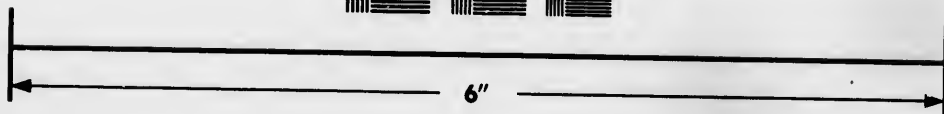
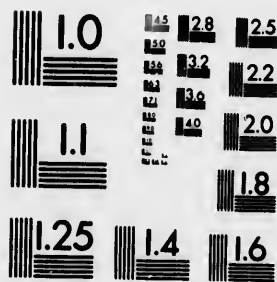


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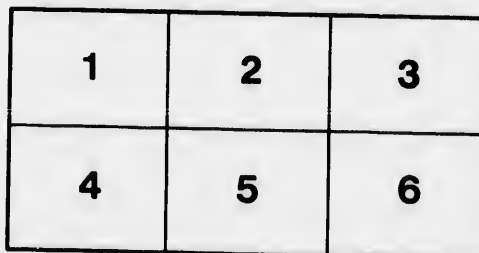
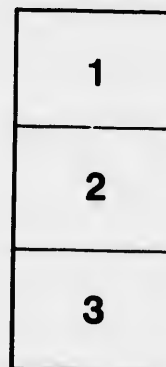
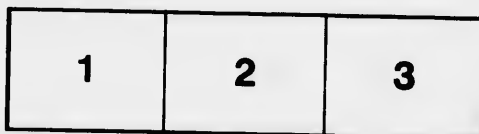
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*March 21<sup>st</sup> 1872*

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REPORT  
 ON THE  
 FURTHER DEEPENING  
 OF THE  
 SHIP CHANNEL  
 BETWEEN  
 QUEBEC AND MONTREAL;  
 ALSO, THE  
 ANNUAL REPORT

FOR 1871,

OF

A. G. NISE, HARBOUR ENGINEER.

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REPORT  
ON THE  
FURTHER DEEPENING  
OF THE  
SHIP CHANNEL

Between QUEBEC and MONTREAL.

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HARBOUR COMMISSIONERS' OFFICE,  
MONTREAL, 29th January, 1872.

H. H. WHITNEY, Esquire,

*Secretary*

*Harbour Commissioners of Montreal.*

SIR,

On the 30th September last, I received yours of that date, accompanied by the Resolutions annexed.

*Resolved*,—"On motion of the Mayor, Mr. Coursol, "seconded by the Honorable John Young,—That in "pursuance of the resolutions passed at the last meeting "of the Board, relating to the deepening of the Ship "Channel to Quebec, the Engineer of the Board be in- "structed to make forthwith such an examination of the "Ship Channel from Montreal to Quebec as will enable "him to furnish the Board with an approximate estimate "of the cost of deepening the same to a uniform depth "of 24 feet, and of widening it to a uniform width of



“ 400 feet; said estimate to show also the cost of deepening the channel as above, but leaving the channel at its present width of 300 feet.

“ *Further*, that when the above information has been obtained, Consulting Engineers be employed, if deemed necessary, with the consent of the Government.

“ That he also be instructed to furnish the Board with an estimate of the cost of adapting the Harbour for the accommodation of the increased size of vessels which may be expected to visit the Port when the proposed improvement of the channel is completed.”

On the 4th October I left Montreal, to make an examination and survey of those portions of the River where required, so as to lay before the Commissioners an exact state of the channel, as well as such information as I required in the shape of soundings and borings; and I also herewith submit a series of sketches of the River from Pointe aux Trembles to Cap Charles, being the scene within our operations hitherto, and also that of any future ones.

During the course of my examination, I have been greatly assisted by the elaborate Survey of the Admiralty, under Commander Orlebar, as well as that conducted by Mr. Bailliargé, under Mr. Page, on behalf of the Government, the latter having made close surveys of the whole of the dredged portions of the channel two years ago, and the only change since that time has been the construction of the new channel at Pointe aux Trembles, which was executed by the Harbour Commissioners two seasons ago.

The result of my examination has been that I consider the question of a further depth of 2 or 4 feet to be perfectly practicable; the material to be removed, soft, and of the same nature as that removed for the 20 feet channel. I took borings at different localities along the route, to depths of 8 or 10 feet below the bottom of the 20 feet, and samples of which I have brought up to

Montreal, so that they may be examined if necessary ; and therefore, the material being the same as that formerly dredged, the Commissioners can have all the confidence in our estimates, as the whole ground to be gone over for another 4 feet, with the exception of one or two small patches of no great extent, is the same as for the 20 feet channel.

I commenced my examination from the Harbour of Montreal, but as the Board are aware, the water from the Harbour to Pointe aux Trembles is all above 24 feet at low water, and therefore little remains to be said ; there is, however, a jutting point abreast of the village of Longueuil, where the *European* grounded last summer ; this is, however, considerably out of the channel, but as this is the usual place for vessels anchoring in leaving the Harbour, and a great number of vessels having grounded on it, last fall the Trinity Board caused a buoy to be placed here, which has been of great advantage. This has also been alluded to by Capt. Armstrong in his report to the Harbour Commissioners of the 13th October, 1870, wherein he recommends a beacon ; but on account of the great distance from the shore, the latter would be practically useless, and therefore a buoy as at present is all that is required.

At Pointe aux Trembles, however, the first scene of our active operations commences in the shape of obstructions, where there exists no less than 3 different channels or routes to escape the pouillier near this place ; but the matter will be seen at a glance, on reference to the annexed sketch, and as the question of these channels has been a good deal discussed, I think it necessary to allude to them more fully.

