307	47	4,814	217	133,554
1886.....	175	150,784	...	.....	4	2,535	3	794	2	466	41	2,902	225	157,481
1887.....	224	194,023	2	2,389	11	8,676	1	313	2	342	36	3,139	276	208,882
1888.....	213	195,598	1	1,199	4	3,079	....	.....	3	701	35	3,375	256	203,952

PORT OF MONTREAL.

COMPARATIVE STATEMENT, *showing the Number, Tonnage, and Classification of Sea-going Vessels that arrived in*

PORT OF MONTREAL.

COMPARATIVE STATEMENT, *showing the Number, Tonnage and Classification of Sea-going Vessels that arrived in Port the past ten years, with the dates of the greatest number in Port at one time, each year.*

Years.	Steamships.	Tonnage.	Ships.	Tonnage.	Barques.	Tonnage.	Brigs.	Tonnage.	Brigantines.	Tonnage.	Schooners.	Tonnage.	Tot'l number of vessels.	Tot'l tonnage	Greatest Number in Port at one time.
1879..	289	378,353	33	38,412	121	65,223	5	1,404	37	8,560	127	15,017	612	506,969	49....Aug. 13
1880..	354	475,741	42	50,141	143	76,816	11	3,252	41	9,715	119	12,606	710	628,271	67.... " 4
1881..	321	446,457	5	4,640	104	60,617	9	2,377	30	6,152	100	11,686	569	531,929	59.... " 14
1882..	379	475,679	4	4,339	93	51,195	10	2,702	37	7,182	125	13,604	648	554,692	53.... " 21
1883..	464	605,805	3	3,356	70	38,547	7	2,417	15	3,012	101	11,126	660	664,263	38....June 27
1884..	444	585,397	2	2,218	83	49,048	3	1,036	13	2,996	81	8,679	626	649,374	44....Aug. 13
1885..	441	619,647	2	2,792	76	45,560	1	338	23	6,141	86	9,376	629	683,854	43....July 15
1886 .	532	736,648	11	13,475	68	47,233	10	3,061	7	1,850	75	7,432	703	809,699	44....Aug. 18
1887..	600	807,471	7	8,684	68	43,275	2	1,118	7	2,031	82	8,194	767	870,773	37....July 21
1888..	532	742,276	7	9,634	32	20,218	....	.....	10	2,631	74	7,714	655	782,473	36....June 27

PORT OF MONTREAL.

Number and Tonnage of Sea-going Vessels consigned to the following Merchants, during the season of 1888:—

No.	Name of Firm.	Steam.	Tonnage.	Sail.	Tonnage.	Total. No. of Vessels	Total Tonnage.
1.	H. & A. Allan	70	170,785	.....	.....	70	170,785
2.	D. Torrance & Co	46	104,879	.....	.....	46	104,879
3.	R. Reford & Co	47	73,077	1	421	48	73,498
4.	Canada Shipping Co	28	63,389	.....	.....	28	68,389
5.	Kingman Brown	42	39,570	5	5,514	47	45,084
6.	J. & R. McLea	26	25,543	3	625	29	26,168
7.	F. C. Henshaw	24	25,858	.....	.....	24	25,858
8.	Wm. Muir & Son	29	25,390	.....	.....	29	25,390
9.	Intercolonial Coal Co	22	24,947	.....	.....	22	24,947
10.	Henry Dobell & Co	34	22,321	.....	.....	34	22,321
11.	Charles McLean	16	20,404	2	1,119	18	21,523
12.	Munderloh & Co	18	20,808	.....	.....	18	20,808
13.	Anderson McKenzie	10	12,086	13	8,108	23	20,194
14.	Carbray, Routh & Co	15	15,789	2	1,675	17	17,464
15.	Bossière Frères	10	14,031	.....	.....	10	14,031
16.	J. G. Sidey	9	11,582	.....	.....	9	11,582
17.	H. Dobell & Co (canal)	17	11,232	.....	.....	17	11,232
18.	Wm. Muir & Son, (canal)	12	10,513	.....	.....	12	10,513
19.	J. & R. McLea (canal)	8	7,686	2	558	10	8,214
20.	Brock & Co	14	6,874	17	1,264	31	8,138
21.	R. Reford & Co. from Three Rivers	4	5,782	.....	.....	4	5,782
22.	Munderloh & Co., (canal)	5	4,956	.....	.....	5	4,956
23.	F. C. Henshaw, (canal)	5	4,890	.....	.....	5	4,890
24.	W. E. Boyd	.....	.....	4	4,555	4	4,555
25.	Kingman Brown & Co., (canal)	5	4,274	.....	.....	5	4,274
	Twenty-three others	16	10,610	74	16,358	90	26,968
		532	742,276	123	40,197	655	782,473

REPORT

UPON THE MAINTENANCE OF THE

BUOYS AND BEACONS

ON THE

SHIP CHANNEL BETWEEN MONTREAL AND QUEBEC

FOR THE YEAR 1888.

JOHN KENNEDY, M. INST., C.E., *Chief Engineer.*

HARBOUR COMMISSIONERS OF MONTREAL,
Chief Engineer's Office,
MONTREAL, February 18th, 1889.

ALEXANDER ROBERTSON, Esq.,
Secretary,
Harbour Commissioners of Montreal.

DEAR SIR:—

I beg to report as follows upon the maintenance of the Buoys and Beacons of the Ship Channel between Montreal and Quebec during the navigation season of 1888.

The buoys and beacons were, as usual, maintained by the Commissioners' officers and steamers, and the service was carried out in connection with the deepening of the Ship Channel; that is, the officers, men and boats have been employed in either work as needed, and the expense charged to the proper account.

The placing of the buoys was commenced on the 30th April, which was as early as the clearing away of the ice permitted. Steamships had already arrived at Quebec from sea, and were waiting to proceed up the river as soon as it was clear of ice; and in order to place buoys for them with the least possible delay, three buoy boats were employed in the placing, beginning at Sorel, Nicolet and Cap à la Roche.

Such buoys as are actually necessary to allow vessels to come up in safety at the high stage of the water which prevails at the opening of navigation, were set by May 2nd, and four steamships arrived at Montreal on the morning of the 4th. By the 10th, all the buoys which it is customary to set in spring were in their places.

The fastening of evergreen bushes (balizes) on the wooden spar-buoys, to make them more easily seen in the season of smoke and fog, was commenced on August 20th, and continued till the close of navigation.

No additional buoys were placed during the summer for the 25 ft. channel, but the opening of the 27½ ft channel, which took place on November 7th, required that changes and additions be made for the new depth.

In certain places, notably between Cap Madeleine and Three Rivers, and between Ile de Grace and Sorel, it was necessary to somewhat change the course of vessels for the increased draft; and in order to familiarize the pilots with such changes, and with the new buoys before requiring to use them, the more important places were buoyed out anew several weeks in advance of the opening.

Fourteen additional buoys in all were placed to mark out the 27½ ft. channel. Their positions are given in the accompanying tables.

Public notice was given by the Commissioners that the taking up of the buoys for the season would commence

on November 23rd, but the last steamship, the "Pomeranian," was delayed in her leaving Montreal for sea till the afternoon of that day, and the taking up of the buoys was also delayed for her safety. Events proved that she was too late in starting, for severe frost had already set in and while she lay anchored off Sorel for the night large sheets of floating ice formed on Lake St. Peter and in the river below, damaging and displacing some of the buoys and submerging nearly all the others. The cold continued and the ice thickened until the 25th, when the steamship, with the assistance of several tugs, chiefly those of the Harbour Commissioners, left Sorel and reached Batiscan, where she again anchored. On the 26th she was able to proceed again and pass Cap à la Roche on her way to Quebec, which she reached on the morning of the 27th. Between Quebec and the Upper Traverse she was further delayed, and it was not till the 30th that, with difficulty and risk and under the convoy of tugs, she got fairly away to sea.

Meanwhile, three steamers had been detailed to lift the buoys. One of them commenced at Montreal, when the "Pomeranian" left, to take up those between there and Sorel. The other two were detained, waiting first for the steamship to pass down, and then by a heavy gale and snow-storm which came up, and they were unable to begin actual work till the 29th. By the 1st December all the buoys from Cap Charles upward were lifted. Those below Cap Charles were either lost or abandoned on account of the heavy running ice which made the risk and the cost of the steamer to lift them greater than the value of the buoys. Besides these, many buoys at and above Cap Charles, both iron and wood, were badly damaged or entirely carried away by the ice.

The total loss thus sustained amounts to about $2,540, in addition to nearly a week's extra service of the buoy steamers and crews.

During the past season there have been no accidents of importance to ships navigating the channel, and none at all traceable to the buoying.

The number of buoys in use in the channel near the close of navigation was :—

Spar buoys (wooden)	192
Cone and cylinder buoys (steel and iron)	39
Total	231

The spare buoys now on hand are :—

Spar buoys (cedar)	17

The cost of the service for the year is $6,944.09. In addition to this, there is the extraordinary loss of buoys in the fall amounting to about $2,540, as above noted.

The comparison of the cost with former years is as follows :—

1884	$ 7,595 44
1885	9,732 46
1886	7,018 42
1887	13,723 84
1888	6,944 09

Appended are abstract tables of details connected with the service.

Yours respectfully,

JOHN KENNEDY,
Chief Engineer.

ABSTRACT of Steamers' time employed in the maintenance of Buoys and Beacons during season of 1888.

MONTHS.	TIME OF SERVICE.			REMARKS.
	Buoys. Days.	Beacons. Days.	Total Days.	
April	2	.....	2	
May	24¾	2¾	27½	Commenced placing buoys
June	4½	3½	8	April 30th.
July	4¼	.....	4¼	
August	6	½	6½	
September	6	.....	6	
October	5¼	¼	5¾	
November	31¼	.....	31¼	
December	2	.....	2	Finished taking up buoys Dec. 1st.
Total	86¼	7	93¼	

STEAMERS employed in the maintenance of Buoys and Beacons during season of 1888, and time of service of each.

NAME OF STEAMER.	TIME OF SERVICE.			REMARKS.
	Buoys Days.	Beacons Days.	Total Days.	
St. James	50¼	5	55¼	Working season from April 30th to December 1st, 186 days, not including Sundays.
McNaughton	4	.....	4	
John Pratt	18	2	20	
St. Francis	12	.....	12	
St. Peter	1	.....	1	
St. Louis	1	.....	1	
Total	86¼	7	93¼	

TABLE showing number of buoys on Ship Channnel near the close of Navigation and details of work of maintenance for season of 1888 :—

LOCALITY.	No. of buoys.			NUMBER OF TIMES WORKED AT.						
	Wood.	Iron or Steel.	Total.	Entirely lost and replaced by another buoy.	Found lying flat and replaced by another buoy.	Found too low and replaced by another buoy.	Ballast adjusted.	Other defects corrected.	Balized.	Total number of times worked at.
Pointe aux Trembles (En Bas) to Three Rivers	38	21	59	17	1	3	16	55	46	234
Three Rivers to Sorel	79	7	86	10	16	45	61	46	136	462
Sorel to Montreal	75	11	86	15	1	37	53	62	111	422
Totals	192	39	231	42	18	85	130	163	293	1118

TABLE showing new Buoys placed in entirely new positions during season of 1888.

Date.	LOCALITY.	No. of buoys.	Color.	Description.	REMARKS.
Sept. 4.	Vercheres Point	2	Black	Wooden Spar	New Buoys for 27½ ft. Channel.
" 24	Batiscan Village	1	Red	"	"
Oct. 3.	Three Rivers	2	Black	"	"
" 3.	Ile de Grace to Sorel	3	Red	"	"
" 3.	" "	1	Black	"	"
Nov. 6.	Champlain	1	Red	"	"
" 6.	Batiscan Traverse	1	Black	"	"
" 6.	St Pierre les Becquets	1	"	"	"
" 6.	Becancour (low. traverse).	1	"	"	"
" 6.	Longue Pointe	1	"	"	"

REPORT

OF THE

PILOTAGE DISTRICT OF MONTREAL,

FOR THE YEAR 1888.

HARBOUR COMMISSIONERS OF MONTREAL,
Secretary's Office,
MONTREAL, March, 13th, 1889.

WM. SMITH, ESQ.,
Deputy Minister of Marine,
OTTAWA.

SIR:—

I have the honour, by direction of the Harbour Commissioners of Montreal, as the Pilotage Authority, to transmit, for the information of the Honourable the Minister of Marine, the following Report of the Pilotage District of Montreal for the year ended 31st December, 1888.

On the 1st of January, Mr. Joseph Léveillé, of Montreal, (who had been Superintendent of Pilots from 15th June, 1876, and had attained the age of 70) was superannuated and granted a pension from the Decayed Pilot Fund on the basis of his thirty years' service as Pilot.

On the 3rd of March, Pilot George Bellisle, of Deschambault, died, aged 48.

Messrs. Liboire Perrault and Wilfrid Raymond, both of Deschambault, were granted their Branches on 20th April.

