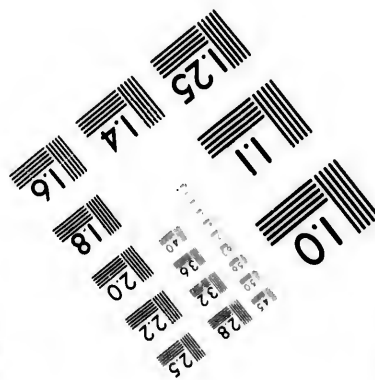
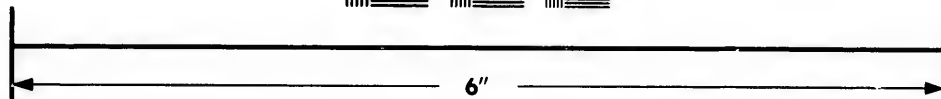
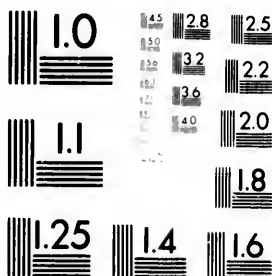


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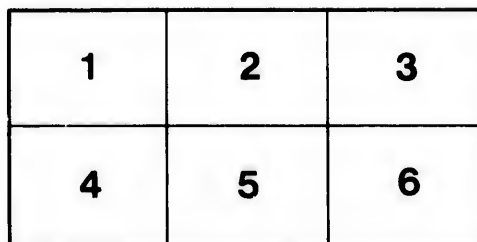
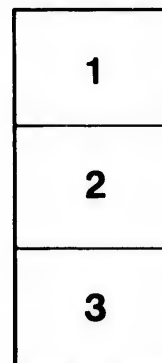
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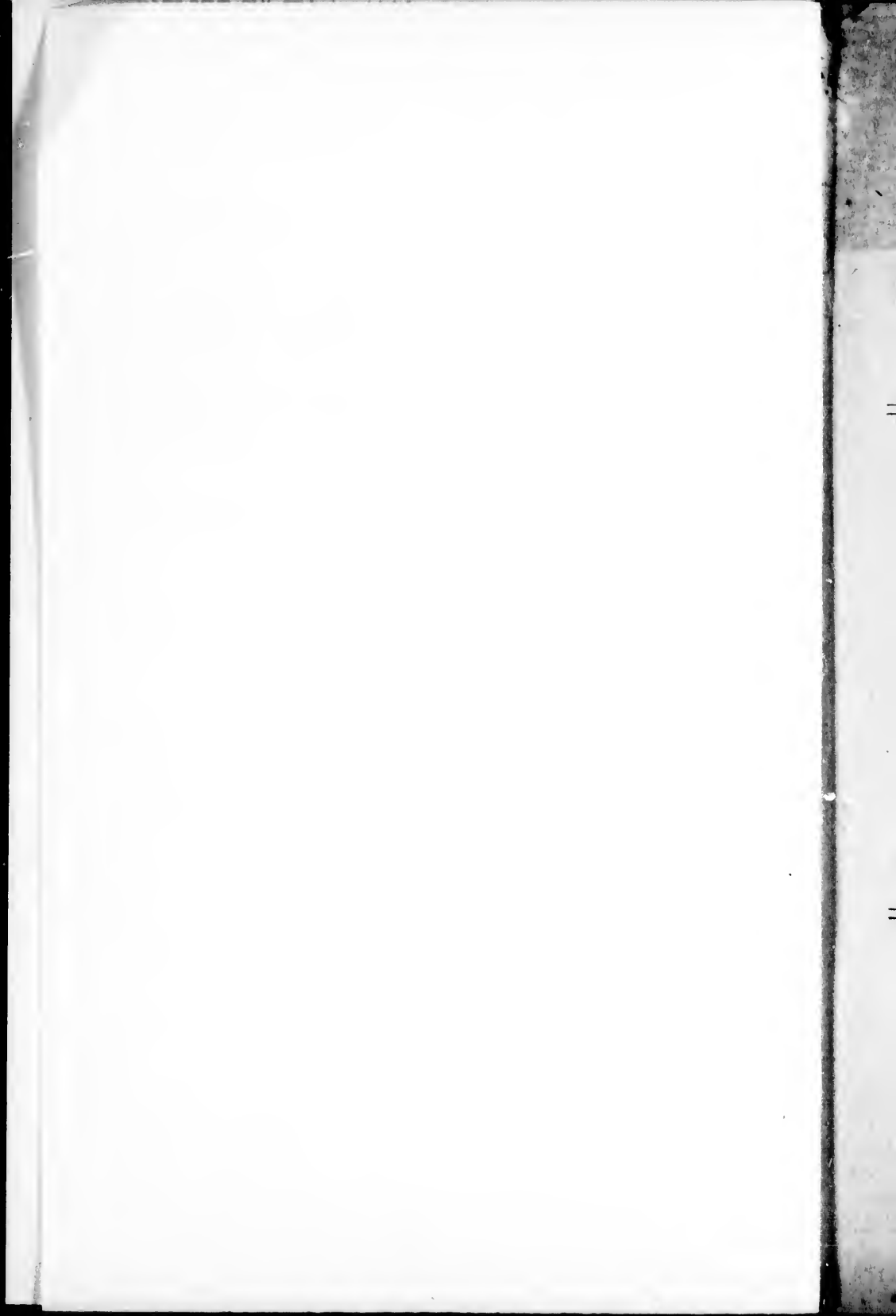
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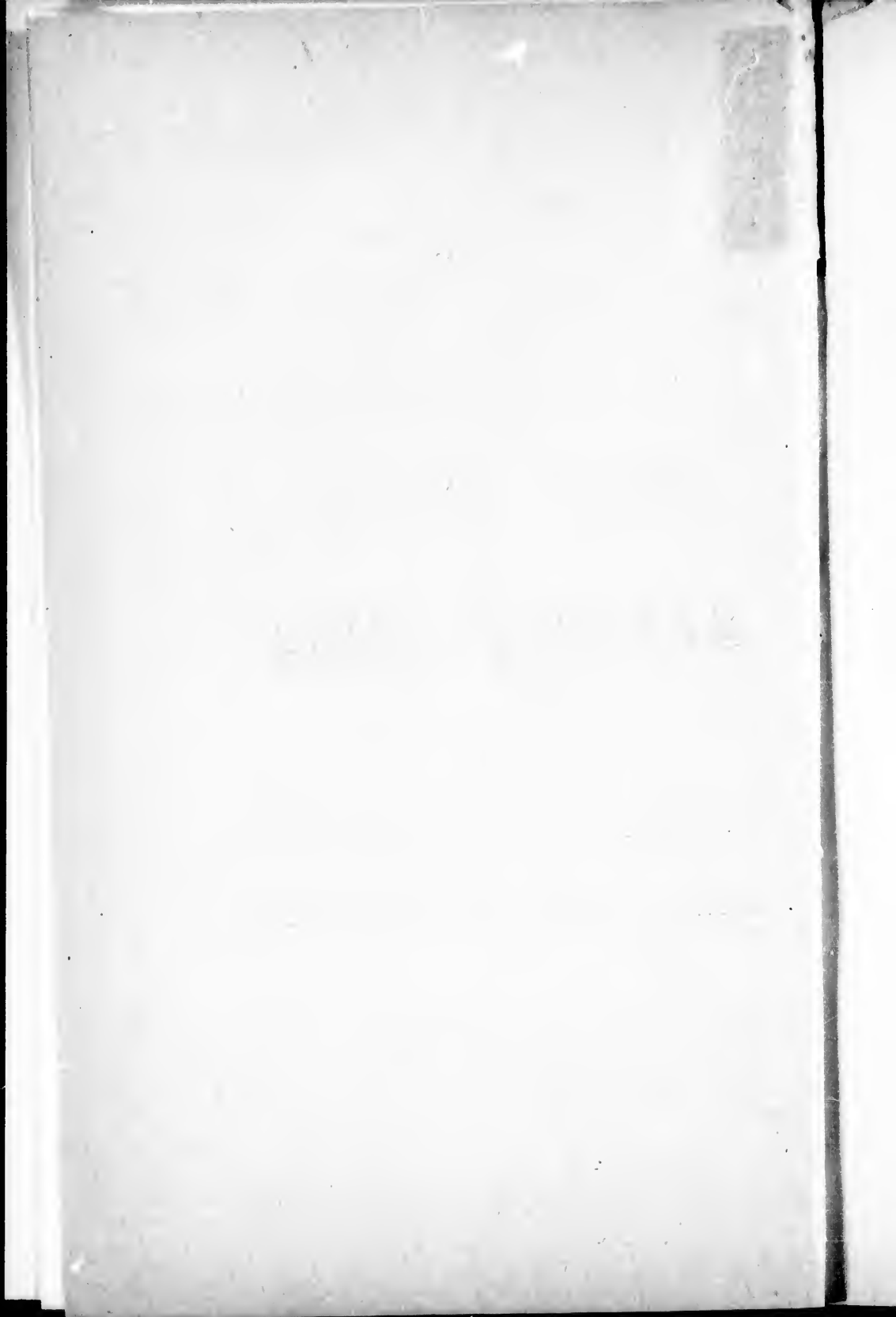
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QUEBEC RAILWAY