In the year 1865 I was deputed by the Harbour Commissioners to accompany the then Superintendent to make an examination of the channel between Sorel and Montreal, with a view of a proper distribution of the dredging fleet so as to endeavour to complete the 20 feet

channel at the close of the season of 1865, and after a complete examination of the vicinity of Pointe aux Trembles, we recommended as follows.

"After sounding all over the channel, and more particularly the pouillier proposed to be removed, we found it to be of much larger proportions than as shown by Commander Orlebar. This shoal is at least 800 or 900 feet long by 300 feet wide, with from two to three feet of dredging on same, with a good many boulders; after examining this thoroughly, we then decided on following up the deep water about 600 feet more to the South, where we found a channel of deep water up to opposite the high light house, and we then crossed over the shoal as shown on Orlebar's Chart; but he shows 16 and 17 feet on same, whereas we found nothing less than 19.6, and that by crossing 6 different times; we would recommend the finished channel to be located here, on account of the small amount of dredging required, compared with removing the pouillier and tail of the bank in the present channel."

Our recommendation as above was carried out at the close of 1865, but was never made use of from the same objections as the channel hitherto used, and further, the Pilots one and all declined it. During the course of the summer of 1868, Mr. Page was engaged on a Survey of the whole of the works under the jurisdiction of the Harbour Commissioners, and in view of the stand taken by the Pilots, and the original route being only 19.3 in depth, I drew the attention of Mr. Page to the desirability of a channel in a more northerly direction than that hitherto used. The latter gentleman made a most careful examination of the channels, and finally on the receipt of his report, the Commissioners decided at once in carrying out his suggestion, which was done during the summer of 1869; consequently, to excavate this portion of the river for either 2 or 4 feet, the operations will extend from A to B, a distance of about 8000 feet, the material

being soft, and the total number of yards to be removed for a 2 feet channel being 33,862 cubic yards.

Deep water then extends as far down as a small pouillier a little above the light on Ile St. Therese, marked C, on the sketch, on which there is 22 feet of water, consequently no dredging will be required for a 22 feet channel and only 800 yards for a 24 feet one.

On the line of the Ile St. Therese lights, the dredging will have again to be resumed at the black buoy, at the turn or D on the sketch, and will have to be extended with some slight exceptions as far down as the buoy near Cap St. Michel or E on the sketch; this will necessitate the removal of about 44,444 yards for a 2 feet and 80,000 yards for a 24 feet channel.

The next obstruction that we encountered is the pouillier a little below Cap St. Michel, the channel is here down to the full depth of 20 feet, but not to the necessary width. By reference to the sketch, it will be seen that the pouillier lies between two deep pools of water, one of which becomes consequently lost to use, unless the pouillier was removed; therefore, if this were done, the channel here, at a most inconvenient turn, is only about 280 feet in width, would by this improvement become 600 feet, but what is of more consequence, become perfectly straight, and I would recommend that the two beacons, formerly on Ile de Laurier (recommended by Capt. Armstrong) should be replaced, as it would be a very dangerous matter for vessels meeting here if any of the buoys should be carried away. The total amount of dredging required here for a 22 feet Channel would amount to 11,574 yards.

At the pouillier abreast of "Marie Point," the channel has a very sudden and crooked turn which makes it extremely awkward for vessels to meet here. Capt. Armstrong, in the joint report before alluded to, suggests removing the pouillier altogether, but as this involves a work of great magnitude, there being only 7 feet of

water on it in some places, and the removal of about 100,000 yards, I would recommend the cutting of an entirely new channel to the south of the pouillier. There exists at present 18 feet of water in depth, and is used to a considerable extent at present by small vessels, and if this one was brought into use, it would make this channel perfectly straight; this would involve the removal of about 11,000 yards for a 22 feet channel.

From thence to the line of the Contrecoeur lights, the water is of ample depth for a 24 feet channel, after being properly buoyed, the water way being of great width and the turns sufficiently practicable. The dredging, at what we may call Lavaltrie, consists of an immense amount of work, being only second to Lake St. Peter, and extends over a distance of about five miles. The original depth was the same as the flats of Lake St. Peter, but the material of a somewhat stiffer nature; but as aforesaid, the portion to be removed is the same as heretofore, in addition to a small pouillier with 21 feet on it, nearly opposite the village of Lanoraie; there are also a couple of small pools, in a portion of the work, of deep water, but as the dredge would in any case have to pass over these, it would not make any difference in the expense. The total amount to be removed, to make a channel here of 22 feet in depth, would amount to about 550,000 cubic yards.

After leaving Lavaltrie, deep water intervenes until we reach the head of the Lake, with one small exception, viz: at the head of Stone Island, where I found a small pouillier with only one sounding on it of 21 feet, and immediately jumping down to 26 feet, so that it is of small extent, but as it lies immediately in the route of the vessels passing, so that for a 22 or 24 feet channel it would require to be removed, and to do so would require the removal of 1000 yards.

The next place where we encounter obstructions is Lake St. Peter. During my survey I found the full

depth of 20 feet at low water with only one or two slight exceptions, which may have been caused during the dredging or from the banks tumbling in, these obstructions amounted to only about a diminution of the depth of water of about 6 inches, and would from the soft nature of the material composing the soil here, offer no objections to a vessel under ordinary circumstances.

The last dredging that was done in the Lake was 5 years ago, when the Commissioners decided on removing the small shoal on which the trial ship "Ocean" had grounded the fall previous. On the removal of this shoal, advantage was taken to remove the small strip of a bank lying between two deep pools, so as to make them both available, particularly as the turn is very sudden, thereby increasing the width from 300 to about 800; and I may say that this action has met with the unanimous approval of the Pilots, and steamboat men generally.