One of the appended statements gives the names, earnings, etc., etc., of all the Branch Pilots for the season of 1888.

The total amount of Pilotage dues therein shown was received from the following services, viz :—

BRITISH :		
Steamers	$38,873 01	
Sailing Vessels	3,660 50	
		$42,533 51
FOREIGN :		
Steamers	$ 3,292 02	
Sailing Vessels	594 91	
		$ 3,886 93
		$46,420 44

During April, an examination was held for those Apprentice Pilots who had fulfilled all the preliminary requirements of the By-laws. Nine presented themselves, of whom the following seven were successful, viz :— Messrs. Joseph Hurteau, Edouard Perrault, Lydoric Bouillé, Honoré Dussault, Arthur Brière, J. Sifroy Labranche, and Alexis Perrault.

These were granted permits, and passed the season, making fifteen double trips each between Montreal and Quebec, with different Branch Pilots, on Ocean-going Vessels, and have now been placed at the head of the Apprentices' List.

To the same Board of Examiners, twelve young men applied to be licensed as Apprentice Pilots and after examination, were approved and entered on the list in accordance with the length of their service on the River.

Five of those returned in last year's list have been struck off, having ceased to make any reports or give replies to letters addressed to them.

The following list shows the name, age and residence of each Apprentice Pilot, serving his time under the authority of this Trust :—

No.	Name.	Age.	Residence.
1	Joseph Hurteau	28	Contrecœur.
2	Edouard Perrault	38	Deschambault.
3	Lydoric Bouillé	31	"
4	Honoré Dussault	35	"
5	Arthur Brière	31	Portneuf.
6	J. Sifroy Labranche	32	"
7	Alexis Perrault	26	Deschambault.
8	Alphonse Cossette	39	Champlain.
9	Hubert Perrault	39	Montreal.
10	N. Edson Angers	38	St. Anne de la Pérade.
11	Jean-Baptiste Nadeau	30	Lévis.
12	Aubert Naud	34	Deschambault.
13	N. Comé Dufresne	28	"
14	Narcisse Bouillé	28	"
15	Joseph Léveillé	25	Batiscan.
16	Josephat Sauvageau	26	Deschambault.
17	Napoléon Dussault	26	"
18	Sévère Perron	30	"
19	Barthélemi Arcand	26	Lachevrotière.
20	Prudent Bellisle	25	Deschambault.
21	George Arcand	24	Lachevrotière.
22	Constant Toupin	22	Three Rivers.
23	George Perrault	22	Deschambault.
24	Arthur Belisle	25	"
25	Charles Bélanger	18	Lotbinière.

Casualties to vessels were very few and not one was of a serious nature.

In June, an investigation was held into a slight collision between the SS. "Govino" and the SS. "Iron Acton" while both were coming up through the Varennes Channel.

After hearing many witnesses, and due deliberation, the Commissioners gave a severe reprimand and caution to Pilot George Raymond for having attempted to pass in a bend of the dredged Channel, when by waiting a little he could have passed safely.

In view of this mishap, which was not reported by either Pilot, a notice was issued to all the Pilots calling attention to the By-laws, which require a report of every pilotage made, immediately on the completion of such.

In November, a complaint was made by Captain Rollo, of the SS. "Alcides", that the SS. "Glendale", in charge of Pilot A. Naud, had on 10th October collided with his vessel, and done her some damage (while both vessels were passing down in Lake St. Peter).

The Commissioners, after due consideration, decided that this case might be allowed to stand over, in view of their intention to have prepared, before next season, a new By-law to ensure the safer navigation of the dredged Ship Channel from Montreal to Quebec.

Mr, Charles Gariépy was, in April, appointed Pilot Agent at Quebec, and discharged the duties of his office to the entire satisfaction of the Commissioners.

On 24th January, 1888, the Commissioners had the honour to transmit to the Honourable the Minister of Marine a petition from the Montreal Pilots, praying that Gas Buoys might be placed at St. Croix and Pointe aux Trembles (en bas), to enable vessels to pass those points at night.

In November, they again brought the matter to his notice, and were pleased to hear that the Department was considering the placing of Range Lights, as preferable to Gas Buoys.

The Tariff of Pilotage now in force in the Pilotage District of Montreal is the second of the appended statements.

The amount received by the Harbour Commissioners, as the Pilotage Authority of the District, was as follows :—

From Poundage, 5 per cent. on the earnings of Pilots.....	$2,217	41
" " " Three Rivers.....	28	60
" " " Sorel.....	52	14
" Sundry poundage.....	8	91
" Interest on Investments and cash in Bank.....	2,444	31
	$4,751	37

The disbursements for Pensions to old and infirm Pilots and widows, were	$3,647 81
Messrs. Riddell & Common, for Audit of Decayed Pilot Fund, for 1887	100 00
Cash Book	8 60
Premium, brokerage and accrued interest on three Harbour Bonds purchased	323 49
	$4,079 90

The above receipts and disbursements were in trust for the Montreal Decayed Pilot Fund, of which the Annual Report and Statements were sent you on 10th January, certified by Messrs. Riddell & Common, Chartered Accountants.

In addition, the Commissioners received, in respect of pilots and pilotage, the following sums, namely :—

License Fees, under By-law No. 71, from four Pilots ($10 each)	$ 40 00
" " " " 71, " 12 Apprentices ($5 each)	60 00
Pilotage Dues in two cases of compulsory pilotage	19 00
Total	$119 00

and they expended as follows:—

On examination of Apprentices	$263 40
Expenses of witness at investigation into collision between SS. "Govino" and SS. "Iron Acton"	5 00
Repaid to Alonzo Carter, Captain of the American schooner "Daniel Brown"	14 00
Paid to Pilot T. Bouillé	4 75
Paid to Montreal Decayed Pilot Fund	25
Expenses of Quebec Agent and Office	626 10
	$913 50

The deficiency was made up out of the Harbour revenues, and was $794.50.

I have the honour to be, Sir,

Your obedient servant,

ALEXANDER ROBERTSON,

Secretary.

STATEMENT *showing the Number of Branch Pilots for and above the Harbour of Quebec, on the Active List, on the 31st December, 1888, their Age, Residence, Number of Pilotages, Earnings, Reports wanting, and whether employed on Special Service or on Tour-de-Rôle, etc.*

No.	NAMES.	AGE.	RESIDENCE.	DATE OF BRANCH.	REMARKS.	No. of Trips to Montreal.		No. of Trips to intermediate places.		Total No. of Trips.	No. of Report wanting.	Earnings to Montreal.	Earnings to intermediate Ports.	Total Earnings.	Employed on Special Service or on Tour-de-Rôle.
						IN	OUT.	IN.	OUT.						
1	Bouillé, Zépherin	60	Deschambault	March 1, 1855		11	11			22	1	$1,254 09		$1 254 09	Allan Line.
2	Bélisle, Cyrille	61	Deschambault	November 15, 1860		8	5			13	4	476 07		476 07	Tour-de-Rôle.
3	Raymond, George	59	Deschambault	June 20, 1861		7	8		1	16	3	616 24	19 50	635 74	Furness Line.
4	Naud, Augustin	62	Montreal	December 4, 1861		13	13	8	7	41	24	941 24	411 06	1,352 30	H. Dobell & Co.
5	Bélisle, Hubert A	58	Deschambault	May 23, 1862		7	2	1		10		359 56	22 50	382 06	Tour-de-Rôle.
6	Dufresne, Athanase	53	Deschambault	March 2, 1862		3	3			6	1	245 62		245 62	"Scotland" and "Polino."
7	Gagnon, Pierre	61	Three Rivers	November 27, 1866		10	10			20	5	1,144 34		1,144 34	Allan Line.
8	Naud, Onésime	48	Deschambault	March 16, 1870		10	11			21	1	1,185 84		1,185 84	Allan Line.
9	Hamelin, J. Octave	55	Deschambault	March 16, 1870		19	12			31	1	1,226 87		1,226 87	Inter-col'ial Co.
10	Chandonnet, Jos	48	St. Henri de Lauzon, Lévis	August 2, 1870		14	20			34	7	1,772 52		1,772 52	Beaver Line.
11	Bouillé, Louis A	49	Deschambault	September 1, 1870		12	12			24		1,346 83		1,346 83	Allan Line.
12	Boudet, Prudent	47	Point Lévis	October 10, 1870	Member Pilots Committee for 1889	14	16			30	6	1,727 78		1,727 78	Dominion Line.
13	Bélisle, Elzéar	54	Deschambault	October 10, 1870		14	14			28	3	625 56		625 56	Quebec S.S. Co.
14	Pleau, Joseph	51	St. Anne de la Pérade	October 10, 1870		18	18	2	2	40	28	1,327 81	108 19	1,436 00	Wm. Muir & Son
15	Brunet, Célestin	46	Montreal	February 28, 1872		13	15			28		1,400 78		1,400 78	Donaldson Line
16	Bélisle, Louis	43	Deschambault	February 28, 1872	Member Pilots Committee for 1889	15	16			31	3	1,726 40		1,726 40	Dominion Line.
17	Caien, Damase	48	Portneuf	October 1, 1872		2	1	1	1	5		60 33	63 25	123 58	Tour-de-Rôle.
18	Groleau, Ulric	41	Grondines	October 30, 1872		7	3	2	1	13	3	423 21	71 42	494 63	Tour-de-Rôle.
19	Frenette, Alfred	49	Portneuf	October 30, 1872		11	10	1	1	23	1	996 68	64 68	1,061 36	Chas. McLean.
20	St. Amant, Alfred	45	Deschambault	October 30, 1872	Member Pilots Committee during 1888	11	10	2	2	25		833 70	112 82	946 52	J. & R. McLea.
21	Bélanger, Philippe	50	Lotbinière	April 8, 1874		8	8			16	2	891 25		891 25	Allan Line.
22	Gagnon, Victor	50	Champlain	April 9, 1874		7	7		1	15	4	548 91	39 37	588 28	Tour-de-Rôle.
23	Perrault, Narcisse	51	Deschambault	April 10, 1874	Secretary of Pilots during 1888	14	14		2	30		1,429 82	76 36	1,506 18	Donaldson Line.
24	Toupin, Trefflé	41	Lake Bouchette, Lake St. John	September 22 1874		6	5	3	2	16		419 53	138 00	557 53	Tour-de-Rôle.
25	Auger, Cléophas	42	Point Lévis	September 22, 1874	President of Pilots in 1888, re-elected for 1889	14	14			28		1,573 60		1,573 60	Beaver Line.
26	Desjordy, François	44	Contrecœur	April 8, 1875		8	8	2	2	20		598 01	95 97	693 98	F. C. Henshaw.
27	Labranche, Ferdin'd	43	Portneuf	April 8, 1875		8	14		1	23	4	882 12	37 29	919 41	Furness Line.
28	Perrault, David	47	Deschambault	April 9, 1875		9	9			18	1	917 93		917 93	Thompson Line.
29	Gauthier, Alexis	42	Deschambault	January 15, 1878		10	10			20	1	992 01		992 01	Thompson Line.
30	Bouillé, Louis Z	40	Deschambault	January 16, 1878	Secret'y Pilots Committee for 1889	10	10			20	1	1,120 61		1,120 61	Allan Line.
31	Toupin, Joseph	39	Champlain	November 15, 1878		19	17			36		1,400 33		1,400 33	Black Diamond.
32	Gauthier, Laurent	39	Deschambault	December 10, 1879	Member Pilots Committee during 1888	16	14			30	3	1,700 88		1,700 88	Dominion Line.
33	Arcand, Jean	36	Deschambault	December 10, 1879		8	11			19	1	865 12		865 12	Bossière Line.
34	Nault, Delovoie	37	Deschambault	December 10, 1879		17	24	1		42	3	1,530 27	31 41	1,561 68	Black Diamond.
35	Gauthier, Wilbrod	37	Deschambault	December 10, 1879	Member Pilots Committee during 1888, re-elected for 1889	9	9			18		1,015 22		1,015 22	Allan Line.
36	Mayrand, Louis	41	St. Anne de la Pérade	December 9, 1880		16	14			30		1,238 73		1,238 73	F. C. Henshaw.
37	Dufresne, George	40	Deschambault	December 10, 1880		9	8		1	18	1	586 17	15 00	601 17	"Greetlands" & "Polino."
38	Arcand, Norbert	36	Champlain	December 10, 1880		11	12			23	2	795 41		795 41	"Greetlands" & "Polino."
39	Toupin, Uldoric	34	Champlain	December 11, 1880	Suspended till 30th Nov., 1888, re-inst'd Sept. 1st, 1888	2	2		1	5		123 99	31 50	155 49	Tour-de-Rôle.
40	Bouillé, Tancrède	35	Deschambault	December 11, 1880		13	14		2	29	1	1,196 85	73 64	1,270 49	Munderloh & Co
41	Arcand, Nestor	33	Deschambault	February 20, 1884		8	6			14	1	620 22		620 22	Tour-de-Rôle.
42	Nault, John	32	Deschambault	February 20, 1884		12	14	3	4	33		1,042 92	208 91	1,251 83	Carbray Routh.
43	Dussault, Joseph	33	Deschambault	February 20, 1884		14	16	3	3	36	1	1,092 96	168 43	1,261 39	J. & R. McLea.
44	Groleau, Gédéon	35	Grondines	May 20, 1887		9	4			13	1	469 03		469 03	Tour-de-Rôle.
45	Bellisle, Néré	36	Deschambault	May 20, 1887		13	13			26		921 30		921 30	Wm. Muir & Son
46	Perrault, Liboire	39	Deschambault	April 20, 1888		7	5	1		13	1	384 48	31 00	415 48	Tour-de-Rôle.
47	Raymond, Wilfrid	34	Deschambault	April 20, 1888		9	7		1	17		527 75	23 25	551 00	Tour-de-Rôle.
												$44,576 89	$1,843 55	$46,420 44	

HARBOUR COMMISSIONERS' OFFICE,
MONTREAL, 13th March, 1889.