AND

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QUEBEC HARBOUR COMMISSIONERS.

PREFACE.

The principal part of the notice of the Railway and Quebec Harbour Improvements contained herein—with the accompanying plan—formed the subject-matter of a leading article in the QUEBEC MORNING CHRONICLE of July the 18th, 1878, which it has been thought advisable to re-print, accompanied by a statement of the comparative distances in miles between the different points of departure and arrival affected by the construction of the North Shore Railway, otherwise called the Quebec, Montreal, Ottawa and Occidental Railway and the Grand Trunk Railway, together with a memorandum shewing the value of the land reclaimed by the new Harbour Works, if divided into lots, which can be leased or sold on the completion of the works. The large block plan of which, prepared at the instance of the Resident Engineer, is now at the office of the Minister of Works, Ottawa.

Quebec Railway and Harbour Works.

It is not too much to say that no period in the history of Quebec has brought forth more important and beneficial changes in its actual position as a city or has had a more material bearing upon its future prospects than the past two years. Within this brief lapse of time, the North Shore Railway, which since 1853 had only an existence in Acts of Parliaments and the aspirations of our citizens, has become *un fait accompli*, and this, happily, under circumstances vastly more favorable for our interests than could have been anticipated until quite recently. The original scheme simply contemplated the construction of a line to connect Quebec with Montreal, while, in the present aspect of the undertaking, this object will not only be attained, but one of much greater value to the permanent weal of our city will be secured in direct rail connection with the productive lands of the West by a choice of routes which must give us a commanding position in competing for the handling of their ever-increasing trade, together with facilities for the purpose equalled by few other ports on the Eastern seaboard of this Continent. And, speaking of the future Western connections of our great Provincial road and the alternative routes of which it can avail itself to draw hitherwards the trade of the West, we should not overlook the fact that it is not dependent upon the action of the Dominion in regard to the Canadian Pacific for an immediate and unbroken connection by rail with the grain fields of the West. A small link only of eight miles of road easily constructed over a level prairie from Pointe Claire, on the line of the Grand

Trunk, to Sault-au-Récollet, on the line of the Montreal and Ottawa section of the North Shore road, is all that is required to give us at once direct and ready-made communication with the West; and this gap can at any moment be filled up at a trilling outlay of about \$80,000, which is as nothing compared to the advantages that promise to accrue from it both to the North Shore Railway, the Province and the cities of Quebec and Montreal on the one hand, and the Grand Trunk Company on the other. Indeed, these advantages are so unquestionable that this small piece of road cannot fail sooner or later to be built; and, indeed, we are given to understand that a private company has been or is about to be formed for the purpose, unless the matter—as it should be, in their own interest—be earlier taken up, either by the Grand Trunk or the Government of the Province. In any case, however, the geographical position of Quebec is such, that when the North Shore Railway is fully completed and its Western connection secured, either with the Georgian Bay or the Grand Trunk in the manner just indicated, it cannot fail soon to become known and utilized as a most important commercial centre, and one of the best shipping ports on the continent. The great cities of the United States—New York, Boston, Portland, Baltimore—have been made such by the Erie Canal or the great lines of railway converging and diverting to them the trade of the West from its natural outlet *via* the St. Lawrence; and there is no reason, physical or otherwise, why, with the assistance of the great public works actually in progress, we should not be able to bring back at least a portion of that trade to its natural channel and profit by it as it passes our doors.*