The dredging required in the Lake for a 22 or a 24 feet channel, would have to be commenced at the extreme upper end, and the whole Lake gone over, with a very little exception. The pools in the Lake, which formerly could be passed over as of ample depth, would not be available for a further depth, as the soundings show 21, 21.6; consequently, to remove this six inches would be as expensive as to remove 2 feet, as the dredge would require to pass over the ground at any rate. The total distance required to be gone over for a 24 feet channel would be about 14 miles. The total number of yards for a 22 feet depth would amount to 1,500,000 cubic yards, and for a 24 feet channel, 3,080,000 yards.

The Lake is well buoyed, and to a certain extent well lighted. I have no suggestions as to the buoying, but the lighting might, I consider, be improved by the addition of one at the white buoy, which is as much required as any of the others. I would, however, do away with the present system of floating lights (when-ever they should require to be renewed), and replace

them with houses built on cribs; the objection to the present ones are, that they are liable to be carried away by rafts, &c., which would not be the case with a permanent crib. I would, therefore, recommend a proper light to be placed at the "white buoy."

I would recommend also that the gentlemen of the Trinity Board be requested to replace the beacon at the rear of the light at Pointe du Lac; or what would be preferable, a leading light should be placed here which would lead vessels up as far as the white buoy by night as well as by day.

From the lower end of the deep water at the foot of the Lake, deep water, either for a 22 or 24 channel, exists as far down as the upper end of the St. Ann's shoals; and the whole distance is well buoyed, but there is a great absence of leading lights. Formerly, when the Provencher Channel was the only one in use, they were well protected by four lights; but since this channel has been abandoned by deep-water vessels for the more Southerly or the Becancour Channel, it has become imperatively necessary that this latter channel should be lighted as other portions of the River. The two beacons on Cap Madeleine should be replaced by lights; the two beacons on the South shore should be replaced also; and thirdly, the two at Champlain above the church, ought also to be replaced.

Our next scene of obstructions is, therefore, from the upper end of the St. Ann's Shoals down as far as the Grondine Shoal near Cap Charles, although deep water exists through the whole of this distance. The channel is a good deal obstructed by small pouilliers in the line of the lights, the position of which can be seen on reference to the Sketch. In the first place, on descending on the line of the Batiscan lights, it is impossible to bisect or bring the Grondine lights into one, without making a sudden turn between two buoys, the danger of grounding being avoided only by having a buoy on each side.

A little further on is a small pouillier also, directly in the centre of the channel, but does not obstruct to such an extent, as it has 19 feet of water on it at low water; but a little further on, again in the line also of the Grondine lights, is perhaps the largest of the obstructions, H, on the plan. This pouillier is about 800 feet in length, with only 18 feet of water on it, *and is of solid rock*—the only piece of such that has been met in the whole of the river. Ships, in passing, frequently touch upon it by hugging the lights of Grondine too close, and attempting to regain again the above lights before taking the lights of Cap Charles, where we again encounter three obstacles on these lights—the first of which we meet is the pouillier “Rayer,” with 16 feet on it, the next the pouillier a Brambal, also with about 17 feet on it—from the absence of buoys here to mark the position of these pouilliers, and lying as they do in the line of the lights, and the lights themselves close together, and difficult to be seen, being on the top of the Cap; and after leaving these lights we encounter the shoal of the Grondine Point, which extends clean across the channel, with 17 and 18 feet on it in some places, which would give the depth of water about 21 and 22 feet; and no doubt there is ample water there for a 20 foot channel, provided vessels would wait for the extreme high tide, but which is not done in every case; allowance must be made for the anxiety and zeal of Masters of vessels and the Pilots anxious to make as profitable a passage as possible, and risk more perhaps than is prudent. The whole of this distance is interspersed with huge boulders, which should be removed even for a 20 feet channel. The most serious obstruction, as I said before, is the Grondine Shoal. Lately there has been placed here a couple of buoys, one on the south and the other on the north side of the channel—the latter on the south side of the Grondine Shoal, which has been of great assistance—and others should be placed on the two pouilliers aforesaid.



But the first and most important thing to be done, is the cutting of a passage between the aforesaid buoys on the Grondine shoal, a portion also of the pouilliers Rayer and Brambal should be removed, and afterwards the sides properly buoyed as they lay right in the channel, and if time and other circumstances permitted, a dredge should go over the whole of the distance from Cap Charles to the upper end of the St. Ann's shoals, and the channel would be left at whatever depth may be determined on, irrespective of the state of the tide, and the amount to be removed to make a channel of 22 feet of water would be 40.000 or 80.000 yards for a 24 feet depth.

From this point downwards to Quebec, deep water extends, neither dredging nor buoying being required and consequently requires no further reference. I have touched on all the points which are of interest to the Commissioners, both as to the buoying and lighting, which will, I hope, be brought under the notice of the Trinity Board, under whose control these matters are, and I annex a tabular statement of the localities of the contemplated works, as well as the cost of each for a 22 and a 24 feet channel, respectively, retaining the width as at present, as well as an estimate for a 24 feet depth, with an increased width of 100 feet.

*Approximate estimate of amount of dredging and cost of same,  
for a further deepening of the Ship Channel to 22 and 24  
feet respectively, between Quebec and Montreal.*

*For a further depth of 2 feet.*

Pointe aux Trembles and vicinity.....	33,862		
Cap St. Michel.....	11,574		
Varennes.....	44,444		
Marie Pointe.....	11,000		
Lavaltrie.....	550,000		
	<u>1,500,000</u>	650,880 yds. @ 30 cts.	\$195,264.00
Lake St. Peter.....	1,500,000	@ 15 cts.	225,000.00
Batiscan, Cap a la Roche and Cap Charles.....	40,000	40,000 @ \$1.00	40,000.00
Total yards.....	<u>2,190,880</u>		
Contingences.....			39,736.00
Total cost.....			<u>\$500,000.00</u>