ALEXANDER ROBERTSON,
Secretary.

TARIFF OF PILOTAGE

BETWEEN THE

HARBOURS OF QUEBEC AND MONTREAL

AND BETWEEN THE

SEVERAL PLACES THEREIN MENTIONED,

Duly made and passed by the Harbour Commissioners of Montreal on the 15th February, 1877, and approved by His Excellency the Governor-General in Council on the 5th March, 1877.

From the Harbour of Quebec to Portneuf and the opposite side of the River St. Lawrence, or below Portneuf and above the Harbour of Quebec :—

For the pilotage of any vessel in tow, or propelled by steam (except as hereinafter mentioned), for each foot of draught of water—Upwards	$0 50
Downwards	0 50
For the pilotage of any sea-going vessel propelled by steam, for each foot of draught of water—Upwards	0 62½
Downwards	0 62½
For the pilotage of any vessel under sail, for each foot of draught of water—Upwards	1 05
Downwards	0 70

From the Harbour of Quebec to Three Rivers and the opposite side of the River St. Lawrence, or any place above Portneuf and below Three Rivers :—

For the pilotage of any vessel in tow, or propelled by steam (except as hereinafter mentioned), for each foot of draught of water—Upwards	$1 50
Downwards	1 50
For the pilotage of any sea-going vessel propelled by steam, for each foot of draught of water—Upwards	1 75
Downwards	1 75
For the pilotage of any vessel under sail, for each foot of draught of water—Upwards	2 60
Downwards	1 90

From the Harbour of Quebec to Sorel and the opposite side of the River St. Lawrence, or any place above Three Rivers and below Sorel :—

For the pilotage of any vessel in tow or propelled by steam (except as hereinafter mentioned), for each foot of draught of water—Upwards	$1 50
Downwards	1 50
For the pilotage of any sea-going vessel propelled by steam, for each foot of draught of water—Upwards	1 87½
Downwards	1 87½
For the pilotage of any vessel under sail, for each foot of draught of water—Upwards	3 15
Downwards	2 10

From the Harbour of Quebec to the Harbour of Montreal, or to any place above Sorel and below the Harbour of Montreal :—

For the pilotage of any vessel in tow or propelled by steam (except as hereinafter mentioned), for each foot of draught of water—Upwards	$2 00
Downwards	2 00
For the pilotage of any sea-going vessel propelled by steam, for each foot of draught of water—Upwards	2 50
Downwards	2 50
For the pilotage of any vessel under sail, for each foot of draught of water—Upwards	4 20
Downwards	2 80
From the Harbour of Montreal to Sorel, or to any place above Sorel and below Hochelaga, and from Sorel, or any place above Sorel and below Hochelaga, to the Harbour of Montreal, for each foot of draught of water for each such pilotage—Upwards	1 00
Downwards	1 00
For the removal of any vessel from one wharf to another, within the limits of the Harbour ; or from any of the wharves into the Lachine Canal ; or out of the said Canal to any of the wharves in the Harbour ; or from the foot of the current ; or from Longueuil into the Harbour ; or from the Harbour to the foot of the current, orto Longueuil ; for each such service	5 00

ALEXANDER ROBERTSON,
Secretary.

HARBOUR COMMISSIONER'S OFFICE,
MONTREAL, 13th March, 1889.

REPORT

ON THE

WORKS FOR THE IMPROVEMENT AND MAINTENANCE

OF THE

HARBOUR OF MONTREAL,

FOR THE YEAR 1888.

JOHN KENNEDY, M. INST., C. E., *Chief Enginner.*

HARBOUR COMMISSIONERS OF MONTREAL,

Chief Engineer's Office,

MONTREAL, February 18th, 1889.

ALEXANDER ROBERTSON, Esq.,

Secretary,

Harbour Commissioners of Montreal,

DEAR SIR:—

I beg to submit, for the information of the Board of Harbour Commissioners, the following report upon the works in the Harbour of Montreal, for the year ended 31st December, 1888.

The principal works of the year are the dredging of the Wind Mill Point basin and approach, dredging the ship channel opposite Victoria Pier, Section 20, and in the Current St. Mary, opposite Ile Ronde; dredging for extension of wharfage at Section 41, opposite the Hudon Cotton Mill, Hochelaga; making crib-work wharf across

the mouth of the basin at Section 25, and filling up the basin and repairing and raising the wharves in Sections 12, 15, 17, 2[illegible], 31, and 33 to 37.

The following are the chief details of the work done :—

New Works.

Section 5 to 10 (Windmill Point).—The deepening and enlarging of the basin was continued from time to time throughout the summer, as dredges could be spared from other work. A stone-lifter from the ship channel was employed for ten days in the fall removing loose boulders and pieces of rock. Quantity removed by dredges and stone-lifter during the past year, 16,900 cubic yards; expenditure, $14,192.78.

Sections 11 to 13.—The approach to the Windmill Point basin was enlarged and deepened by dredging to 25 feet at low water. Expenditure, $7,257.10.

Section 25.—A small shoal about 200 feet out from the wharf was partly cut away to 25 feet depth at low water. Expenditure, $5,624.40.

The basin in Section 25 has of late years been found to be inconvenient, because its length, 300 feet, was too short for berthing large modern vessels, and also because it unduly reduced the wharfage breadth behind it. It was, therefore, closed up during the past summer by extending the wharf across its entrance, thus making the line of wharf continuous. The new piece is of crib-work 302 feet in length at top, is founded at 28 feet depth at low water, and face planked and finished to standard height. The crib-work is filled with rock and gravel dredgings, and the remainder of the basin is filled up partly with road scrapings and earth from builders' excavations, but mainly with dredgings. Cost, $11,400.14.

Sections 40 and 46.—About 700 feet in length was dredged out to receive cribs for the proposed extension of

the wharf in Sections 40 and 41, opposite the Hudon Cotton Mill. Expenditure, $2,431.20.

The depositing of dredgings along shore, and levelling them off so as to be utilized in future wharf building, was continued, and during the summer 27,740 cubic yards were thus placed. Expenditure, $1,221.35.

A timber culvert was built at Section 44 to carry the Ruisseau Migeon through the new earth filling. Length, 112 feet; height, 5′ 6″; breadth, 6′ 0″ internal dimensions; built of pine cribwork, having flat pine transverse sleepers 20 feet long, 6 feet apart; sides 12″ × 12″ square pine with land ties 10 feet apart in every second course, covered with flat pine 10 feet long laid transersely, floored with two thicknesses of three inch hemlock plank. Expenditure, $881.92.

At the property Cadastral Lot No. 9, Hochelaga, 3,735 cubic yards of dredgings were deposited on the beach, and at Lots 36 and 37, Longue Pointe, 1,732 cubic yards were deposited.

The electric light plant has been increased by the addition of a 50-arc light dynamo, the extension of the lighting circuit to Section 40 from its former termination at Section 36, and by the addition of 14 arc-lamps in this and other parts of the harbour. Cost of the addition, $3,915.81.

It will be remembered that lighting the wharves by electricity was commenced in 1880, Montreal being, it is believed, the first port which was lighted in this way, with the longest circuit then in use. The lighting plant, which at first consisted of a 16-light dynamo, 16 arc-lamps, and a circuit of 2¾ miles, has been increased with the needs of the harbour, until it now consists of of one dynamo of 35 lights and one of 50 lights capacity, 60 arc-lamps, and about 8½ miles of conducting wire.

Harbour Repairs.

The river behaved last spring in its ordinary old-time way. There was no flood nor unusual shoving of ice; neither was there any considerable damage to the wharves, nor unusual quantity of ice left lodged upon them at the opening of navigation. Advantage was, therefore, taken of the lightness of these items in the repair account to do other needful work. The side of the Island Wharf, Section 15, which faces north-east; the lower side of the shore pier, Section 20, and a long stretch of wharf in Sections 33 to 37, needed and received heavy repairs. These and numerous smaller repairs required to keep the wharves in fair condition, bring up the total maintenance cost for the year to $49,519.75, which compares with that of former years as follows:—

1875	$16,499
1876	35,711
1877	26,077
1878	18,974
1879	18,819
1880	17,330
1881	16,159
1882	27,962
1883	35,768
1884	44,869
1885	42,158
1886	64,989
1887	64,984
1888	49,520

The following are the chief repairs made during the year:—

Section 12.—A piece of crib-work wharf, 150 feet in length, which had sunk, was brought up to standard height by new face timbers, longitudinals, cross ties, coping and top planking. Expenditure, $198.42.

Section 14.—The sewage deposit of the lower basin was dredged out at the request and expense of the city.

Section 15.—The down-stream end of the Island Wharf, which had again settled, was built up to standard height with new timbers on the crib-work and new top planking. Expenditure, $721.75.

Section 17.—Two bents of pile-work that had been broken by ice were replaced by new piles, stringers, coping and top planking. Part repaired about 40 feet in length by 20 feet in width. Expenditure, $96.03.

Section 18.—The upper basin had the sewage deposit dredged out at the request and at the cost of the city.

Section 20.—At the upper end of the Military Basin, the crib-work having become undermined by scour, had settled badly out of line, and the filling was gone. This was repaired by a row of sheet piling, provided with face-fenders and secured to land ties, with longitudinals, cross-ties, &c., and filled in rear with shale rock and top planked. Length repaired, 185 feet. Expenditure, $3,547.39.

Section 31.—A piece of wharf, 175 feet in length, damaged by ice, was repaired with from one to four courses of new face timbers, with rear longitudinals, cross-ties and top planking. Expenditure, $557.59.

Section 33 *to* 37.—The superstructure of the crib-work wharf which was built in 1875 had become decayed and sunken below proper height. Two thousand lineal feet of this was renewed and brought to standard level with two to four courses of face timbers, also new rear longitudinals and cross-ties, new top planking and new pine face planking. Expenditure, $7,703 20.

General Repairs.—Minor general repairs to the woodwork of the wharves have been made throughout the harbour wherever needed during the season. Some of the larger items are as follows :—

Section 17, furnished with four new oak fender posts.

Section 19, about 175 feet of new coping and 175 lineal feet of new pine face planking were put on outward part of the pier; also new fenders and fender posts. Section 20, 350 feet of new coping was put on the east or inner side of the pier. Section 24, about 100 lineal feet of wharf, damaged by ice, was brought up to standard height by two courses of face timbers, cross-ties, and part new top planking. Expenditure, $4,138.99.

Roadways.—The roadways of the wharves and ramps have been maintained with "banc rouge" macadamizing stone, as usual; 400 toises in all were spread upon them.

Electric Lighting.—As mentioned under the head of New Works, the lighting circuit was extended to Section 40, thus embracing all the wharves except the two at Longue Pointe. The plant has all worked well, except the new 50-light dynamo, which was troublesome and uncertain in action a good part of the summer, and near the close of the season it failed altogether by the burning out of the armature.

The cost of lighting for the season was $3,377, which is at the rate of 44 cents per lamp per night, or 4 $\frac{7}{10}$ cents per lamp per hour.

Harbour Dredges and Dredging.

The harbour dredging plant was composed of three spoon, or dipper dredges, two derricks, and two screw tugs, with scows and a floating shop, as detailed in the appended table. Besides this, there were borrowed from the Government ship channel fleet, for a short time in the fall, two elevator dredges, with their scows, and one stone-lifter.

The harbour dredging fleet was wintered, as usual, in the Richelieu River, at the Harbour Commissioners' ship-yard, Sorel, and the necessary repairs were made at the Commissioners' works.

The dredges were brought up from Sorel on April 30th. They all got to work in Montreal harbour on May 4th, and continued throughout the summer, as elsewhere detailed. All the dredges were sent to winter quarters on the 22nd November.

The number of days during which the spoon dredges were on duty, including all except Sundays and fourteen days employed in dredging sewage at the cost of the city, from commencing in the spring to leaving off in the fall, was 164 days for No. 4, 173 for No. 6, and 167 for No. 7, making an aggregate of 504 days for the season.

The nominal working time is ten hours per day, which gives a total of 5,040 hours' service. but the actual dredging time, after deducting that lost for repairs, changing position, detention by vessels, short days in autumn, and all other causes, was reduced to 3,569 hours, or an average of 70.81 per cent. of the gross time of service.