*It should not be forgotten that we are mainly indebted to Mr. A. Luders Light, M. I. C. E., Government Engineer in Chief, for the beneficial changes in the railway route above alluded to. It was he who originated the Terrebonne route with its western extensions, wisely perceiving the advantages which its adoption would bring to the City and Province of Quebec. Although at first opposed and discouraged, Mr. Light's views have ultimately received the support to which his remarkable ability and long professional experience entitled him.

The following comparison of the difference in mileage distances between the competing lines, which must eventually determine the course of the traffic, will clearly shew the future direction of the general carrying trade:—

DETAILS OF DISTANCES.	MILES.
Quebec to Ottawa via Grand Trunk Ry	337
do do via Q. M. O. & O. Ry	264
Difference in favor of latter.....	73
Quebec to Toronto via Grand Trunk Ry.....	525
do do via Q. M. O. & O. Ry. and proposed new line from Ottawa to Toronto	417
Difference in favor of latter....	88
New York to Toronto.....	547
Boston to do	610
Portland to do	630
Quebec to Pointe Claire via Grand Trunk Ry.	186
do do via Q. M. O. & O. Ry	170
Difference in favor of latter.....	16
Portland to Pointe Claire.....	312

The above will show the necessity for the construction of the direct Ottawa & Toronto Railway, upon the completion of which Quebec will be 120 miles nearer than New York, 193 miles nearer than Boston, and 142 miles nearer than Portland.

	Miles.	
Liverpool to Toronto.....	2650 sea.	} 3067
Via Quebec.....	417 land.	
Liverpool to Toronto.....	3040 sea.	} 3587
Via New York.....	547 land.	

Difference in favor of Quebec..... 520 miles.

Fortunately for Quebec the two great undertakings so intimately connected with its future prospects—the North Shore Railway and the Harbour Improvements—are approaching completion simultaneously, as the one without the other would be of comparatively little value. The facilities offered by the tidal docks in connection with the direct Northern railway lines will then be such as to command universal attention, and our citizens have only to be true to their own interest to render Quebec that which it was intended by nature to be—the head of salt water navigation on the St. Lawrence. As an important factor in our future prosperity, the harbour works now in progress on the River St. Charles under the direction of the Harbour Commissioners and the immediate supervision of the Resident Engineer*—necessarily take a foremost position; and as the improvements which they are intended to effect have advanced sufficiently to become the subject of some general notice at the close of the second working season since the date of their commencement, we may be permitted to refer to them more particularly and to call the attention of our readers, as well to their history and prospective advantages, as to the character and extent of the work performed and the difficulties that have had to be overcome, which, together with the plant employed, have, it is needless to say, attracted from time to time much notice from the general public and visitors both from the mother country and the United States. To render our remarks more intelligible, we supplement them with a plan of the proposed improvements, both railway and harbour, to which we refer the reader. At first sight it might seem extraordinary that works of any magnitude should be needful with a water-way possessing so many apparently natural facilities as the St. Lawrence presents to view at the port of Quebec: but such a conclusion, though natural,

* Mr. Woodford Pilkington, Member Inst. C. E., Resident Engineer.
Mr. St. George J. Boswell, Assoc. Mem. Inst. C. E., Assistant.

loses much of its force on a more complete acquaintance with the facts of the case. The great width of the river; the rocky foreshore; the great and unnecessary depth of water in places close in shore, with strong currents at certain times of the tide; the rise and fall of tide, only serviceable at present for repairing slips and dry docks of small size; the need of some sort of harbour of refuge during the winter months, for late arrivals or vessels under detention, to protect them from dangerous ice floes and shoves, afford reasons ample enough to justify the construction of tidal harbours and wet docks, where suitable localities present themselves for the purpose. Therefore, to overcome the difficulties above alluded to, and also to provide access to deep water at all times of the tide for the carrying trade opened up by the North Shore Railway; the mouth or embouchure of the St. Charles River was selected for the commencement of works of improvement in this direction, and acting under a minute of the Privy Council of Canada, approved by His Excellency the Governor-General, in accordance with the provisions of the 17th section of the act 36 Victoria, chapter 62, the construction of certain works there was finally determined upon, and a contract was entered into, based upon the plans and specifications of Messrs. Kinipple & Morris, M. I. C. E., Engineers of Westminster and Greenock, with Messrs. Peters, Moore & Wright, Contractors, of Quebec. These works as at present in progress form the centre embankment of a scheme for double wet docks and tidal basins on either side of it, the embankment itself having a length of 3,500 feet by a breadth of 330 feet, extending from the Gas house wharf to the end of the isolated mole or breakwater already sunk in 50 feet of water, and known as the ballast wharf. On the south side of this embankment, (which it is suggested by the way should, with proper permission, be called "The Louise Embankment," after Her Royal Highness the Marchioness of Lorne,) along its entire length, a quay wall, having a