*For a further depth of 4 feet.*

At all places above Lake St. Peter ..	1,301,760 yds. @ 30 cts.	\$390,528.00
Lake St. Peter.....	3,080,000 @ 15 cts.	462,000.00
At all places below Lake St. Peter ..	80,000 @ \$1.00	80,000.00
Total yards.....	<u>4,461,760</u>	
Contingences.....		67,472.00
Total cost.....		<u>\$1,000,000.00</u>

*For an increased width of 100 feet and 4 feet in depth.*

Total for Lake St. Peter.....	5,505,412 yds. @ 15 cts.	\$825,811.80
Lavaltrie.....	1,747,206 " @ 30 cts.	524,161.80
Above Lavaltrie.....	200,000 " @ 30 cts.	60,000.00
Batiscan, Cap a la Roche, &c., &c..	150,000 " @ \$1.00	150,000.00
Total yards....	<u>7,602,618</u>	\$1,559,973.60
Contingences.....		190,026.40
Total cost.....		<u>\$1,750,000.00</u>

In the above estimates, however, is not included the cost of the original plant for the construction of same. The above estimates are based supposing the work to be done by contract, and which I would strongly recom-

mend to the Commissioners should they have control of the work: they would have, no doubt, to purchase the vessels in the first instance, but they could lease them out to the Contractor, charging he or they a sufficient amount for ordinary wear and tear and interest of the outlay. I have no hesitation in saying that this work could be done by a Contractor twenty-five per cent cheaper than could be done by the Harbour Commissioners, and of course much more expeditiously. I would suggest the purchase or building of no less than 5 new dredges with tugs, scows, &c., complete, which would cost about \$250,000, which would complete the 22 feet channel in 2 seasons, 4 seasons for the 24 foot channel, while 10 seasons would be required to complete the channel of 24 feet and 400 feet width.

In the Resolution of the Board instructing me on this question, I am required to give the relative cost of the different channels, without any further question as to the necessity for same; during the time in which I have been connected with the Harbour of Montreal, I have invariably found that all collisions have occurred in some crooked portion of the channel. I have endeavoured in the foregoing report to point out the places where such exist, and the means recommended for their removal; and I therefore think that the present width is all that is required; and I would strongly urge upon the Commissioners not to attempt to increase the width. The present width is great in comparison with artificial works of the same nature; as for instance, the Canals are only one-third of this width, while the Clyde improvements, which are works of a similar nature, are in some places barely 400 feet, with a much larger traffic. What, therefore, is more required than width, is depth, as the greater the depth the less the chances of collision, on account of vessels steering better.

The question of providing of the plant, from its great cost, forms the first item of the expenses, and a

considerable one. The dredges formerly used by the Trust in these improvements are the best that could be selected. Of course, as you are aware, the Trust have now no dredges available for this purpose; they possess 2 elevator dredges, one fast and one slow; they are called respectively fast and slow, not so much to designate their speed as their capacity for different kinds of work. The fast dredges are preferable for the River, and the slow ones for the Harbour; but from the increased depth required in the Harbour, which improvement must progress simultaneously with the Lake and River, it must be evident to the Commissioners that an entirely new stock of vessels will be required for the latter. There are various ways in which they can be procured. The Agents for the sale of the dredges employed in the construction of the Suez Canal have written us offering to sell the vessels employed on that undertaking; the Messrs. Simmons of Renfrew, have sent us circulars offering to supply us with any number of vessels; and thirdly, we have the local market;—all anxious to do business with us. And, taking the whole into consideration, there is no doubt that they could as well be built in Canada, and the work could be better supervised; that they would be required for only 7 or 8 years, consequently they could be built of wood a great deal cheaper than of iron. The last dredge rebuilt for the Trust has had all the improvements possible, both as regards the depth of capacity, being capable of working in 35 feet depth of water, and other facilities. Another important matter, second only to the vessels themselves, is the tenders for them; formerly it was the custom on our works to have the tenders large side-wheel boats, (double-engined) with crews of 14 or 15 men; since then, however, small Tugs have come into fashion, both here and elsewhere; and for light towing, have superseded the large boats to a great extent, while their great economy, both as regards crew and fuel, renders them much better adapted for our purpose.

The superintendence of such a work as the above is next in importance to the means for accomplishing it. Messrs. McNeil, Child, and Gzowski, in their report on this very subject dated the 31st October, 1850, recommended that the works should be placed under the superintendence of a competent Civil Engineer, and also of an Assistant who would be constantly resident on the works; I agree with those gentlemen as to the superintendence of a Civil Engineer, who would visit the works from time to time, but I would prefer a mechanical engineer who would have charge and be resident on the works, as the whole of the duties of a resident superintendent would be of a mechanical nature, while the duties of the Engineer in Chief would be comparatively trifling considering the knowledge now possessed by every one of the river, such as derived as aforesaid from the very valuable surveys made by the admiralty under Commander Orlebar as well as those made by Mr. Page for the Public Works Department, the surveys which have been made from time to time by your own Engineers, and finally the knowledge possessed by the Pilots, who are daily passing up and down, renders the whole route as familiar as a public highway.

In conclusion, the result of my survey and examination has been, that I consider the present width of 300 feet as ample, but that the depth requires to be increased and would recommend that an additional 2 feet be undertaken at once and on the completion of same, the expense of a second two feet could be assumed.