The total outlay for working the fleet, consisting of three spoon-dredges, two unloading derricks, two screw-tugs and the scows, was $36,576.49, and this, as usual, represents the entire cost of working the plant and machinery, repairs, outfit, fuel, wages, salaries, insurance, and all other outlays, except interest on capital and depreciation of plant.

The following are the comparative costs and quantities of dredging for 1888, and for previous years :—

Years.	Cubic Yards Dredged.	Total Cost.	Cost per Cubic Yard, Cents.	Remarks.
1875...	151,719	$68,979	45	
1876...	156,082	55,462	$35\frac{50}{100}$	
1877...	173,449	45,103	26	
1878...	211,731	48,748	23	
1879...	189,609	41,006	$21\frac{63}{100}$	
1880...	186,430	46,914	$25\frac{16}{100}$	
1881...	170,764	54,128	$31\frac{69}{100}$	
1882.	187,339	53,598	$28\frac{60}{100}$	Spoon Dredges and Stone-lifters.
	9,429	13,254	$\$1.40\frac{60}{100}$	Elevator Dredges.
	196,768	66,852	$33\frac{96}{100}$	Totals and average.
1883.	36,358	17,956	$49\frac{38}{100}$	Spoon Dredges and Stone-lifters.
	6,990	19,385	$\$2.77\frac{30}{100}$	Elevator Dredges—lifting rock and boulders and clearing up.
	43,348	37,341	$86\frac{14}{100}$	Totals and average.
1884...	125,648	49,468	$39\frac{37}{100}$	Spoon Dredges and Stone-lifters.
1885...	69,494	28,563	$41\frac{10}{000}$	" " "
1886...	57,728	25,772	44	" " "
1887...	36,993	23,259	62	" " "
1888.	73,150	36,690	$50\frac{16}{100}$	" " "
	2,077	1,333	$64\frac{18}{100}$	Elevator Dredges.
	75,227	38,023	$50\frac{54}{100}$	Totals and average.

The cost and character of the dredging done in the different parts of the harbour are as follows:—

Sections 5 *to* 10 (*Windmill Point*).—Enlarging and deepening the basin, clearing up loose boulders and rock, material chiefly shale and hard pan, dredged with spoon-dredges, and boulders raised by a stone-lifting barge; depth of water at time of dredging, 18 feet to 30 feet; quantity dredged, 16,900 cubic yards, scow measurement, costing 84 cents per yard.

Sections 11 *to* 13.—Clearing off shoals in the approach to Windmill Point Basin, material chiefly hard pan with some shale, dredged with spoon-dredges; depth of water, 25 feet to 30 feet; much detention allowing vessels to pass; quantity dredged, 12,532 cublic yards, costing 58 cents per yard.

Sections 12 *to* 14.—Clearing off shoals opposite entrances to both canal locks and along wharf at Section 13, material hard pan and stones, dredged with spoon-dredges; depth of water, 25 to 30 feet; much detention allowing vessels to pass; quantity dredged, 3,893 cubic yards, costing 58¾ cents per yard.

Section 18, *Jacques Cartier Basin.*—Clearing the basin of sand and bricks; depth of water, 6 feet to 15 feet; quantity dredged, 1,103 cubic yards, costing 16½ cents per yard.

Section 19, *Bonsecours Basin.*—Deepening the basin to 27½ feet; material chiefly sand; depth of water, 24 to 29 feet; quantity dredged, 2,295 cubic yards, costing 34¾ cents per yard.

Section 20, *Military Basin.*—Deepening the basin opposite the lower end of Victoria Pier; material chiefly sand and gravel; depth of water, 32 to 33 feet; quantity dredged, 1,867 cubic yards, costing 54 4/5 cents per yard.

Section 25.—Dredging crib seats for new wharves, and cutting off a shoal in the approach from the ship channel; material, sand, gravel and boulders; depth, 25 to 30 feet; quantity dredged, 17,505 cubic yards, costing 32⅛ cents per yard.

Section 32, *Longueuil Ferry Wharf.*—Dredging out piles from site of railroad ferry slip; cost, $108.85.

Sections 35 *and* 36.—Clearing off lumps near wharf; material, shale, hard pan and boulders; depth, 25 feet to 30 feet; quantity dredged, 1,395 cubic yards, costing 44¼ cents per yard.

Sections 40 *and* 41.—Dredging crib seats for proposed new wharf at Hochelaga Cotton Mill; material, sand, gravel and boulders; depth, 15 feet to 28 feet; quantity dredged, 11,205 cubic yards, costing 21 $\frac{7}{10}$ cents per yard.

Section 46.—Dredging test pits on site of proposed new wharves; material, hard sand, gravel and boulders; depth, 15 feet to 28 feet; quantity dredged, 855 cubic yards, costing 51 cents per yard.

Ship Channel through Harbour.—Considerable dredging was done in clearing off lumps and shoals in the vicinity of Victoria Pier to 27½ feet depth at low water, with minimum width of 300 feet. Material chiefly small stones, with some sand and a few large boulders; much detention in allowing vessels to pass; quantity dredged, 5,677 cubic yards, costing $3,075, or 54 cents per yard.

Appended are tables giving further particulars as to the dredging plant and the work done.

Yours respectfully,

JOHN KENNEDY,

Chief Engineer.

HARBOUR DREDGING—*Abstract of work done by each Dredge for the Harbour of Montreal in* 1888.

VESSELS.	Time of Service. Days.	Time of Service. Total Days.	SECTION.	QUANTITY DREDGED. Cubic Yds.	QUANTITY DREDGED. Total.	MATERIAL.
Spoon Dredge No. 4	113		Sections 5 to 10, Windmill Point	9,562		Shale and hard pan.
	8		" 11, Approach to Windmill Point	1,215		Hard pan and stones.
	31½		" 12 to 14, Allan's Basin	3,893		Do do.
	11		" 20, Military Basin	1,372		Sand and gravel.
	½		" 25			Placing new crib.
		164			16,042	
Do. do No. 6	30½		" 12 & 13, App. Windmill Point	5,130		Hard pan and stones.
	3		" 20, Military Basin	495		Sand.
	76		" 25	17,505		Sand, gravel and boulders.
	33½		" 40 and 41	11,205		Do do.
	6		" 46	855		Hard sand and boulders (test pits).
	24		" 21 to 22, Ship Channel through Montreal Harbour	3,600		Sand, gravel and boulders.
		173			38,790	
Do. do No. 7	81		" 5 to 10, Windmill Point	7,200		Shale, hard pan and stones.
	61½		" 11, Approach to Windmill Point	6,187		Hard pan and stones.
	2½		" 18, Jacques Cartier Basin	1,103		Sand and bricks.
	11		" 19, Bonsecours' Basin	2,295		Sand.
	1		" 25			Placing crib.
	1½		" 32			Tearing up piles.
	8½		" 35 and 36	1,395		Stones, hard pan and black rock.
		167			18,180	
Elevator do No. 8	34		" 20 & 21, Ship Channel through Harbour	1,740		Sand and stones.
		34			1,740	
Do. do No. 10	25		Do do do do	337		Stones.
		25			337	
Stone-Lifter, No. 2	10		" 8 & 9, Windmill Point	138		Boulders.
		10			138	
Total		573			75,227	

HARBOUR DREDGING—*Statement showing the number of days worked by each Dredge and the quantity dredged at each place for the Harbour of Montreal in* 1888.

PLACE.	VESSEL.	Time of Service. Days.	Time of Service. Total Days.	QUANTITIES DREDGED. Stone Lifters & Elevators.	QUANTITIES DREDGED. Spoon Dredges.	QUANTITIES DREDGED. Totals. Cubic yds	MATERIAL.
Sections 5 to 10, Windmill Point...	Spoon Dredge No. 4	113			9,562		Shale and hard pan.
	" " No. 7	81	194		7,200		Do do
	Stone Lifter No. 2	10	10	138		16,900	Boulders.
" 11 to 13, approach to Windmill Point	Spoon Dredge No. 4	8					
	" " No. 6	30½			1,215		
	" " No. 7	61½	100		5,130		
" 12 to 14, Allan's Basin	" "				6,187	12,532	Shale, hard pan and stones.
" 18, Jacques Cartier Basin	" " No. 4	31½	31½		3,893	3,893	Hard pan and stones.
" 19, Bonsecours Basin	" " No. 7	2½	2½		1,103	1,103	Sand and bricks.
" 20, Military Basin	" " No. 7	11	11		2,295	2,295	Sand.
	" " No. 4	11					
" 25	" " No. 6	3	14		1,372		Sand and gravel.
	" " No. 6	76	76		495	1,867	Sand.
" 25	" " No. 4				17,505	17,505	Sand, gravel and boulders.
	" " No. 7	1	1½				
" 32	" " No. 7	1½	1½				Assisting to place crib.
" 35 and 36	" " No. 7	8½	8½				Tearing out old piles.
" 40 and 41	" " No. 6	33½	33½		1,395	1,395	Hard pan, black rock and stones.
" 46	" " No. 6	6	6		11,205	11,205	Sand, gravel and boulders.
" 20, 21 and 22, Ship Channel through Harb. of Mont.	" " No. 6	24	24		855	855	Hard sand and bould. (Test pits).
	" " No. 8	34			3,600		Sand, gravel and boulders.
	" " No. 10	25	59	1,740			Sand and boulders.
				337			Sand and stones.
Totals						5,677	Stones.
			573	2,215	73,012	75,227	

HARBOUR COMMISSIONERS' DREDGING PLANT EMPLOYED IN THE HARBOUR OF MONTREAL IN 1888.

				573	2,215	73,012	75,227						

HARBOUR COMMISSIONERS' DREDGING PLANT EMPLOYED IN THE HARBOUR OF MONTREAL IN 1888.

DESCRIPTION OF VESSEL	HULL. Length over all.	Breadth of Beam.	Depth of Hold.	When Built.	ENGINES. Kind of Engine.	No. of Cylinders.	Diameter of Cylinders.	Length of Stroke.	Pressure of Steam.	Capacity of Bucket.	Depth to which Dredge can work.	REMARKS.
DREDGES.	Ft. In.	Ft. in.	Ft. in.				Inches.	Inches.	Lbs.	C. feet	Ft.	
Crane Spoon Dredge, No. 4	77.3	27.0	6.6	1872	Horizontal, non-condensing.	1	14	16	60	40	32	Wooden Hull.
Boom " " No. 6	77.0	27.0	7.6	1874		1	14	16	90	40	35	Altered in 1881.
Crane " " No. 7	77.3	27.0	7.0	1874		1	14	16	60	70	32	Wooden Hull.
DERRICKS.												
Clam Shell Derrick, No. 1	56.8	23.9	5.9	.....	Horizontal, non-condensing.	1	8	12	75	....		Used as pile-driver.
" " " No. 2	57.0	23.6	5.9	1872		2	7	12	75	....		Wooden hull.
" " " No. 3	61.9	24.0	5.9	1875		1	10	12	75		....	" "
TUG BOATS.												
Tug St. Louis.....	67.0	15.0	8.7	1875	Vertical, non-condensing.	1	16	20	90		..	Wooden hull.
" St. Peter.....	71.6	16.6	8.6	1875		1	20	22	93	...	....	" "
BARGE.												
Staghound, (floating shop)..	103.4	21.5	7.6	1869	.....	.....	.....	.....	.....	..	....	Wooden hull.
SCOWS.												
4 Dumping Scows.....	80.0	16.0	7.6	.....	.....	.....	.....	.....	.....	.....	.....	All wood.
2 Flat Scows.....	75.0	20.0	5.9	1876	.....	.....	.....	.....	.....	.....	.....	" "
2 " "	75.0	20.0	6.0	1878	.....	.....	.....	.....	.....	.....	.....	" "
6 " " various sizes and ages..	...	.....	.....	.....	.....	.....	.....	.....	.....	..	....	" "

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REPORT

UPON THE

DEEPENING OF THE SHIP CHANNEL

BETWEEN

MONTREAL AND QUEBEC,

FOR THE YEAR 1888.

JOHN KENNEDY, M. INST., C.E., *Chief Engineer.*

HARBOUR COMMISSIONERS OF MONTREAL,

Chief Engineer's Office,

MONTREAL, February 20th, 1889.

ALEXANDER ROBERTSON, ESQ.,

Secretary, &c.,

Harbour Commissioners of Montreal.

DEAR SIR:—

I beg to submit, for the information of the Harbour Commissioners, the following Report upon the works accomplished during the year 1888, in deepening the Ship Channel between Montreal and Quebec.

The object kept in immediate view in the year's work was the earliest possible opening of the 27½ foot Channel for navigation. This was accomplished and the Ship Channel publicly inaugurated on the 7th November last. At the close of the season's work the condition of the Ship Channel was as follows:—From Montreal to the head of

Cap à la Roche Channel, there is not less than 27½ feet throughout, at low water with 10½ feet on the Flats of Lake St. Peter and at low water of tides, except at the Champlain Point bar where a slight silting up had taken place. Through the Cap à la Roche, Pouillier Rayer and Cap Charles Channels there is a depth, varying with the tides, between about 30 feet and 36 feet when the river is swollen in spring, and between 24 feet and 30 feet when it is at its lowest in the fall.