cribwork and concrete foundation with a masonry superstructure is being constructed with a preliminary channel way of 150 feet in width, 1,250 feet in length of which is to be dredged to a depth of 24 feet at low water, and the remaining 2,160 feet to a depth of 10 feet at low water—there being a rise and fall of 18 feet at spring and 13 feet at neap tides respectively. With these works alone completed, upwards of one mile of continuous wharf accommodation, communicating with the shore, will be added to the port of Quebec. The first section of quay wall, 1,250 feet in length, forms one side of the enclosed area of the tidal basin on the south side, and the 2,160 feet of the second section forms one side of the enclosed area of the wet dock—the whole containing an entire water area of 60 acres. Work was begun under this contract in May, 1877, and was continued to the close of November, when the weather put an end to it for the season. During this period the outer line of low cribwork at the western end, was trenched in across the southern channel of the St. Charles, which, when filled with dredge material from the trenches forming the excavation for the foundation of the quay walls of the Tidal Basin, completely diverted the low water current of the river, as was naturally expected by the engineers. At the eastern end of the works, larger crib-work was constructed and laid in position, closing the low water tidal ingress and egress at this point; 120 feet of this latter crib-work was laid on an even bed previously dredged to a depth of 16 feet below low water mark. Early in May last operations *in situ* were resumed and continued again until the close of November, when the last of the high tides had to be taken advantage of for getting the contractors' plant into winter quarters. During the working season thus closed, the excavating and dredging have, considering the difficulties encountered, been carried on with great success. The construction of the deep crib-work caissons for the reception of the concrete used in the

foundation and general structure of the quay walls, have been executed in a manner quite exceptional for excellence of workmanship. These crib-work blocks have a character of their own, differing from any previously constructed in certain particulars, which specially adapt them for the reception of concrete. Nine of these—each 120 feet in length—having closed faces of solid entremise filling in front, and 4 inch planking in rear, 27 feet in height and 32 feet in extreme breadth, have been sunk in 24 feet depth of water at low tide, each having been filled with 1,002 cubic yards of concrete or about 1,500 tons net. The concrete has been laid evenly in skips, and bonded throughout so that the whole shall represent one homogeneous mass, or a solid monolith of concrete of the entire length of 1,250 feet and a weight of 15,500 tons, all evenly distributed over a width of from 12 to 15 feet in wall and counterfort, with a back filling of *pierres perdues* and dredge material holding the back longitudinals and cross-ties for a width of 20 feet. The preparation of the foundation surface of the trenches in which these large caissons had to be sunk in perfect line, and on a level bed was a work of some difficulty. After the dipper dredge had brought the surface within two or three feet of the grade, the clam shell dredger was employed to complete the excavation, but, carefully as this was attempted, it failed to obtain a sufficiently even surface, and other expedients had to be resorted to. Wooden sleepers weighted around their sides with old chain cable were laid along under the lines of longitudinals forming the sills of the caissons, placed perfectly level and out of winding with each other, by divers; copper wire being stretched below at the required depth by the tide gauge to enable them to judge of the level of each sleeper laid. This plan, though answering the purpose, gave place to the use of short or stub piles of six feet each in average length, which were driven by a follower formed with a key fitting the pile head. Thus the short piles were driven down to the depth

required and the follower then released—the level of the piles being afterwards adjusted by the divers as the sleepers had been previously. On these, the crib-work caissons were placed and the bottom levelled up underneath and packed with ballast and broken stone to an even surface prior to the insertion of the concrete. Care having been taken both with the testing of the Portland cement and the preparation of the aggregate forming the concrete—the mixing, chiefly by hand, and the depositing by skips, was carried through with complete success—divers having been employed throughout in filling under the cross-ties and levelling the surface generally. After this manner, nine out of ten of the 120 feet deep crib-work blocks were constructed, towed into position, brought into line by transit,—sunk, and finally concreted up. These blocks are at present 27 feet in height from the bottom sills and rising three feet above low water, at which level the 12 inch course of elm capping is to be trimmed and planted on to receive the masonry wall and concrete backing of the superstructure—to coping level 20 feet higher—thus completing a deep water wall of 48 feet in height with a batter of half-an-inch to the foot. On the outer or northern face 1,500 feet in length of crib-work laid at the level of low water and trenched in has been completed, representing half the entire length of 3,130 feet, between the salient angles, much of which, it is expected, will be brought to coping level in the course of next season. The plan accompanying this notice of the progress so far made with these important works, shews the proposed extension of the North Shore Railway from Prince Edward Street across the Palais to the main embankment, with the curve on to the production of Dalhousie Street, crossing the caisson entrance to the wet-dock, which will divide the present water area when enclosed into the wet-dock and tidal harbour or basin before referred to, the extra accommodation for vessels thus afforded.

if lying two abreast, in this section of the work, will be about 100, or from 700 to 800 during the entire season. The area of the embankment is expected to provide 100 sites for first-class ware-houses, bonding stores or lumber yards, and these, with railway communication on each side, should be very valuable. Thus, the position of Quebec as the principal geographical sea-port and centre of the Dominion as a depot and entrepot for both import and export trade may be expected once more to assert itself. With every Western extension of the North Shore Railway system, fresh impetus will be given to the development of its trade. The projected line of railway to connect Toronto with Ottawa will, if we are rightly informed, be again moved for by an Act of the Dominion Parliament at its next session. On the construction of this, another link will have been formed of that continuous line of iron highway which will one day connect us with the Pacific. It will therefore be seen that Quebec is once more stepping forward to help itself. Successful competition in this day is not simply one of industry; it is also one which makes intelligent use of those products and forces which lie at our feet, and a confidence in the result that must follow by experience of the past, gives us more than a hope in the future with the help of these manifestly productive works.

The memorandum forming an appendix to this paper, referred to in the preface, will be found on the next page, dealing in detail with the question of revenue and also with the valuable available area of reclaimed land in the embankment noticed above; and the manner in which it is suggested that it should be ultimately subdivided is set forth in the accompanying plan and schedule objectively to show that independently of the probable revenue derivable from Harbour and Dock dues, the works themselves may be made to refund the cost of construction.

ANNEXURE TO LETTER, FOLIO 408, WITH GENERAL PLAN.

MEMORANDUM showing the probable available area for sale or lease on the Main Embankment, after deducting the widths of three lines of street and cross-street, quays and railways, as shewn in the accompanying general plan, viz :—

—	Block.	Area in feet.	Number of lots.
Front or South Quay Lots.	{ A.	60,000 sup. ft.	12 lots.
	{ B.	60,000 "	12 "
	{ C.	60,000 "	12 "
	{ D.	25,000 "	5 "
	{ E.	55,000 "	11 "
	{ F.	47,180 "	11 "
Back or North Quay Lots.	{ G.	60,000 "	12 "
	{ H.	60,000 "	12 "
	{ I.	60,000 "	12 "
	{ J.	11,880 "	3 "
	{ K.	58,000 "	11 "
	{ L.	22,000 "	6 "
Undivided Spaces.	{ M.	46 000 "	{ 1 space.
	{ N.	26,400 "	{ 1 "
	{ O.	3,000 "	{ 1 "
	{ P.	3,200 "	{ 1 "
Total.	657,660 sup. ft.	119 lots & 4 spaces.