I have the honor to be,

Sir,

Your most obedient servant,

A. G. NISH,

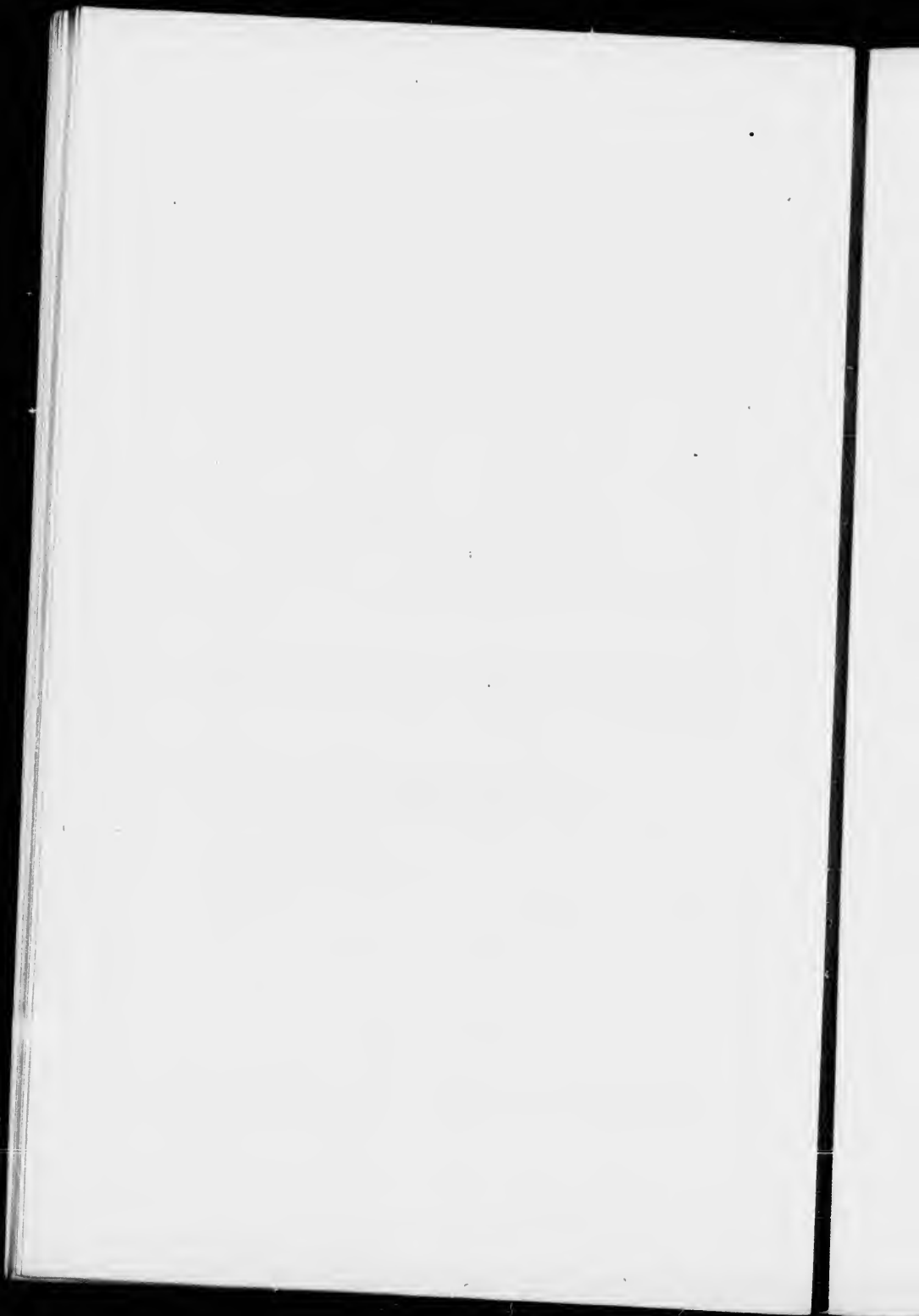
*Engineer Harbour Commissioners.*

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ANNUAL REPORT  
OF THE  
HARBOUR ENGINEER  
For 1871.



ANNUAL REPORT  
OF THE  
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HARBOUR COMMISSIONERS' OFFICE,  
MONTREAL, 1st February, 1872.

H. H. WHITNEY, Esquire,

*Secretary*

*Harbour Commissioners of Montreal.*

SIR,

I beg to lay before you, for the information of the Harbour Commissioners, a statement of the works carried out under my superintendence for the past season, under the respective headings of Repairs of Harbours, New Works near Windmill Point, Raising of Russell Pier, Elgin and Metcalfe Basins, Extension of Commissioners' Wharf, Repairs of Upper End of Military Basin, Harbour Dredging, Dredging at Repentigny, Contrecœur, and suggestions for future improvements.

REPAIRS OF HARBOUR.

On the opening of Navigation, last spring, ~~on the usual departure of the ice,~~ the wharves were left comparatively unhurt, with the exception of the upper end of the Military Basin, alluded to elsewhere, but there



was an immense quantity of ice left on some of the wharves and piers, which had to be removed by hand, and of course at considerable expense. The expenses of this portion of the department are gradually increasing from year to year, as the Harbour extends; the principal item being the cleaning of the wharves, on account of the necessity of keeping a staff of horses to carry away the accumulation of material on the different piers, our deposit being nearly a mile from the centre of the Harbour. Next season I propose bringing before the Board the necessity of having a scow constructed similar to our present dumping scows, having a space reserved for her, in some central portion of the Harbour, when after being filled, she could be towed ~~out~~ into the current and dumped, and by such means the wharves would be kept much cleaner, and at considerable less expense.

The only large repair which will require to be undergone, on the opening of the navigation, will be the Albert Pier. From the great amount of traffic across this pier, as the whole of such from the Island wharf passes over it, the planking over several portions of it has been cut through, and will require to be renewed as soon as possible; and on account of the difficulty of procuring red tamarac, at that early part of the season, I would recommend that it be relaid at once, with 6 inch pine, and that the same be ordered to be cut at once, so as to be ready on the opening of navigation.