Below Cap Charles no dredging has ever been done. There are points where the depth is suspected to be less than 27½ feet at lowest water and which need to be carefully examined, but in the meantime this depth is available by waiting for tides.

The breadth of the dredged channel is uniformly 300 feet, except between No. 1 Lightship and the White Buoy on Lake St. Peter where it is 325 feet, at nearly all bends where it is more or less enlarged up to a maximum width of 450 feet, and in Current St. Mary where there remain some small points to be taken off to give the full breadth.

The following are the chief details of the work done during the year :—

Cap Charles.—At the upper end of the shoal two places, equivalent to about 1,600 feet long of the full breadth of the Channel, were dredged to 26 feet 9 inches in depth at low water.

Boulders were also lifted by stone-lifters on 200 feet of length of the north half breadth, and the whole tested to 24 feet depth at low water.

Quantity dredged, consisting of hard pan and boulders with some shale rock, 34,080 cubic yards, costing 41½ cents per yard, scow measurement.

Boulders lifted 672 cubic yards costing 63⅔ cents per yard.

Pouillier Rayer.—At the upper end of the Channel, near the curved junction with the Cap à la Roche Channel, several detached pieces equivalent to about 1,000 feet long of the full breadth of the Channel were cleared of boulders by the stone-lifters and tested to 24 feet depth at low water.

Quantity of boulders lifted 452 cubic yards, costing $2.55 per yard.

Cap à la Roche.—In the bend, or curve, joining the Pouillier, Rayer and Cap à la Roche new Channels a distance of 2,540 feet of the south half breadth of the Channel, and of 1,350 feet of the north half breadth was dredged to 26 feet 9 inches depth at low water. Besides this a further distance of 920 feet of the south half, extending upwards, was dredged to 25 feet 3 inches depth, and 400 feet of the same half, lower down, was cleared of boulders by a stone-lifter.

At the upper end of the Cap à la Roche Channel detached pieces equivalent to 1,600 feet of the whole breadth was cleared of boulders by stone-lifters. About 1,600 feet, partly of the same ground, was also dredged, three-fourths being made to 26 feet 9 inches and the remainder to 25 feet 3 inches depth at low water.

The whole Cap à la Roche and also the Pouillier Rayer and Cap Charles Channels were tested and opened to navigation, on Nov. 7th last, to 24 feet depth at lowest water, this being the greatest depth which the shallowest part of the unfinished work would afford.

Quantity dredged at Cap à la Roche last year: shale rock, 142,110 cubic yards, hard pan and rock, 4,650 cubic yards; boulders by stone-lifters, 1,820 yards; total, 148,580 cubic yards. Cost of shale rock, 36$\frac{3}{16}$ cents per yard, rock and hard pan, 86$\frac{1}{8}$ cents per yard, scow measurement; boulders, 1.35\frac{3}{4}$ per yard.

Cap Levraut.—A distance of 2,000 feet of the whole breadth of the Channel was cleared of boulders by stone-lifters, and afterwards tested to 27½ feet at low water.

Quantity of boulders lifted, 1,970 cubic yards, costing $1.13½ per yard.

Batiscan Traverse.—Two pieces of 3,000 feet aggregate length were gone over with a dredge to clear off small obstructions found in testing, and a piece of new work of 1,550 feet in length was dredged through; a few boulders were also lifted, after which the whole was tested to 27½ feet at low water.

Quantity lifted, consisting of clay and boulders, and including boulders removed by stone-lifter, 31,016 cubic yards, costing 22¾ cents per yard.

Batiscan Village.—At Batture Perron some points of shoals were dredged through and cleared off by stone-lifters in such a way as to give a fairly good but curved Channel for the present, and with a view to its being utilized hereafter in making a straight permanent Channel.

Quantity dredged, consisting of clay, sand and boulders, 12,030 cubic yards, costing 20 cents per yard, boulders lifted, 276 cubic yards, costing $1.93 per yard.

Champlain.—Just above the bend and slightly to the north of the line of the Champlain lights, a small shoal of about 200 feet diameter, which greatly restricted the deep water space, was dredged off to 27½ feet at low water.

Quantity dredged, consisting of sand, clay and stones, 1,005 cubic yards, costing 76$_{10}$ cents per yard.

Becancour.—On the lower traverse, just below the bend, a small detached shoal and a point of the main shoal on the south side were dredged off to 27½ feet at low water, so as to give a clear, straight Channel.

Quantity, consisting of hard pan, sand and stones, 3,570 cubic yards, costing 77¾ cents per yard.

Cap Madeleine.—Several small detached shoals and points of main shoals, at and just below the bend, were dredged off to 27½ feet at low water.

Quantity, consisting of hard pan, sand and stones, 1,335 cubic yards, costing 81⅓ cents per yard.

Nicolet.—A small bar, extending out from the main shoal on the south side, was dredged through to 27½ feet at low water.

Quantity, consisting of hard pan and stones, 6,825 cubic yards, costing 35⅓ cents per yard.

Lake St. Peter.—Three detached pieces between the White Buoy and No. 3 Lightship, of an aggregate length of 2⅞ miles, were dredged through in mid-summer, finishing the Lake dredging.

Quantity dredged, consisting of soft clay, 567,180 cubic yards, costing 2½ cents per yard, the lowest cost yet attained.

Stone Island and Ile de Grace.—Several points of shoals were dredged off so as to widen and straighten the natural channel and utilize it for the 27½ feet depth.

Quantity dredged, 73,425 cubic yards, costing 13⅛ cents per yard.

Contrecœur Channel.—Several small detached shoals and points and some unfinished places, at the lower end of the new channel below Ile St. Ours, were dredged through. Two small spots found in testing the former work in the upper part of the channel and between that and Vercheres, were also cleaned off. This completed the channel to 27½ feet depth at low water.

Quantity dredged, 47,150 cubic yards, costing 17 cents per yard.

Vercheres to Pointe Marie.—About a dozen small spots and points of shoals were dredged off so as to widen and straighten the natural deep water and make it available for the 27½ foot Channel.

Quantity dredged, 11,865 cubic yards, costing 23 $\frac{6}{10}$ cents per yard.

Cap St. Michel.—A heavy piece of work just below the Cap and two smaller pieces above it were dredged through. Nearly all the Channel passing the Cap and Ile de Lorier is curved and is made 450 feet wide.

Quantity dredged, 202,660 cubic yards, consisting of stiff clay, common clay, sand and stones, costing 5 $\frac{6}{10}$ cents per yard.

Varennes.—The curve opposite Varennes has, as is well known, proved very difficult of navigation to deep draft steamers going downward. The radius of the curve was smaller than usual and the current, which sets to the north, draws the steamers toward the bank of the Channel and sometimes upon it. New lines, giving larger radius and greater breadth, were laid out in 1887, and the dredging done both in that year and 1888 followed the new line for the north bank. This gives a maxium widening of 150 feet on that side, and at the worst place, and it has already afforded great relief to vessels navigating the curve.

A small piece of dredging was done last summer below the curve, a larger piece in the upper part of it and another in the Poulier Varennes, after which the whole was tested to 27$\frac{1}{2}$ feet at low water.

Quantity dredged last summer, 144,720 cubic yards, consisting of clay with some stones, costing 4$\frac{2}{3}$ cents per yard.

Ile a l'Aigle.—Opposite the lower end of the island, the point of a shoal was trimmed off to give more room in the natural channel.

Quantity dredged, consisting of clay and stones, 2,160 cubic yards, costing 17 $\frac{9}{10}$ cents per yard.

Pointe aux Trembles and vicinity.—On testing the channel

at and below Pointe aux Trembles, a number of loose boulders and small spots were found in the work of former years, at which there was slightly less than the standard depth. These were cleared off. A small piece of limestone rock at Pointe aux Trembles, and nearly a mile of new work which remained at the upper end of the channel were also dredged through, after which the whole was tested. Quantity dredged, 76,053 cubic yards, consisting of rock, stiff clay and stones. Cost 24 cents per yard.

Longueuil.—About half a mile in length of irregular cutting was done, chiefly between the bend and the head of the shoal, after which, the work was tested to 27½ feet at low water.

The material consists of very stiff clay and hard pan packed full of boulders, of boulders imbedded in gravel and of boulders alone, some of them of great size.

Quantity, 16,881 cubic yards, costing 76$\frac{3}{10}$ cents per yard.

Current St. Mary.—The current is so swift that ordinary soundings are of little value in ascertaining the exact condition of the bottom, and it was therefore carefully tested with the testing scow. A small bar extending across the channel, and some isolated spots and points of shoals were found in this way, on which there was less than 27½ feet at low water.

These consisted of clean boulders of all sizes up to ten tons weight, and enough was done by a stone-lifter in removing them to afford a clear channel, but of rather less than the full width. A few more yet, require to be taken away to complete it.

Quantity lifted, 1,246 cubic yards, costing 1.94\frac{4}{10}$ per yard.

Dredging Plant and Working Expenses.

The year's outlay, including all repairs, outfit, fuel, wages, salaries, insurance, and every expense except interest and depreciation of plant, for the ship channel fleet, while employed in the channel work was $180,536.65. The quantities dredged are 1,236,520 cubic yards of earth, and 148,631 cubic yards of rock and large boulders, making an aggregate of 1,385,151 cubic yards.

The cost of the year's dredging is necessarily high from the peculiar conditions incident to the finishing up of the greater part of the channel.

In many places there were only a few stones to be removed, which had been found in testing former dredging. In others there was a succession of small spots and stones extending over several hundred feet. At other places small new shoals were found in testing what had been considered deep water. All such work is necessarily costly, for it involves much loss of time of dredges and stone-lifters in moving from place to place and yields only insignificant results, measured in cubic yards of materials lifted.

Nearly all the plant, too, was worked both night and day, which is more costly than working by daylight only.

The following are the comparative costs and quantities of dredging for 1888, and for previous years :—

Years.	Cubic Yards. Dredged.	Total Cost.	Cost per Cubic Yard.	Number of Vessels Employed.
1875.....	820,773	$134,744	16 4/10 Cents.	7 to 8 Elevat'r Dredges
1876.....	922,808	130,744	14 1/10 "	8 " "
1877.....	1,262,308	137,830	10 8/10 "	7 to 8 " "
1878.....	966,973	$124,891	12 9/10 "	8 Elevat'r Dredges
	117,663	24,125	20 5/10 "	1 to 3 Spoon "
	1,084,636	$149,016	13 8/10 "	Totals and Average..
1879.....	813,391	$135,519	16 66/100 "	8 Elevat'r Dredges
	29,819	7,835	26 26/100 "	2 to 5 Spoon "
	843,210	$143,354	17 "	Totals and Average..
1880.....	1,171,757	$136,537	11 65/100 "	8 Elevat'r Dredges
	47,474	10,500	22 11/100 "	2 to 4 Spoon "
	1,219,231	$147,037	12 5/100 "	Totals and Average..
1881.....	1,375,251	$149,141	10 84/100 "	8 Elevat'r Dredges
	78,537	18,160	23 12/100 "	1 to 4 Spoon "
	1,453,788	$167,301	11 43/100 "	Totals and Average..
1882.....	824,932	$151,223	18 36/100 "	7 Elevat'r Dredges
	74,303	20,981	28 23/100 "	2 to 4 Spoon "
	899,235	$172,204	19 15/100 "	Totals and Average..
1883.....	360,716	$121,325	33 66/100 "	6 Elevat'r Dredges
	138,115	40,690	29 10/100 "	2 to 5 Spoon "
	498,831	$162,015	32 17/100 "	Totals and Average..
1884.....	816,392	$122,163	14 96/100 "	6 Elevat'r Dredges
	22,197	11,244	50 66/100 "	2 Spoon "
	838,589	$133,407	15 91/100 "	Totals and Average..
1885.....	1,372,349	$142,455	10 38/100 "	7 Elevat'r Dredges
	32,703	15,182	46 42/100 "	1 to 3 Spoon "
	1,405,052	$157,637	11 22/100 "	Totals and average...
1886.....	1,491,177	$154,640	10 37/100 "	7 Elevat'r Dredges
	32,411	13,930	42 98/100 "	1 to 4 Spoon "
	1,523,588	$168,570	11 6/100 "	Totals and average..
1887.....	1,293,550	$171,365	10 35/100 "	6 Elevat'r Dredges
	31,128	19,408	62 33/100 "	2 to 3 Spoon "
	1,324,678	$190,773	14 41/100 "	Totals and Average..
1888.....	1,385,151	180,536	13 0/0 "	6 Elevat'r Dredges

The measurement of the quantity dredged is by tally of the scows, which, when filled level, hold 80 and 150 cubic yards, but they are reckoned at 60 and 120 cubic yards each respectively, to allow for imperfect filling.