The value of these lots, if sold at the price paid for land in the Palais by the Quebec, Montreal, Ottawa & Occidental Railway, viz: \$1 per foot superficial, would amount to \$657,660. At the rentage of Corporation wharfage land in the Palais, of \$12 for 144 superficial feet, for 4,567 such areas, the number contained in the total area per schedule, there would accrue an annual rental of \$54,804, equivalent to six per cent. on the probable total cost of the works at present under contract, including all contingencies and

extras, if assumed at \$750,000, allowing a margin for loss and cost of collection.

To this should be added the probable Harbour Dock and Wharfage dues. These might reasonably be assumed to yield another \$20,000, which, added to the land rental, would amount to a total of \$74,804, thus yielding a fairly estimated revenue, equivalent to the interest at six per cent. on a capital of \$1,250,000.

Leaving out of consideration the value of the running powers of the Quebec, Montreal, Ottawa & Occidental Railway over the Commissioners' ways, there would be what may be taken as four miles of single way equipped with switches, sidings, turn-tables and crossings, at say, £4,000 or \$16,000 per mile, giving a total of \$64,000, or say, \$70,000, for surface, railway, and road works.

This estimate supposes the ways laid on longitudinal sleepers and transverse ties, with angle iron guards to support the roadway at each side on a level with the head of the rail.

These works I would strongly advise the Commissioners to keep entirely in their own hands, laying down and equipping the ways or tracks, and receiving such annual sum as may be agreed upon from the Quebec, Montreal, Ottawa & Occidental Railway for running powers.

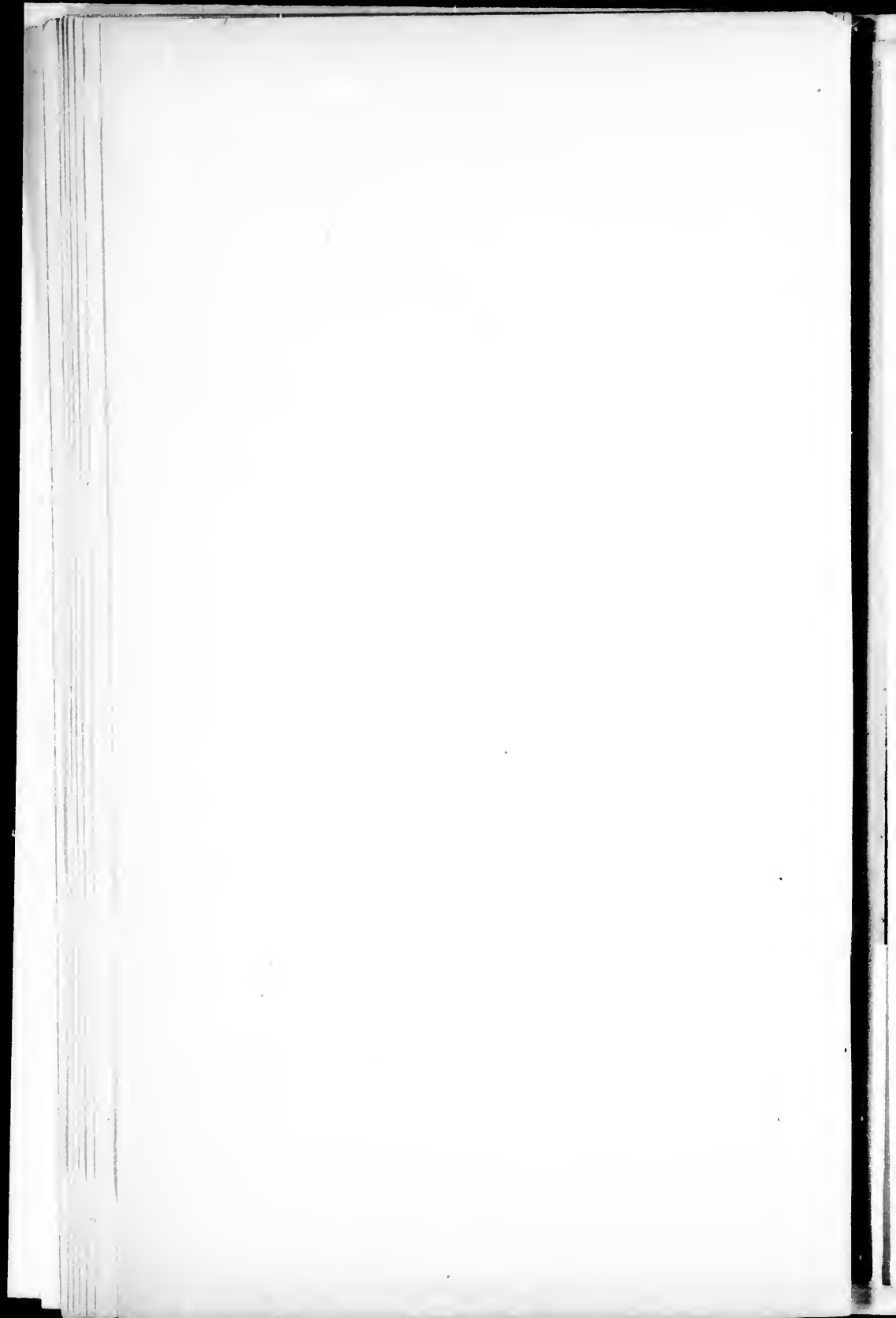
Adopting this view of the probable fiscal value, or the capitalized redemption value due to the productive results of these works, it would appear that the prospective offer of sale of the lots, either in freehold, or in say 99 years leases, might be entered upon, or, borrowing powers be so increased as to enable the Commissioners to complete the entire works, including the Dalhousie Street extension, on the most improved plan now submitted without delay.