In my report for last season, I brought under the attention of the Commissioners the necessity of raising a portion of the Island Wharf, and the upper end was selected, about 240 feet in length; the contract was awarded to Messrs. Bowie Bros., and the work executed by them. The whole cost for this improvement was \$2,329.76, which includes ~~also~~ the cost of about 50 feet in width, of macadamizing at the rear of this wharf; and in view of the great utility of having this portion of the Harbour raised, I would recommend the continuation

of same, and would suggest the raising of the outside face of this wharf next season, and as the length is about the same, the cost would be about \$2,500.

The total cost of the repairs this season, not including the raising as above, has been \$8,716.97.

#### NEW WORKS NEAR "WINDMILL POINT."

As you are aware, there has been very little work done here this season. In my report of last season, I brought under the notice of the Commissioners the benefit that would be derived to the trade, if the basin formed here could be utilized; the Board finally adopted the scheme, and the work ordered to be proceeded with, when the Government, with a view of making a second outlet to the Lachine Canal, caused these improvements to be suspended. This would have given a great relief to the small vessels, employed in the local trade which is now suffering greatly, and in consequence of the action of the Government they must be provided for elsewhere. I caused this summer some temporary trestle work to be made to accommodate the lumber barges at this wharf, so that they could discharge at it. This was of the greatest convenience to these people, but as the cost of same is great, I would not recommend that it be renewed again, at least at our expense.

There has not been any material deposited at this work this season; ~~but as aforesaid~~, on account of the proposed improvements contemplated by the Government, I would not propose to deposit any more material until what action the Government propose taking is known. The whole money spent here this season has been \$3,040, and including trestle work.

#### COMMISSIONERS' WHARF.

Since the completion of the 1400 feet of this wharf last year, nothing has been done here except the depositing of dredged material, with a view of its future

extension at some not distant day. The whole amount expended here this season has been only \$410, which was for the expenses of the derrick in discharging the dredged material.

During last fall the Commissioners gave out a large contract, also to the Messrs. Bowie, for the extension of this wharf, for a further 1300 feet, and a depth of 24 feet. The latter depth was decided on in anticipation of the Channel between Quebec and Montreal being dredged to that depth, so that if the Harbour could not be put down to that depth on the completion of the Channel, at least some portion of the Harbour would be available. By reference to the plan it will be seen that this 1300 feet has been divided into two basins; this has been rendered necessary, by the great and rapid current which exists here, and which would have been much felt, if the wharf had been carried down straight, as no vessel, supposing her to be unloaded, could have been loaded with a barge and elevator alongside; But on the completion of these two basins, the vessels will be in comparatively still water.

#### ELGIN AND METCALFE BASINS.

The contract for this wharf was completed last fall, but from the soft state of the backfilling, at the close of the navigation, it was impossible to macadamize it. During the winter, a contract for the broken stone, necessary to ~~cover it~~, was awarded to the Messrs. Bowie; and on the opening of the navigation no time was lost in spreading it ~~on same~~, before the spring work commenced. The total amount of the cost this year, for this stone, was \$1766, and the balance of \$381 was for the spreading of same, forming a total of \$2,148.41.

#### RUSSELL PIER.

For several years the condition of the above pier has been very bad. During the construction of the Elgin

and Metcalfe Basins, on account of the increased width, from the Revetment Wall, the hole in the Russell Pier was closed ~~up~~, and the wharf raised ~~up~~ about 18 inches. From the delapidated state of this pier it was necessary that large repairs should be made here, which were adopted by the Board. A contract was awarded to the Messrs. Bowie, whereby the whole of the work was to be cut down to the level of low water; but as the work progressed, the timber composing the pier, although placed there nearly 30 years ago, was found so sound that it was determined not to disturb it, which occasioned a saving of about \$1400 to the Trust. This pier has been raised about 18 inches, or up to the improved levels, and will now be <sup>above</sup> ~~out~~ of the spring floods. The top has been covered with the best of 4 inch red tamarac, and the cost has been \$8,973.18.

#### MILITARY BASIN REPAIRS.

Ever since the construction of the Victoria Pier the wharves inside of the Military Basin have suffered more or less every year. Before the wharf was completed ~~at~~ ~~all~~, when only 400 feet in length was sunk, the water was diverted inwards, and caused a damage to the contractor of at least \$3,000. The following year a portion of the approach to the said pier, as it was only in 7 and 8 feet of water, gave way. The next season <sup>one</sup> ~~another~~ of the cribs, on the outside pier, gave way a second time, and remains the same at present; and last winter the whole of the lower side of the approach to the Victoria pier was upset, on account of the height of water in the spring; it was impossible to say the amount of damage, or what it required, but on the 10th May I brought it under the notice of the Board, when a contract was awarded to Messrs. Bowie, and the whole sunk in 24 feet ~~depth~~ of water, as well as making the approach about 100 feet in width. The total cost of this has been \$8,043.60, of which the contractor received \$6,702.19, while the

balance was for the expenses of the derrick, in depositing the backfilling.

#### HARBOUR DREDGING.

The dredging in the Harbour has been prosecuted with all the vigor possible this season, and the dredges show as good a return of work done as usual. Dredge No. One commenced work at the shoal, abreast of the Commissioner's wharf, on the 14th May, where she worked the whole of the season, with scarcely any interruption, a period of 140 working days, removing during that time 18,000 cubic yards, as well as about 200 tons of boulders of from 1 to 10 tons in weight, and at which, as may reasonably be expected, a great deal of time was consumed, occasioned by the great depth of water, and the strong current, which renders the gripping and drilling very tedious and expensive. The total cost of this vessel, this season, including cost of this work, \$11,066, which would make the average tender, has been per yard, about 60 cents, without including the boulders.

I would propose that this vessel should continue at this shoal until its complete removal. I would place her here, on the opening of the navigation, for as long as there is the slightest obstruction at this place, the 1400 feet of wharfage will always be regarded with suspicion by ship owners.