The working plant employed consisted of the following vessels :—

Two Elevator-Dredges, with cast-steel buckets for rock, Nos. 11 & 13.
One Elevator-Dredge, with large built " " No. 8.
One " " with small built " " No. 10.
Two Elevator-Dredges, with large built " for clay, &c., Nos. 9 & 12.
Nine Screw Tugs.
Three Stone-lifting Barges, Nos. 1, 2 and 3.
Five Barges as coal tenders and Smiths' shops.
Eighteen Hopper-bottomed Scows.
Five Flat-deck Scows.

The first dredge was sent out from winter quarters at Sorel on April 30th, which was as soon as the floating ice permitted. Another followed on May 2nd, and two others on the 3rd. One was delayed for repairs till May 8th, and the last of the six till the 13th. Two of the Stone-lifters went out on May 3rd, and the third on May 15th.

All worked till they finished their several pieces of work on the 27½ foot channel, and they were then laid up in winter quarters at Sorel. The first one finished and went in on November 6th, two others followed on the 8th, two more on the 19th, and the last on the 20th.

The number of days during which the Elevator Dredges were on duty, reckoning every day from the date of leaving winter quarters to that of returning, except Sundays and the time they worked in the Harbour, was 139 for the one which worked by day only, and 294 to 345 for those which worked day and night, reckoning a day and night as two days. The aggregate for the six dredges during the season was 1,769 days, or an average of 295 days each.

The time of the stone-lifters was 174 days for No. 1, which worked during day only; 311 days for No. 2, which worked night and day, and 329 days for No. 3, which also worked night and day, counting a night and day as two days.

The nominal working time for day work is 12 hours per day, and for night and day it is 10½ hours to each watch. The actual dredging time is, however, reduced by short days in autumn, early stoppages on Saturdays, time lost in storms, changing positions, accidents, repairs and delays of all kinds, so that the time during which the dredges were actually dredging was 11,663 hours, or an average of $6\frac{6}{10}$ hours per watch for the whole season.

No accident worthy of note occurred to the plant during the season.

The dredges and tugs were laid up during the winter of 1887–8, in the Richelieu river, at the Harbour Commissioners' Ship Yard, Sorel, and the barges, scows and other vessels without machinery were wintered about a mile above in the same river.

The repairs were, as usual, done at the Harbour Commissioners' works.

Appended are tables giving further particulars as to the dredging plant and the work of 1888. There is also a summary of all the work done in the successive stages of the deepening of the channel from 20 feet in the beginning of 1875, to 27½ feet at the close of 1888.

In accordance with an Act passed last Session of Parliament, 51 Vic. Cap. 5, the deepening of the Ship Channel became one of the Public Works of the Dominion, and was virtually so treated after 22nd May last. The immediate management of the work, however, remained in the hands of the Harbour Commissioners till 31st December last, when the staff, working plant, ship-yard and shops, were entirely handed over to the Government.

The official connection of the Harbour Commissioners with the Ship Channel Works then ceased, after having continued over 38 years, during which time the Commissioners have carried out all the successive deepenings of the channel from the effective commencement of the work to the present time.

Yours respectfully,

JOHN KENNEDY,
Chief Engineer.

DREDGING PLANT *employed in Deepening the* SHIP CHANNEL *between* MONTREAL *and* QUEBEC *in* 1888.

DESCRIPTION OF	HULLS.	ENGINES.

Dredging Plant *employed in Deepening the* Ship Channel *between* Montreal *and* Quebec *in* 1888.

DESCRIPTION OF VESSEL.	HULLS. Length over all.	Breadth of Beam.	Depth of Hold.	When built.	Tonnage Register.	ENGINES. Kind of Engine.	No. of Cylinders.	Diam. of Cylind.	Length of Stroke.	Pres're of Steam.	Capacity of Buckets.	Depth to wh dredge can work	REMARKS.
Dredges.	ft. in.	ft. in.	ft. in.					inches.	inches	Lbs.	c. ft.	Feet.	
Elevator Dredge No. 8.	135 0	29 0	10 0	1874	.....	Two coupled vertical direct acting condensing engines to each dredge.	2	20	32	70	16	37	Wooden hull.
" " No. 9.	135 0	29 0	10 0	1874	.....		2	20	32	70	28	37	" "
" " No. 10.	135 0	29 0	10 0	1874	.....		2	20	32	70	4	35	" "
" " No. 11.	135 0	29 0	10 0	1874	.....		2	20	32	80	6½	38	" "
" " No. 12.	135 0	29 0	10 0	1874	.....		2	20	32	70	16	38	" "
" " No. 13.	135 0	29 0	10 0	1874	.....		2	20	32	80	6½	38	" "
Tug Boats.													
Minnie F. Parsons	76 0	15 0	6 6	1864	22.42		1	18½	20	80	....	.....	Wooden hull.
Delisle	62 5	14 9	7 5	1869	17.07		1	18	20	90	....	.....	" "
John Pratt	96 0	19 2	7 3	1874	21.41	Vertical Non-condensing.	2	14	16	77	....	.....	" "
C. J Brydges	62 2	16 0	8 0	1874	21.29		1	20	22	85	....	.....	" "
St. Francis	80 0	17 0	7 9	1875	37.93		1	20	22	85	....	.....	" "
St. Paul	60 6	15 0	8 0	1875	27 00		1	16	18	100	....	.....	" "
St. James	76 0	17 0	8 2	1875	54.57	Vertical condensing.	1	21	20	85	....	.....	" "
McNaughton	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	.....	" "
Str. South Eastern	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	.....	Chartered for summer's work.
Barges.													
Caroline	103 8	22 6	3 3	1864	132.95	.....	.....	.....	.....	.....	....	.....	Wooden hull.
Dreadnaught	104 2	21 5	7 4	1869	136.42	.....	.....	.....	.....	.....	....	.....	" "
Waverly	100 0	20 11	7 1	1870	176.00	.....	.....	....	.....	.....	....	.....	" "
Alfred Demers	105 0	22 5	7 6	1878	131.00	.....	.....	.....	.....	.....	....	.....	" "
A. G. Nish, (float'g shop)	100 8	22 6	6 4	1873	.....	.....	.....	.....	.....	.....	....	.....	" "
Stone lifter No. 1	65 0	22 0	6 0	1858	.....	Steam Winches.	.....	.....	.....	.....	....	.....	" "
" " No. 2	75 0	24 0	9 9	1878	.....	" "	.....	.....	.....	.....	....	.....	" "
" " No. 3 (Government Barge)	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	.....	" "
Scows.					Scow No.	Capacity of Scow, Cubic yards.							
10 Hopper bottomed	80 0	16 0	6 9	1874	33 to 44	80	.....	.....	.....	.....	....	.....	4 Hoppers.
2 " "	54 6	18 0	7 0	1875	47 and 48	80	.....	.....	.....	.....	....	.....	2 "
1 " "	50 0	19 9	7 3	1876	50	89	.....	.....	.....	.....	....	.....	2 "
2 " "	89 0	18 0	7 9	1879	51 and 52	140	.....	.....	.....	.....	....	.....	3 "
2 " "	89 0	18 0	7 9	1880	53 " 54	150	.....	.....	.....	.....	....	.....	3 "
1 " "	82 5	20 0	8 0	1886	55	150	.....	.....	.....	.....	....	.....	3 "
4 Flat scows	.....	.....	.....	.....	10 to 17	.....	.....	.....	.....	.....	....	.....	All wood.

ABSTRACT *of work done by each Dredge in Deepening the Ship Channel between Montreal and Quebec in* 1888.

VESSEL.	Places at which Dredging was done.	Time of Service		Quantities Dredged—Cubic Yards.			CHARACTER OF SOIL.
		Days.	Total Days.	Earth.	Rock.	Total.	
Dredge No. 8	Cap Charles	146½		34,080			Hard pan, with rock and bould's.
" "	Cap à la Roche	41½		4,650			Do do do
" "	Becancour	20½		2,505			Hard pan and stones.
" "	Cap Madeleine	11½		1.335			Hard pan, sand and stones.
" "	Nicolet Bank	25		6,825			Hard pan and stones.
" "	Cap St. Michel	23		23,700			Hard clay, sand and stones.
	Pointe aux Trembles	26		5,205			Rock and clay.
" No. 9			294				
" "	Lake St. Peter	148		567,180		78,300	
" "	Contrecœur, Main Channel	10		4,1·0			Soft clay and sand.
" "	Cap St. Michel	94		178,960			Clay and stones.
" "	Varennes	69		144.720			Do do
" "	Ile aux Vaches	4		2,160			Clay, stones and boulders.
	Pointe aux Trembles	3		2,080			Do do do
" No. 10			328			899,260	Clay.
" "	Contrecœur, Lower entrance	30		12,015			Stones and gravel.
" "	Contrecœur (Ile St. Ours.)	43		30,975			Hard clay and stones.
" "	Vercheres	24		8,265			Clay and gravel.
" "	Pointe Marie	5		3,6·0			Clay and stones.
	Pointe aux Trembles	37		6.420			Stiff clay, gravel and stones.
" No. 11			139			61,275	
" "	Cap à la Roche	214			57,000		Shale rock.
" "	Champlain	8		1,005			Sand, clay and stones.
	Opposite Longueuil	123		16,785			Hard pan, stiff clay and boulders.
" No. 12			345			74,790	
" "	Batiscan Traverse	73		30,975			Clay and boulders.
" "	Batiscan Village	25		12,030			Clay, sand and boulders.
" "	Stone Island & Ile de Grace	100		73,425			Clay, sand and stones.
" "	Pointe aux Trembles	122		62,310			Clay and boulders.
	Opposite Longueuil	6		90			Clay and sand.
			326			178,830	
Dredge No. 13	Cap à la Roche	329			85,110		Shale rock.
"	Becancour	8		1,065			Hard pan and boulders.
			337			86,175	
Stone-lifter No. 1	Cap Charles	1					

	Opposite Longueuil	6	326	90		178,830	Clay and sand.
Dredge No 13	Cap à la Roche	329			85,110		Shale rock.
" "	Becancour	8	337	1,065		86,175	Hard pan and boulders.
Stone-lifter No. 1	Cap Charles	1			10		Boulders.
" "	Cap à la Roche	79			436		"
" "	Opposite Longueuil	63			6		"
" "	Currrent St. Mary	31	174		40	492	"
" No. 2	Cap Charles	36			647		Boulders.
" "	Pouillier Rayer	100			416		"
" "	Cap à la Roche	170			1,384		"
" "	Pointe aux Trembles	5	311		38	2,485	"
" No. 3	Cap Charles	¾			15		Boulders.
" "	Pouillier Rayer	1			36		"
" "	Cap Levraut	146¾			1,970		"
" "	Batiscan Traverse	½			41		"
" "	Batiscan Village	35			276		"
" "	Current St. Mary	145	329		1,206	3,544	"
Totals			2,583	1,236,520	148,631	1,385, 51	

STATEMENT *showing the number of days worked and the quantity* DREDGED *at each place in deepening the* SHIP CHANNEL *between* MONTREAL *and* QUEBEC *in* 1888.

PLACES WHERE DREDGES WORKED.	VESSEL.	Time of Service		Quantities Dredged—Cubic Yards.			CHARACTER OF SOIL.
		Days.	Total Days.	Earth.	Rock.	Totals.	
Cap Charles	Elevator Dredge No. 8	146½		34,080			Hard pan with rock and boulders.
	Stone-lifter No. 1	1			10		Boulders.
	" 2	36			647		Do
	" 3	¾			15		Do
			184¼			34,752	
Pouillier Rayer	Stone-lifter No. 2	100			416		Boulders.
	" 3	1			36		Do
			101			452	
Cap à la Roche	Elevator Dredge No. 8	41½		4,650			Hard pan with rock and boulders.
	" " 11	214			57,000		Shale rock.
	" " 13	329			85,110		Do
	Stone-lifter No. 1	79			436		Boulders.
	" 2	170			1,384		Do
	" 3	146¾			1,970	148,580	Boulders.
			833½			1,970	
Batiscan Traverse	Elevator Dredge No. 12	73		30,975			Clay and boulders.
	Stone-lifter No. 3	½			41		Boulders.
			146¾			31,016	
Batiscan Village	Elevator Dredge No. 12	25		12,030			Clay, sand and boulders.
	Stone-lifter No. 3	35			276		Boulders.
			73½			12,306	
Champlain	Elevator Dredge No. 11	8		1,005			Clay, sand and stones.
			60			1,005	
Becancour	" " 8	20¾		2,505			Hard pan and stones.
	" " 13	8		1,065			Do do
			8			3,570	
Cap Madeleine	" " 8	11¼		1,335			Hard pan, sand and stones.
			28¾			1,335	
Nicolet Bank	" " 8	25		6,825			Hard pan and stones.
			11¼			6,825	
Lake St. Peter	" " 9	148		567,180			Soft clay and sand.
			25			567,180	
			148				
Stone Island, Ile de Grace	Elevator Dredge No. 12	100		73,425			Clay, sand and stones.
			100			73,425	
Contrecœur	" " 9	10		4,160			Hard clay, gravel and stones.
	" " 10	73		42,990			Do

Lake St. Peter	"	"	9	148	25	567,180		6,825	Hard pan and stones.
					148			567,180	Soft clay and sand.
Stone Island, Ile de Grace.	Elevator Dredge No.		12	100	100	73,425		73,425	Clay, sand and stones.
Contrecœur	"	"	9	10		4,160			Hard clay, gravel and stones.
	"	"	10	73	83	42,990		47,150	Do do
Vercheres to Pointe Marie.	"	"	10	29	29	11,865		11,865	Clay, gravel and stones.
Cap St. Michel	"	"	8	23		23,700			Hard clay, sand and stones.
	"	"	9	94	117	178,960		202,660	Clay and stones.
Varennes	"	"	9	69	69	144,720		144,720	Clay and stones.
Ile a l'Aigle	"	"	9	4	4	2,160		2,160	Do
Pointe aux Trembles and Vicinity	Elevator Dredge No.		8	26		5,205			Rock and clay.
	"		9	3		2,180			Clay.
	"	"	10	37		6,420			Stiff clay and stones.
	"	"	12	122		62,310			Clay and boulders.
	Stone-lifter No. 2			5	193		38	76,053	Boulders.
Opposite Longueuil	Elevator Dredge No.		11	123		16,785			Hard pan, stiff clay and boulders.
	"	"	12	6		90			Clay and sand
	Stone-lifter No. 1			63	192		6	16,881	Lifting boulders and assist'g dred.
Current St. Mary	Stone-lifter No. 1			31			40		Lift. boul. and assist. S. Lift. No. 3
	"		3	145	176		1,206	1,246	Boulders.
Totals					2,583	1,236,520	148,631	1,385,151	

SUMMARY of dredging done in deepening the Ship Channel between Montreal and Quebec from 20 feet at the beginning of 1875 to 27½ feet depth at the end of 1888.