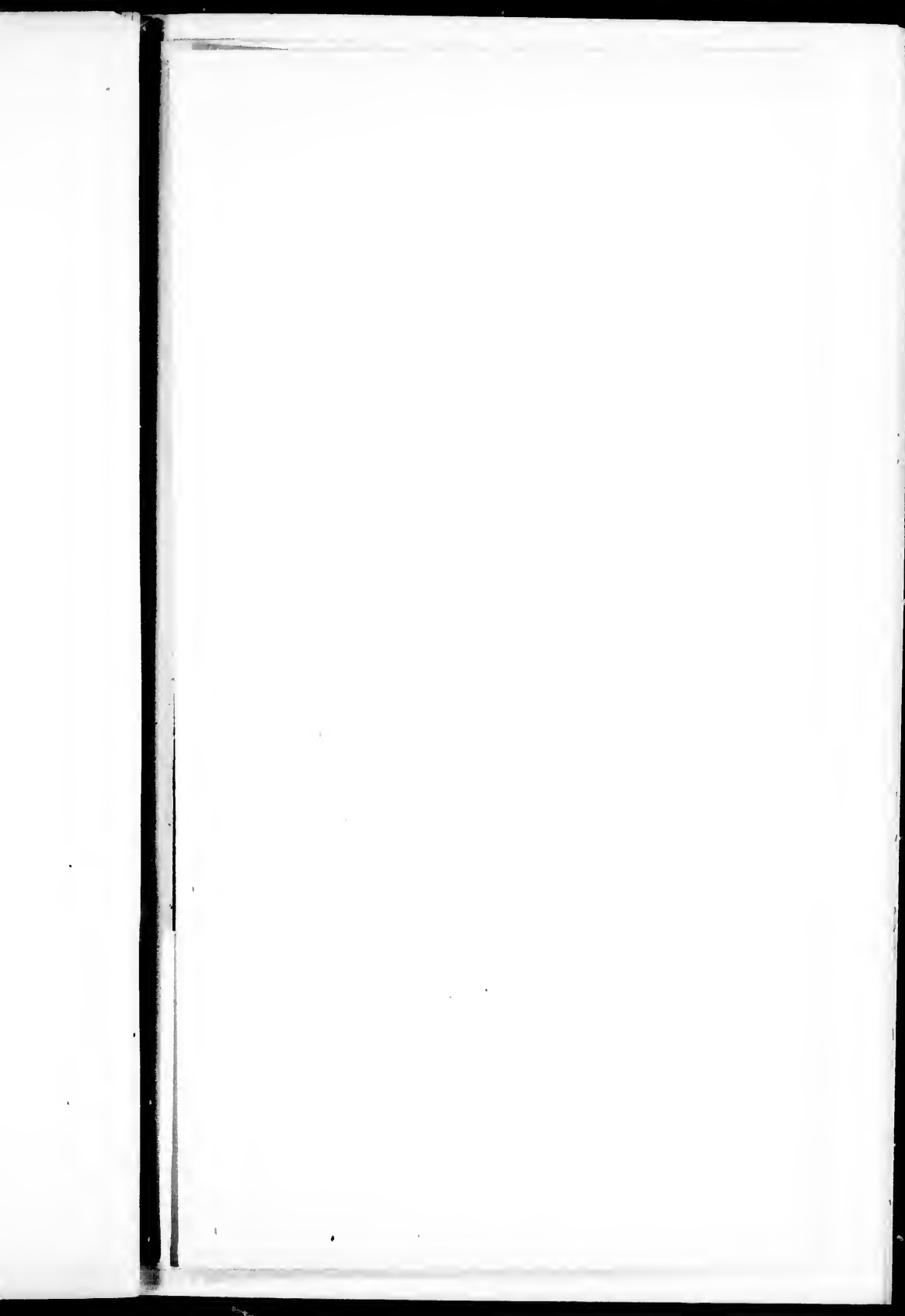
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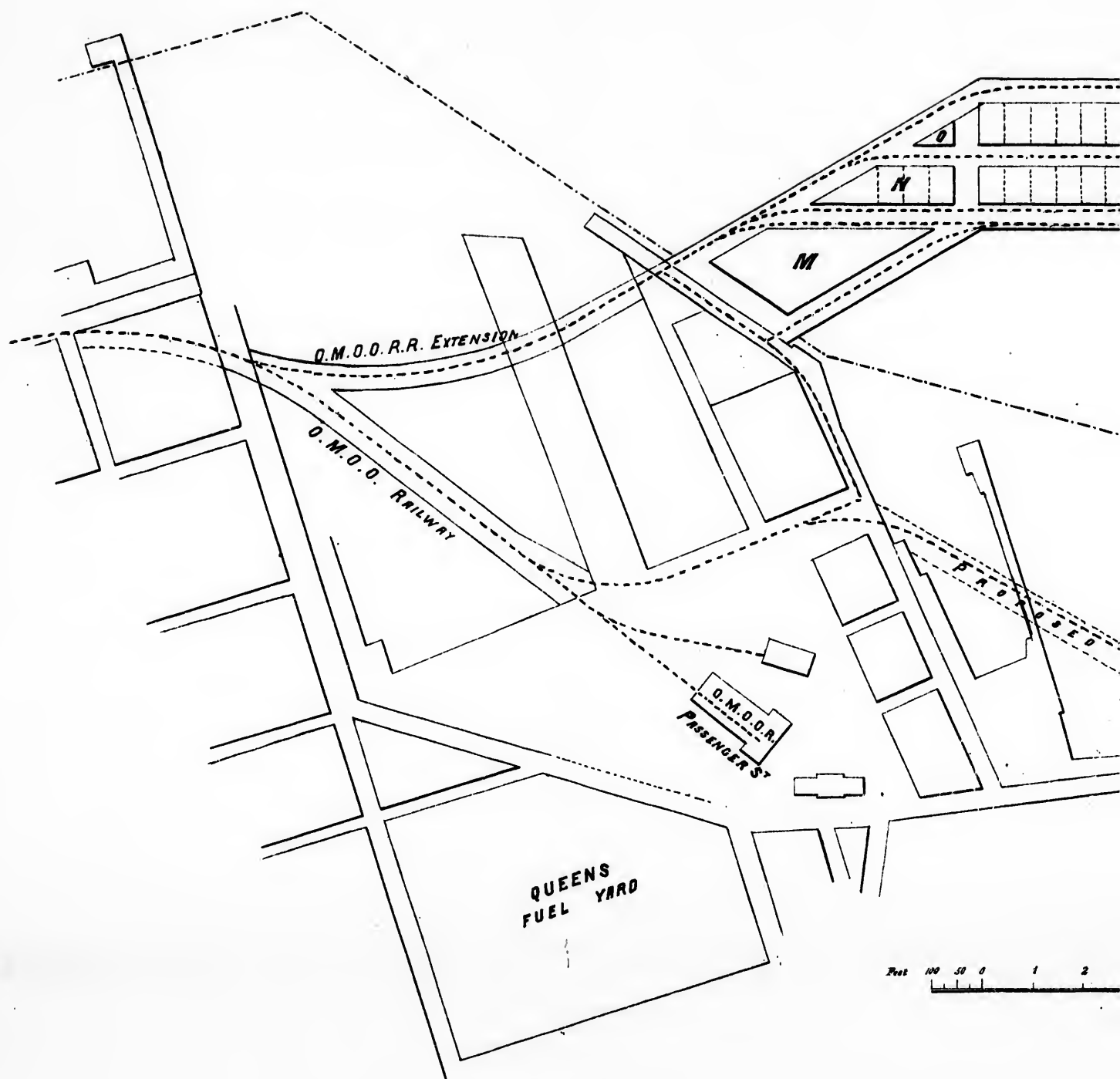
Resident Engineer, M. Inst. C. E.