#### DREDGE NUMBER THREE.

On the 18th April this vessel was taken down to Repentigny, to excavate a channel for the Messrs. Cushing. The total distance required to be excavated was about 3,000 feet in length. It was at first proposed to work to make same about 30 feet in width, but it was found impracticable as the beam of the vessel was equal to that; it was made eventually about 40 feet in width. We completed this channel on the 9th June, a period of about 40 days, but several of these were lost on account of the delays incidental to a new machine.

On the completion of the work here we received a communication from the Government in reference to dredging a channel at Contrecoeur, but before the negotiations were completed 12 days were lost. As it was useless to bring the vessel up to Montreal pending these, on the receipt of instructions on the 21st June, we moved her down to Contrecoeur, and placed her in position where she worked up to the 10th July, when, on account of the water having fallen to only 3 feet where we were working, we were obliged to discontinue; and after receiving the necessary instructions, I brought her up to Montreal, and placed her to dredge a shoal at the lower end of the Commissioners' wharf, where she worked up to the close of the navigation. This vessel removed during the season, 10,000 yards at Repentigny, 3,500 at Contrecoeur, and 17,000 in the Harbour, or a total of 30,500 yards, at a cost \$12,079.60, including tender.

#### DREDGE NUMBER TWO

Commenced work at the outside of the Windmill Point wharf on the 15th May, where she worked up to the 15th June. She was then moved down to the Elgin Basin, where she worked up to the 20th July, having cleaned out this Basin and the mouth of the sewer thoroughly. She was then removed back to the Windmill Point wharf, where she worked up to the 22nd August, when she was moved to the Prince's Basin, to clean out same, where she worked up to the 28th, when she again moved up to the Windmill Point Wharf, where she worked up to the 2nd October, when she moved down to the Military Basin, where she worked up to the 9th October, when she went up to the Allan's Steamship Basin, when she returned to the Military Basin, where she worked from the 16th to the 21st October, when she was moved down to the Commissioners' wharf, where she worked up to the 6th November, when she was lent to the Corporation, to remove some obstructions at the

mouth of the tunnel now being constructed at Colborne Avenue, where she worked up to the 17th November, thence down to clean out the mouth of the Fullum Street sewer, and then she returned to the Commissioner's wharf, where she worked up to the 28th November, when she was moved into winter quarters in the Canal.

This vessel has worked this season 180 days, during which time she has removed 51,452 cubic yards, at the different places above mentioned, at a cost of \$11,682, which would make an average of about 22 cents per yard, (tender included). She removed from Windmill Point Wharf, 24,995 yards, Elgin Basin, 10,797, Prince's Basin, 1,290, Military Basin, 5,109, Steamship Basin, 1,187, Commissioners' Wharf, 5,570, Colborne Avenue drain, 1,825, and Fullum Street, 675, forming a total of 51,452 yards.

From the satisfactory nature of the working of this vessel, the Commissioners were induced to have a second spoon dredge built, and the contract was given out last fall, and she will be ready for work on the opening of the navigation. The contract for the hull was awarded to Mr. A. Cantin, for \$5,316; the machinery for same to W. P. Bartley & Co. for \$5,075. A new derrick is also under contract, of which Mr. M. A. Lefebvre, has the hull for \$1,650, and the machinery to W. P. Bartley & Co. for \$1,975, while the 3 scows are being constructed for same by the above Mr. Lefebvre for \$1,185 each.

#### SUGGESTIONS FOR FUTURE IMPROVEMENTS.

Before going into the above question, it will be necessary to repeat what is now under contract, and will be made available next season. Last fall a contract was entered into with the Messrs. Bowie, for the Market Basin Contract, which comprises the extension of the Jacques Cartier Pier, about 150 feet, and when completed it will be 300 feet in length and 85 feet in width, while the face on the Market Basin will be re-faced to the full

depth of water, and the width from the Revetment Wall increased by about 30 feet, which has been rendered necessary from the increased business, which will reasonably be anticipated ~~from these improvements~~; while the whole of the present basin will be dredged ~~down~~ to 24 feet in depth, this improvement will give accommodation for 8 sea-going vessels, all discharging berths, while the centre of the basin is very large, and can accommodate a great many loading ~~with~~ grain, &c. This improvement will cost about \$50,000, and is expected to be completed for the use of the fall fleet next summer.

A second contract was awarded the Messrs. Bowie, for the extension of the present Commissioners' wharf, from its present terminus till its connection with the Monarque Street Wharf, a distance of about 1300 feet. From the sketch accompanying, it will be seen that it is proposed to make 2 basins inland, which will be protected from the strong current. These basins will be 300 feet in length, by 100 feet in ~~depth~~, which will ~~further~~ <sup>width</sup> leave a distance of 90 feet to the edge of the hill, which will be ample for the discharging of cargo from vessels, a roadway, and the passage of the Railway, while the outside of this wharf and the basins will be put down to the depth of 24 feet.

A third contract was awarded to the Messrs. Bowie, which was the improvement at the Windmill Point. This was intended to enclose the water space inside so as to make same available for the local trade; it was proposed to be in 10 feet depth of water, with a portion of 12 feet. This would have given us about 2400 feet of wharfage, for the local trade, which is now being crowded in the vicinity of the steamship, &c.

For several years past the accommodation for this trade has been gradually curtailed. The whole of the space from the Island Wharf, down to the lower end of the Harbour, was, on account of the depth of water necessarily detailed for them, but since the Prince's and



Merchants' wharves, the Richelieu, the Victoria Piers, and now the Market Basins have been put into deep water; it renders it imperatively necessary that something be done, and that at once, and on a somewhat extensive scale; and in justification of such, I annex a tabular statement of the number of vessels and their tonnage for the last 10 years.