LOCALITY.	QUANTITIES DREDGED.—Cubic Yards.				MATERIAL DREDGED.
	Deepening from 20 feet to 22 feet. 1875 to 1878.	Deepening from 22 feet to 25 feet. 1879 to 1882.	Deepening from 25 feet to 27½ feet. 1883 to 1888.	Total from 20 feet to 27½ feet. 1875 to 1888.	
Platon Wharf			2,036	2,036	Sand and wreckage.
Cap Charles	35,631	63,505	174,467	273,603	Shale rock and boulders.
Pouillier Rayer		2,458	128 261	130,719	Tough clay and many boulders.
Cap à la Roche	41,762	[illegible],087	597,628	794,477	Shale rock and boulders.
Cap Levraut and Vicinity	48,854	53, 59	212.936	3 4,849	Tough clay and boulders.
Champlain Pointe and Champlain	11,415	52,167	68,057	131,639	Sand, clay and boulders.
Bécancour	2,657	383	24,135	27,175	Hard pan, clay and boulders.
Cap Madeleine			1,335	1,335	Hard pan and stones.
Port St. Francis, Iron and Force Shoals	7,260	13,502	47,047	67,809	Hard pan, clay and boulders.
Lake St. Peter	2,217,932	2,836,860	3,455,485	8,510,2 7	Clay.
Ile de Grâce and Stone Island		40,545	171,855	212,4 0	Clay, sand and stones.
Sorel Harbour	2,940			2.940	Deposit, sand, etc.
Contrecœur Channel	834,360	558,002	742,895	2,135,257	Hard sand, clay and stones.
Plum Island		8.880	5,460	14 340	Tough clay and stones.
Pointe Marie to Verchères	29,685	48,990	46,995	125,670	Clay and boulders.
Cap St. Michel and Vicinity	165,615	137,445	234,940	538,000	Do do.
Varennes	201,9 7	36,?25	367,745	605,927	Do do.
Pointe aux Trembles and Vicinity	387,218	174,269	432,243	993,730	Shale rock, clay and boulders.
Opposite Longueuil		5,025	48,933	53,958	Hard pan, stiff clay and boulders.
Current St. Mary			1,246	1,246	Boulders.
Ship Channel through Montreal Harbour	107,043	229,062	212,190	548,295	Clay, sand, gravel and boulders.
TOTAL, Cubic Yards	4,094,329	4,415,464	6,975,889	15,485,682	

LENGTHS of Dredging at different places in the 27½ foot Ship Channel between Montreal and Quebec.

LENGTHS of Dredging at different places in the 27½ foot Ship Channel between Montreal and Quebec.

LOCALITY.	Distance Dredged.		Length passed over by Dredges.		Depth at low water of 10½ feet on Flats of Lake St. Peter.
	Dredging of full width of Channel. Lineal feet.	Irregular Dredging part width of Channel. Lineal feet.	Lineal Feet.	English Statute miles.	
Longueuil	1.150	2,350	3,500	.6628	27 ft. 6 in.
Longue Pointe to Ile à l'Aigle	13,320	7,650	20,970	3.9716	"
Ile à l'Aigle, small projecting point of shoal at lower end of Island		600	600	.1136	"
Pouillier Varennes	650	950	1,600	.3030	"
Varennes to Cap St. Michel	4.750	1,900	6,650	1.2594	"
Cap St. Michel, emb. work from upper end of Ile Delorier to Ile Bellegarde	5,000	3,500	8,500	1.6099	"
Pointe Marie to Verchères	1,200	5,850	7,050	1.3352	"
Plum Island		1,400	1,400	.2651	"
Contrecœur Traverse, small isolated lumps		550	550	.1041	"
Contrecœur Channel, embraces upper bend and Ile St. Ours work	24,000	8,800	32,800	6.2121	"
Sorel to Stone Island	3,550	9,500	13,050	2.4715	"
Lake St. Peter, Ile aux Raisins to Nicolet	95,500		95,500	18.0871	"
Port St. Francis, Iron and Force shoals	850	1,770	2,620	.4962	"
Cap Madeleine, Isolated lumps		550	550	.1041	"
Bécancour; Upper and Lower Traverses	230	3,520	3,750	.7102	"
Champlain and Vicinity	1,950	2,450	4,400	.8333	"
Pointe Citrouille, (Champlain Point)	1,250	850	2,100	.3977	"
Batiscan, Batture Perron		1,700	1,700	.3219	"
Batiscan Traverse, Batiscan to Cap Levraut	7,600	1,800	9,400	1.7803	"
Cap Levraut, Cap Levraut to Cap à la Roche	2,600	2,150	4,750	.8996	"
Cap à la Roche and Pouillier Rayer	11,325	525	11,850	2.2443	24'6" to 27'0"
Cap Charles	3,200	350	3,550	.6723	26'3" to 26'0"
TOTALS	178.125	58,715	236,840	44.86 miles	

The Lavaltrie Channel, of 20 feet deep and about 5 miles length of dredging, is not included above.

REPORT ON

PROPOSED HARBOUR IMPROVEMENT

AND

FLOOD PROTECTION

FOR THE

CENTRAL PORTION OF MONTREAL

BY

JOHN KENNEDY, C.E., CHIEF ENGINEER,
Harbour Commissioners of Montreal,

AND

PERCIVAL W. ST. GEORGE, C.E.,
City Surveyor of Montreal.

MONTREAL:

1889

CHARLES GLACKMEYER, Esq.,

City Clerk, Montreal,

AND

ALEXANDER ROBERTSON, Esq.,

Secretary, Harbour Commissioners of Montreal.

SIRS:—

In compliance with a resolution passed at a joint-meeting of Committees appointed by the Harbour Commissioners and the City Council of Montreal, held on the 13th of June last, a copy of which is annexed, the undersigned have prepared plans and estimates of different schemes for combining the protection of the city from floods; the widening of Commissioners Street and the Improvement of the Harbour.

As a basis for these schemes we have assumed (1) that the central portion of the city front, or that between Berri Street and the entrance of the Lachine Canal is the only part yet to be provided with permanent works for flood protection, and it is therefore the works for this central part only with which we have at present to deal; (2) that the raising of the whole width of Commissioners and Common Streets to above flood level, or a strong dyke or wall of the same height along their outer side, either of which are approved by the Government Flood Commission, would be an efficient protection against floods and one complying with our instructions; (3) that the widening of Common Street is required and implied in the widening of Commissioners Street, and that the latter may be widened either by encroaching on the Harbour property on one side or private properties on the other, as may best suit the public interest; (4) that the project

for Harbour improvements approved by the Flood Commission and by the Harbour Commissioners last year is that which will doubtless be carried out in its main features, and therefore, the one to be fitted into the general scheme; (5) that in compliance with the spirit of our instructions, as well as for simplicity, only those features of flood protection, street widening and Harbour improvements which affect one another and in which both the City and the Harbour Board are directly interested, should be at present dealt with by us. Space should of course be provided for surface and elevated railway tracts, freight sheds and other necessary adjuncts to the business of the Port, but these need not be treated of in detail.

As regards the estimates of cost, it must be understood that the valuations of land and buildings can only be taken as rough approximations, for there is no knowing in advance what such items would actually cost. We have, as a general basis, assumed that all properties wholly or largely cut into could be bought out altogether at about twenty-five per cent. advance on the assessed value and that surplus residues could be afterwards sold by the City at fair prices. If this be questioned, other valuations can be made.

It will be noticed in all the estimates for the work of construction that we have included the Guard Pier of the Harbour plans, and this is done because it is an essential feature in all the flood protection works. Its effect will be to entirely guard the City front from the violent shoving of the River ice, and therefore to leave the inner works on Commissioners Street to resist only still water and a smooth sheet of ice. Without such a guard pier the flood protection works proper would have to do their own battling with the river shoves besides holding out the water, and would, therefore, need to be so much the

stronger. Without it, too, the City would only have a single line of defence against both forces. We have, therefore, included the guard pier in the gross estimate of all the schemes. It may be held that in apportioning the cost of the works between the City and the Harbour that the City should be charged with so much of the cost of the pier as it saves in other protection works, but we have not been able to agree as to this and have, therefore, for the present, placed the whole cost amongst the Harbour Commissioners own work.

The widening of Commissioners Street on the Harbour side would encroach largely upon wharf space which has cost a large sum to bring it to its present state of usefulness. This moving out of the shore line also reduces the possible length of the proposed piers, and by that much reduces the ultimate capacity of the Harbour, but the reduction, as will be seen by the appended tables, is not very great and it is attended with some reduction in the cost of construction. We have left this curtailment of the Harbour property and Harbour capacity to be valued hereafter, if thought proper, and in the meantime have confined ourselves to apportioning to the City the cost of moving the wharf line as much further out as is necessary to restore the breadth taken for street widening.

Upon this basis the following schemes and estimates have been prepared :—

SCHEME 1.—This project contemplates widening Commissioner and Common streets to 100 feet, mainly by taking ground on the north, or City side, and for flood protection it proposes raising the widened streets about seven feet so as to be above highest flood level. The cross streets, where they approach Commissioners and Common streets would, of course be graded to the high level. The wharves would be raised about three feet above their present level, so as to be above the May

freshets, and access to them would be had by ramps as at present. There would be in all seven double ramps and one single one for carts, and one for railway track, the former being thirty feet wide and fourteen feet high with a grade of one in twenty; that is, they would be half the steepness and a half more roomy than the present ramps, but of a half greater height to climb.

Reference to the plan will show that the street and new ramps would not materially interfere with the wharves, and that the flood protection and street widening could be carried out either with or without the Harbour improvements.

The cost of this scheme would be very great, both in works and land damages. Besides the raising of the streets, the revetment wall would have to be entirely rebuilt and of greatly increased height and strength; four entire blocks of buildings would be permanently swept away, and practically the same would be done with all the other buildings fronting on the Harbour from Bonsecours Market to Prince street. Land amounting to over 350,000 square feet would have to be purchased outright and permanently retained.

The scheme could, of course, be modified and reduced in cost by adhering more closely to the existing line of ramps, and by saving more of the valuable block between St. Peter and McGill streets, but the opinion of many who have considered the matter has been in favour of a liberal widening and rectification of the street lines, and this we have endeavored to embody in this scheme.

The estimated cost of the scheme as drawn out is :—

For Works.....	$2,496,227
For Land and Buildings.....	2,128,528
Total.....	$4,624,755

SCHEME 2.—In this it is proposed to widen Commissioners and Common streets on the City side to 100 feet to preserve nearly their present level: to keep out floods by a strong masonry parapet wall, built upon the revetment wall to above flood level; to raise the wharves some three feet, and to give access to them by ramps with suitable openings, which would be closed at flood time by strong iron water-tight gates.

There would be ten double ramps and one single one for carts, and one for railway tracks, with a lift of only seven feet. The present revetment wall would have to be replaced by a new and much stronger one, and the ramps would also have to be rebuilt. The cost of land and building would be as heavy as in Scheme 1. The new ramps, revetment wall and parapet make the works expensive also.