Quebec Harbour Works,

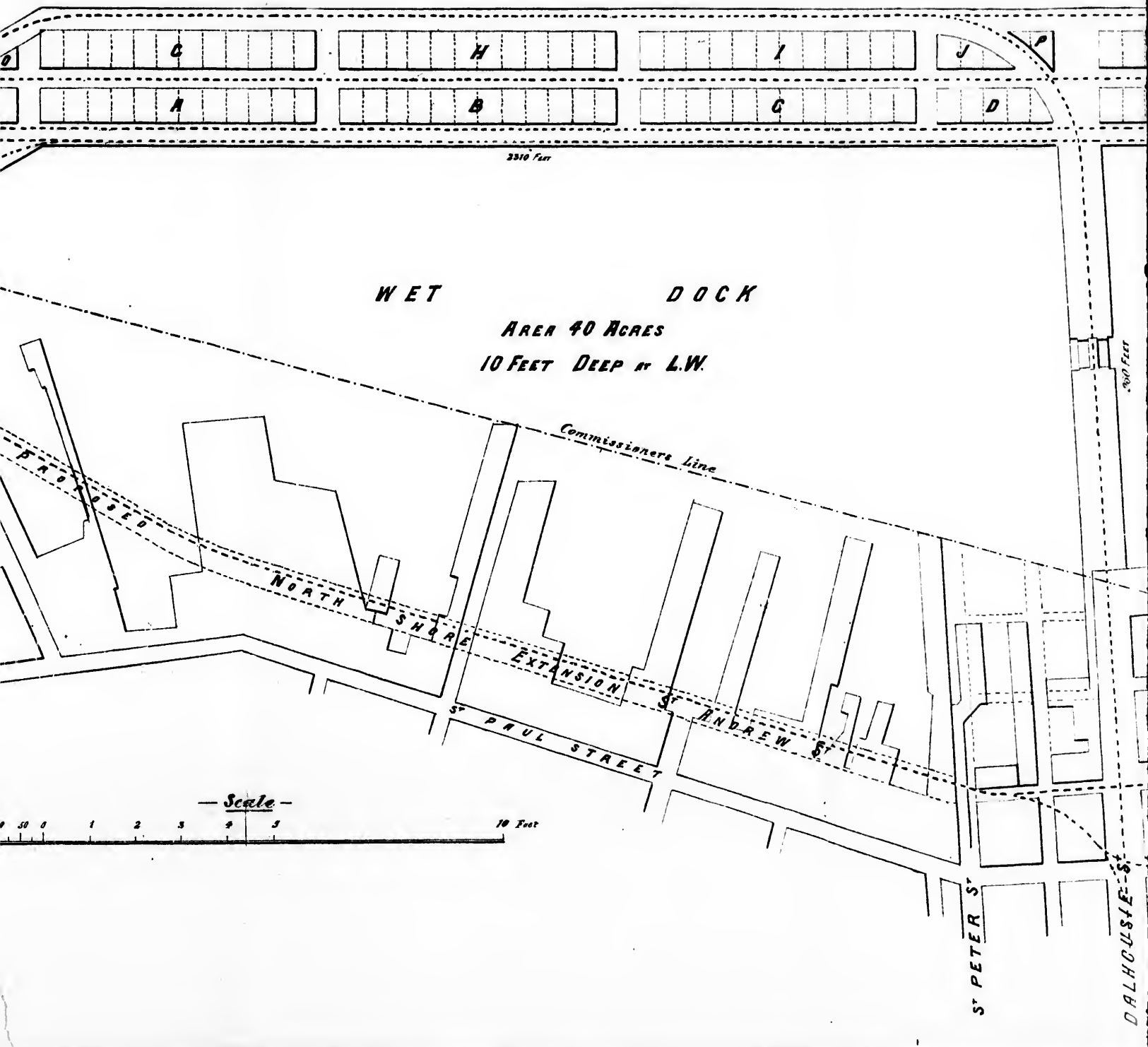
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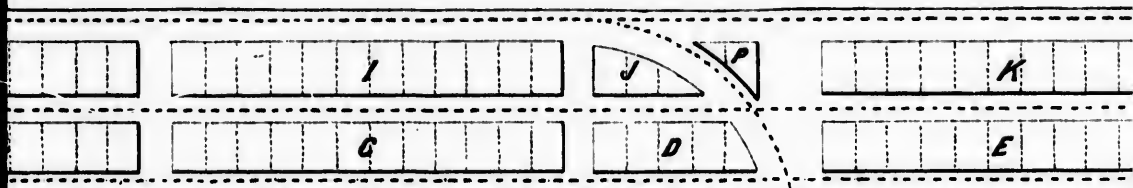




RIVER ST CHARLES



R S^T CHARLES



10 Feet

DOCK

OVER 40 ACRES
10 FEET DEEP AT L.W.