	VESSELS.	TONNAGE.		VESSELS.	TONNAGE.
1861	5,247	530,224	1866	5,083	613,679
1862	4,875	523,991	1867	5,248	744,476
1863	4,697	534,740	1868	5,822	746,927
1864	4,509	439,057	1869	5,866	721,324
1865	4,771	601,071	1870	6,345	819,476
			1871	6,878	824,787

From the above it will be seen that the increase of vessels and tonnage has been gradual and gratifying, but not sufficient to go into extacies. As aforesaid, had it not been that the space occupied by these vessels formerly has been encroached upon there would have been ample accommodation. I have been preparing a scheme for their use, and would suggest the following:

The total distance from the lower end of the Monarque Street wharf to the Longueuil Ferry wharf is 2,800 feet. From the peculiar position of this distance, lying opposite the strongest of the St. Mary's current, it is utterly impossible to embark in any extensive undertaking here. Apart from the strong current, the danger to be apprehended is from any encroachment on the bed of the River, either by breast wharves or piers. Mr. Forsyth, in his report on the extension of the Harbour for 1861, recommends a series of piers to be constructed that would extend ~~out~~ into the river, at right angles to the shore. I have never ceased to urge upon the Commissioners not to attempt to encroach upon the bed of the river, as any obstruction renders the ice more easily obstructed in the spring, while the risk of damage from the diverting of the current is well illustrated in the case of the Victoria Pier.

A further objection to the extension of wharves in 24 feet depth of water in this direction is the impossibility of handling a vessel with such a draft of water, and in the face of such a current; I would therefore propose to the Commissioners, that the accommodation for the local craft be extended by the construction of a wharf or breast wharves, from Molson's to the Longueuil Ferry wharf, a distance of 2800 feet, which would be a great relief to the other portions of the Harbour. Objections may be raised to this on account of the distance from the centre of the City; but the public must be accustomed to the fact sooner or later, that they cannot all be accommodated under the shadow of the Custom House, but must go either east or west, and I have selected this portion of the Harbour, as it can be done cheaper and quicker than elsewhere. And further, the matter has been pressed upon us by the action of the new City Gas Company, who have erected extensive establishments here, and require wharf accommodation; I would therefore recommend that a contract for, say 1000 feet, be given out this winter, but beginning at the lower end of the work, so as to accommodate the Gas Company, as they will require this to land their coal for next season. As aforesaid, the whole distance is 2800 feet, and the cost for same would be about \$100,000, which could be divided over a couple of seasons. The concluding portion of the resolution on the Lake and River survey directs me to report on the cost of adapting the Harbour for the increased size of vessels, which may be expected to visit the port, when the proposed improvement of the channel is completed.

Of course the Commissioners are aware that the whole of the works that have been constructed in the Harbour for the last 15 years, have all been in reference to a 20 foot depth of water, and the cribs constructed to that depth, while the older structures have been placed in 8 or 10 feet for the local trade; but it does not follow

that in view of the proposed <sup>depth</sup> ~~depth~~ of the channel to 24 feet, that all the vessels trading here <sup>will</sup> ~~are all to~~ be of that draft. It must be remembered that the majority of the vessels will still be below 20 feet, and that accommodation must be reserved for them. The material of which the channel entering the Harbour, and which forms no portion of Lake and River improvements, is ~~of the ma-~~ <sup>the</sup> most difficult to dredge; the whole surface of the bed of the channel being paved with large boulders, the cost of which to remove is at least \$1.50 per cubic yard. It is only at one portion of the year that the Harbour is unable to accommodate the deep draft vessels; and in view of such I would recommend that for the increased size of vessels, on account of increased draft of water in the proposed improved channel, that the present Harbour above Molson's wharf be reserved for vessels of that draft, (20 feet), and that a wharf should be constructed from the Ferry wharf, down to the Hochelaga wharf in 24 feet of water, and any large vessels that could not come higher up, on account of the draft of water, would remain here, and when not occupied by such, would be ~~of use and occupied~~ <sup>used</sup> by ships trading in lumber.

Another reason for the Commissioners seriously thinking of this latter extension, is the prospect of the early construction of the North Shore and Northern Canalization Railways, both of which must necessarily have their termini here, as well as the connection with the Grand Trunk Railway. The connection of the latter with the Harbour of Montreal is one of the most important events to the trade of Canada, and the Harbour of Montreal in particular. It was made on the 22nd July last, when a locomotive and 2 platform cars came down. The cars of the Grand Trunk, removed from the wharves, from the 24th July to the 15th December, about 32,000 tons of goods, while the ordinary carters, during the same period, had more to do than they could

perform; and in the absence of the rails it is a question how these extra goods could have been removed before ~~being overtaken by~~ the close of navigation. The rails since then have been extended as far as the Richelieu Pier; but it is intended to continue them down, next spring, as far as the ground is graded or Molson's wharf, and also put in a number of sidings, so that the same complaints as last year of the wharves being crowded, will not exist, and further, if the Commissioners decide on connecting the Molson wharf, the Ferry wharf, and the Hochelaga wharf, the three Railways can have a common terminus, and that the above, when constructed, I consider sufficient for the next 20 years, if we may judge by the past, and also by the following statement, which shows the number of arrivals and their tonnage for the last 11 years.

Statement of the arrivals and their tonnage for the last 11 years :—

YEAR.	VESSEL.	TONNAGE.	YEAR	VESSEL	TONNAGE.
1861	574	261,793	1866	516	205,775
1862	571	265,243	1867	464	199,053
1863	504	209,224	1868	478	198,759
1864	378	161,901	1869	557	259,863
1865	358	152,943	1870	680	316,846
			1871	664	353,621

From the above it will be seen that the Commissioners must proceed with caution in any schemes for Harbour extension, as with the exception of the last 2 years, the business of the Port has comparatively been at a stand still.

Submitting the whole for their consideration,

I have the honour to be,

Sir,

Your most ob'dt servant,

A. G. NISH,

*Engineer Harbour Commissioners.*