The estimated costs are:—

For Works.....	$2,456,461
For Land and Buildings.....	2,128,528
Total.....	$4,584,989

SCHEME 3.—This scheme contemplates widening Commissioner and Common streets to 100 feet by encroaching upon the Harbour property east of St Peter street, and upon private property west of that point. For flood protection it proposes a parapet wall built upon a new revetment wall, and having openings leading to ramps which give access to wharves at low level. The openings in the parapet would be closed in winter by iron gates. The ramps would be numerous, of easy grade and of only seven feet rise from wharf to street level. The encroachment of the street upon the present wharves is compensated for by moving out the line of proposed new shore shore wharves.

The other features of the scheme are similar to those of Scheme 2.

The estimated cost is :—

For Works	$2,495,586
For Land and Buildings	551,003
Total	$3,046,589
Of this the portion for which the City is clearly liable would be	$ 926,704
And the Harbour portion would be	2,119,885
Total	$3,046,589

SCHEME 4.—In this it is also proposed to widen the street to 100 feet by encroaching on the Harbour property east of St. Peter Street and by taking private property west of this point; the present level of the streets would be preserved and the wharves would be raised up to practically the same height, thus abolishing ramps entirely; flood protection would be attained by a parapet wall and access given to the wharves by frequent roomy openings, which would be closed in winter by iron gates.

The cost of raising the wharves to the Commissioners Street level would, of course, be very great, but this, on the other hand, is largely compensated by the saving in masonry effected by abolishing the revetment wall and ramps.

The estimated cost is :—

For Works	$2,782,942
For Land and Buildings	499,254
Total	$3,282,196
Of this the City's portion would be	$1,165,680
and the Harbour portion would be	2,116,516
Total	$3,282,196

SCHEME 5.—Under this project Commissioners and Common Streets would be widened on the City side to

100 feet, but otherwise its main features would be like those of Scheme 4, that is, it would have high level wharves and no ramps, and for flood protection it would have a parapet wall with openings closed in winter by iron gates.

The cost, as in all schemes for widening on the City side, would be very heavy. The estimate is:—

For Works	$2,767,658
For Land and Buildings	1,145,646
Total	$3,913,304

SCHEME 6.—This is in substance an economical modification of Scheme 4. It contemplates the widening of Commissioners and Common Streets to seventy-five feet minimum, east of St. Peter Street, by encroaching on the Harbour property, and to the same width west of McGill Street by taking private property. Between St. Peter and McGill Streets, where the restricted breadth of the wharf space does not allow of widening on that side and very valuable property opposite makes it costly to widen on the City side, the present width is retained. The wharves are proposed to be raised to Commissioners Street level, so as to abolish the ramps, and flood protection is to be secured by a parapet wall with openings and moveable gates as in other schemes. It will be observed on reference to the plan that Commissioners Street would be seventy-five feet wide at its narrowest, and that its average breadth would be nearly 90 feet.

The estimated cost of the scheme is:—

For Works	$2,739,372
For Land and Buildings	88,522
Total	$2,827,894
Of this the City's portion would be	$ 708,428
and the Harbour portion would be	2,119,466
Total	$2,827,894

Several other schemes and modifications have been considered, but none of them possess merits in proportion to their cost, and we have, therefore, confined the plans and descriptions to those above enumerated.

On taking a general view of the projects thus sketched out, it will be seen at once that they are all large and expensive. The cheapest will cost the City nearly three-quarters of a million dollars and the Harbour Commissioners over two millions more, making nearly three millions for the two bodies to contribute, From this sum the estimates for the different schemes rise to over four and a half millions for the most costly.

It must be noted, too, that the estimates do not include railway tracks and freight sheds for the wharves, nor paving for either streets or wharves. The magnitude of the proposed works is also on a commensurate scale; a mile and a quarter of street is to be doubled in width in a place where it must be done either by destroying valuable property or building costly works; the St. Lawrence is to be banked out along a mile of one of its most violent parts; the whole central section of the Harbour is to be remodelled and over three miles of deep water wharfage built new.

On comparing the different schemes it will be seen that No. 1 is that which most disturbs existing conditions. It proposes to build a broad earth embankment, as high as the present wooden dyke and of the same length. This high embankment and street would be below the level of St. Paul street, at St. Sulpice Street and eastward, but at Custom House Square and all westward the approaches to the Harbour would be banked across as high as by the wooden dyke; but unlike it, the high level street would have no openings leading through to the wharves. All traffic between this part of the City and the wharves would have to be carried on over the elevated street, in-

volving an ascent or descent of fifteen and a half feet on the Harbour side and seven feet on the City side, at Custom House Square and westward. It would be a delightful riverside avenue on which to drive lengthwise, but a permanent nuisance to heavy cartage crosswise. The high street has obviously very serious disadvantages, but on the other hand it has the merit of being an absolutely safe protection from floods up to the limits of its height. There would be neither parapet nor gates to break down, nor go wrong, nor to be maintained.

In common with Scheme 2, this project involves the demolition of many buildings, including whole blocks where the remnants of lots would be left uselessly small, and the throwing of their sites into streets and open space. We are aware that this has been considered a favorable feature in projects for widening on the City side, but we cannot help looking on it otherwise. It involves the utter destruction of many business buildings and putting useful land to comparatively useless purpose, and that at heavy public expense. The open spaces which would be made are not needed as breathing spaces alongside the open river; they would be too narrow for squares and inconveniently wide for streets. We, therefore, think that the widening of Commissioners street on the City side wonld involve an annihilation of property which would be unjustifiable, while new ground can be reclaimed from the River as easily as it can.

Scheme 2, which also contemplates widening the streets on the City side is subject to the objection just urged. As regards flood protection, its safety rests in the strength of the proposed parapet wall and its winter gates. These in our judgment can be made amply strong by sufficient material and good work, and they are provided for in the estimates. In the matter of access to the wharves, the scheme would be only fairly satisfactory. The ramps

would be only seven feet high and of easy grade, but they would still be ramps, costly to build, taking up valuable space and to be climbed up by loaded carts, so long as goods continue to be carted.

A point less important but still worth mention, is that the parapet, in this and all schemes except the first, must always give a shade of the feeling induced by the present dyke; it will be a wall bounding the river side of the street and shutting off something of the river view. But the wide street proposed will give ample room in fact and in feeling; the roadway and outer footpath can be made high enough to allow of seeing over the wall, and the wall itself can be made sightly.

Scheme 3, by encroaching upon the Harbour property avoids the heavy cost of private land and buildings east of St. Peter street, but it is objectionable as taking up more wharf area and affording less wharf frontage than any other of the schemes. In the matter of ramps and flood protection it is substantially the same as Scheme 2, and the same remarks apply to both.

In Scheme 4 the high level of the wharves is by far the most important feature. It does away with all ramps, except one pair at the lower end, and thus not only gives complete freedom for cartage and tramway traffic between the City and wharves, but it saves the space which ramps would occupy and the money they would cost both to build and maintain In the matter of flood protection the high wharves would contribute towards safety in preventing the ice from ever touching the parapet and gates. For the freight sheds on the wharves the high level would also be of much advantage. It would not keep the sheds above flood level, but it would keep them above the level at which heavy ice forms, and therefore make them less liable to damage from it.

As to the question of the effect of high level wharves

upon the convenience with which vessels can be discharged and loaded, a point already discussed by some of those interested and well able to judge, we need only say that looking at it from a technical point of view, we consider the height of the wharves, within reasonable limits, as of really small importance. No fixed height can suit all conditions; the water fluctuates ten feet during summer; ships vary greatly in their height, and the same ship varies between her loaded and light lines. Modern freight handling appliances can be easily adapted to meet these varying conditions, and such appliances are of course to be reckoned upon in considering plans for new wharves and permanent freight sheds. The one serious objection to a scheme with high level wharves is the necessarily heavy cost of the works, and it is at least questionable whether the manifest advantages are a sufficient offset.

Scheme 5 is obviously a combination of 2 and 4 and its cost is, we think, out of all proportion to its advantages.

Scheme 6 has, we think, the chief merits of all the other projects with a saving in cost which outweighs its defects. The width of wharf and street which it gives between McGill and St. Peter Streets are both less than desirable, but yet all that appears to be needed at that particular place; in any case the benefit to be had from greater breadth cannot be considered worth the cost of obtaining it. The breadth of Commissioners Street and the other part of Common Street is not as liberal as in the other schemes, but taken in connection with the high level wharves we think it would be ample. Traffic of all sorts could circulate freely between them, and any strain upon one would always be relieved by the other.

After carefully considering the questions submitted to us we are of opinion that scheme 6 answers all necessary conditions, and that in proportion to its cost it better suits

the combined interests of the Harbour and the City than any other scheme of which we have knowledge, and we therefore recommend the adoption of its main features with a view to it being carried out at such rate as circumstances may warrant.

Yours respectfully,

(Signed) JOHN KENNEDY,
Chief Engineer, Harbour Commissioners of Montreal.

(Signed) PERCIVAL W. ST. GEORGE,
City Surveyor.

Montreal, Jan. 21st, 1888.

RECAPITULATION OF COST.

Estimated cost of Scheme No.	1	$4,624,755
" "	2	4,584,989
" "	3	3,040,589
" "	4	3,282,196
" "	5	3,913,304
" "	6	2,827,894

HARBOUR COMMISSIONERS OF MONTREAL.

Extract from Minutes of Meeting of the Board of Harbour Commissioners held June 19th, 1888.

A joint-meeting of a sub-committee of the Inundation Committee of the City Council and a Committee of the Harbour Commissioners was held at the Harbour Commissioners' Office, at 10 a.m., June 13th, 1888, when there were present Aldermen Jacques Grenier, Laurent and Wilson, representing the City, and Messrs. Andrew

Robertson, Bulmer, and McLennan, representing the Harbour Commissioners, when it was

Resolved :—That it appears expedient in the interest of the City and Harbour of Montreal that there should be joint action in plans covering the following improvements :—

(1) An elevation of the front of the City securing the City from flood inundations.

(2) A sufficiently commodious street, enlarging the present Commissioners Street.

(3) A plan of Harbour improvements specific in detail in so far as it may connect with the City improvements above referred to.

(4) The appointment of the City and Harbour Engineers to furnish plans providing for above improvements, make estimates of probable cost, and, so far as practicable, the proportion of total cost that should be assumed by the City and Harbour respectively.

In the forthcoming plans and estimates it will be well to indicate the cost of alternative width of Commissioners Street, also, the elevation of said street and the elevation of the wharves of the Harbour.

TARIFF.

Rates & Dues to be levied in the Harbour of Montreal,

Under and by virtue of the Acts, 40 Vic., Cap. 53, 42 Vic., Cap. 28, and 51 Vic., Cap. 5.

ON AND AFTER THE TWENTY-THIRD DAY OF MAY, 1888.

Wharfage Dues

To be levied on all Merchandise, Animals and Things whatsoever Landed or shipped in the Harbour.

25c. per Ton—All Goods, Wares and Merchandise not elsewhere specified.
20c. " " —Hay, Straw, Pig and Scrap Iron, Pot and Pearl Ashes.
15c. " " —Apples, Crates and their contents, Flour and Meal, Fish, Meats, Pitch, Potatoes, Tar, Horses, Neat Cattle, Sheep, Swine.
10c. " " —Ballast, Clay, Fire-Bricks, Gypsum, Lime, Marble, Phosphates, Sand, Salt.
7½c. " " —Coal and Coke, Grain and Seeds of all kinds.
Special.....Bricks, 10c per 1,000; Cordwood, 5c. per cord; Lumber, 10c. per 1,000 feet, board measure.
Free.....Bullion, Specie.

On all Goods, Wares and Merchandise whatsoever, the quantity of which by weight, measurement or other mode of estimate provided for in the Tariff, cannot be conveniently ascertained, it shall be lawful for the Harbour Commissioners to levy a rate of ¼ of 1 per cent. on the value thereof.

Each entry shall pay not less than 5 cents.

All property landed on the wharves for re-shipment, shall only pay one wharfage.

The Ton mentioned in the Tariff of Wharfage dues shall be 2,000 lbs. weight, or 40 cubic feet measurement, according to the Bill of Lading.

STANDARD FOR ESTIMATING WEIGHTS.

Ashes, Pot or Pearl.....	3 brls. to one Ton.	Horses	2 to one Ton.
Apples, Flour, Meal, Potatoes	9 " "	Neat Cattle....	3 " "
Fish, Meats, Pitch, Tar....	7 " "	Sheep.....	15 " "
		Swine	10 " "

Certified,

H. D. WHITNEY,
Secretary.

HARBOUR COMMISSIONERS OFFICE,
MONTREAL, 26th March, 1881.

PRIVY COUNCIL OFFICE,
OTTAWA, 1st April, 1881.

I hereby certify that the foregoing Tariff has been approved by His Excellency the Governor-General in Council on this 1st day of April, 1881.

J. O. COTÉ, *Clerk, Privy Council.*

Certified,

ALEXANDER ROBERTSON,
Secretary.

HARBOUR COMMISSIONERS OFFICE,
MONTREAL, 23rd May, 1888.