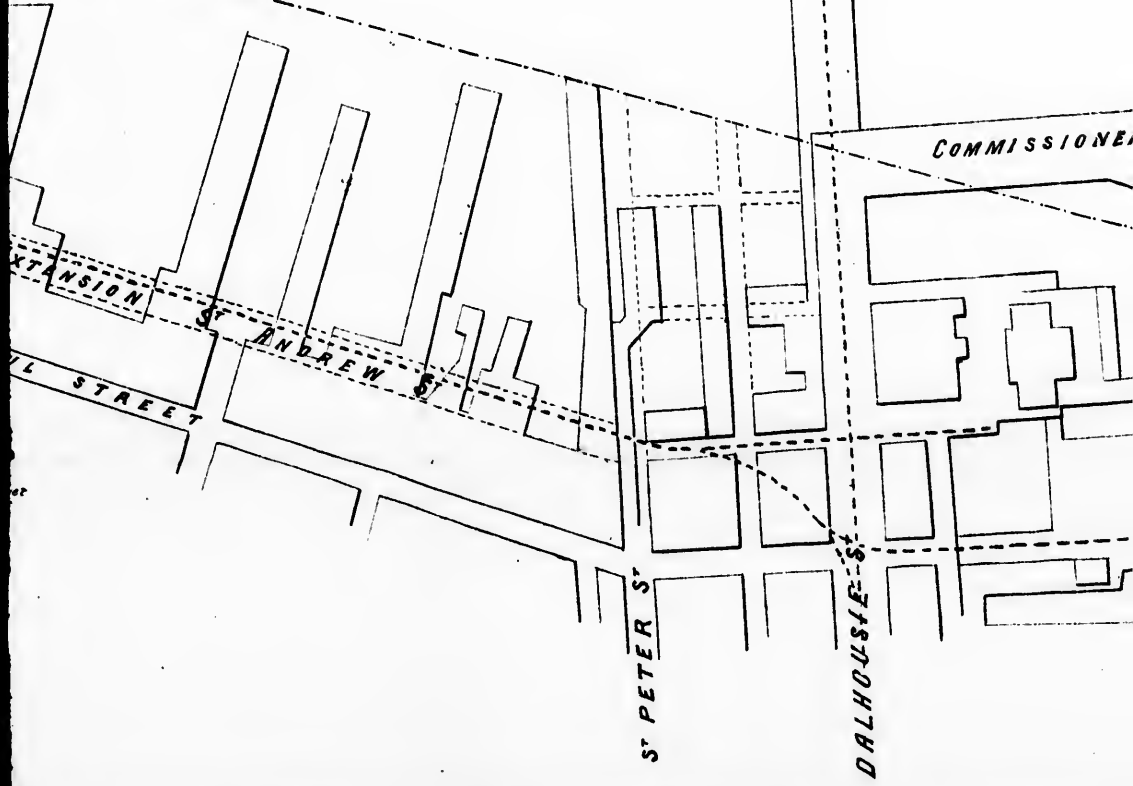
TIDAL

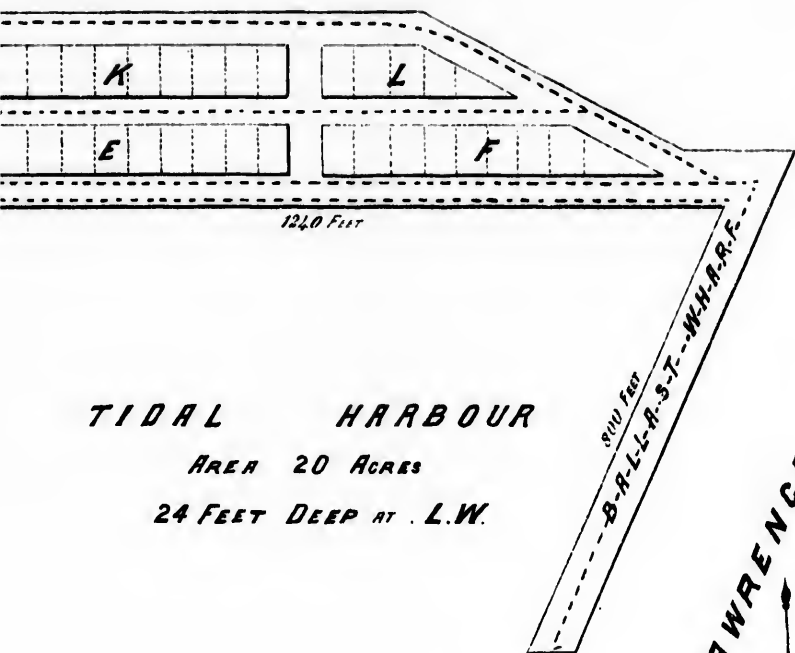
AREA
24 FEET

Commissioners Line

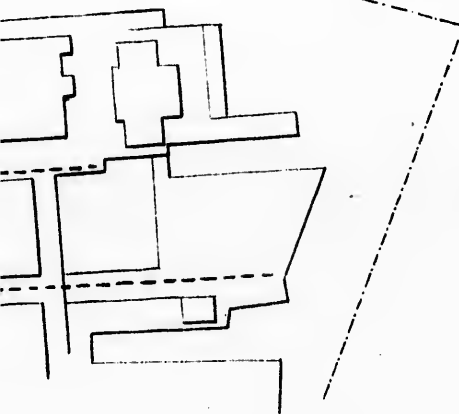
100 Feet

COMMISSIONERS





TIDAL HARBOUR
AREA 20 ACRES
24 FEET DEEP AT L.W.



100 FEET

RIVER

