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CANADA.

ANNUAL REPORT

OF THE

MINISTER OF PUBLIC WORKS

FOR THE

FISCAL YEAR 1880-81

ON THE WORKS UNDER HIS CONTROL.

PRINTED IN ACCORDANCE WITH THE PROVISIONS OF THE ACT THIRTY-FIRST
VICTORIA, CHAPTER TWELVE, SECTION NINETEEN, AS AMENDED BY
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PRINTED BY ORDER OF PARLIAMENT.



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CANADA.

—
REPORT

OF THE

MINISTER OF PUBLIC WORKS

FOR THE

FISCAL YEAR ENDED 30TH JUNE, 1881.



To His Excellency the Right Honorable Sir John Douglas Sutherland Campbell, Marquis of Lorne, one of Her Majesty's Most Honorable Privy Council, Knight of the Most Ancient and Most Noble Order of the Thistle, and Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor General of Canada and Vice Admiral of the same.

MAY IT PLEASE YOUR EXCELLENCY :

I have the honor to submit the Annual Report of the Department of Public Works for the fiscal year 1880-81.

The Buildings and Works under the control of the Department are :—

PUBLIC BUILDINGS.

HARBORS AND RIVERS.

DREDGING.

SLIDES AND BOOMS.

TELEGRAPHS.

PUBLIC BUILDINGS.

PROVINCE OF ONTARIO.

OTTAWA.

PARLIAMENT GROUNDS.

These grounds have been kept in good condition.

A contract has been awarded for the construction of a new green-house, measuring 68 by 19 feet, and adjoining that already in use.

Trees have been planted and a boulevard laid out in front of the Parliament Grounds on Wellington street.

PARLIAMENT BUILDINGS.

The Senate and Commons Chambers have been painted and ornamented. A part of these works was rendered necessary by the incipient conflagration mentioned in my preceding Report. (Appendix 3, page 19.)

DEPARTMENTAL BUILDINGS.

WESTERN BLOCK.

The four new rooms required for the Post Office Department, and mentioned in my last Report, have been completed.

The windows of the large hall of the same Department have been enlarged, so as to give more light. (Appendix 3, page 19.)

EASTERN BLOCK.

The large fire-proof vault for the Finance Department has been completed; the vault was mentioned in my last Report.

A portion of the cut stone masonry of the main tower having begun to give way, it was necessary to replace it. This had to be done by day's work, it being impossible to estimate its extent without removing the stones one by one. (Appendix 3, page 19.)

NEW SUPREME COURT.

The Government having decided to close the workshops, situated on the Parliament grounds at the corner of Bank and Wellington streets, tenders were called for, for their conversion into a Supreme Court, and a gallery for the reception of pictures presented to the Government by the Royal Canadian Academy.

The place now occupied by the Supreme Court will be again used for the purpose for which it was originally intended; that is to say, it will form an addition to the Library of Parliament, and will at the same time afford a good reading room for members of the House of Commons.

The external appearance of the workshop building will be but slightly modified by the addition of gable windows to light the court room; an entrance will also be made on Bank street.

In the interior, the ground floor will comprise the following apartments:—picture gallery, 36 by 20 feet, with an entrance both to the gallery and the court on Bank street; six rooms for the judges, with private entrance on Bank street; offices, vault, lavatory, &c.

On the first floor: picture gallery, 36 by 20 feet; barristers' room, barristers' library; court room, 48 by 36 feet, and 24 feet high, with a vaulted ceiling; judges' library, judges' consultation hall, and waiting room.

Part of the drying house which was in the workshop yard will be converted into a laboratory and a gallery of photometric apparatus for the Department of Marine and

Fisheries. The works necessary to carry this out are included in the contract. (Appendix 3, page 20.)

RIDEAU HALL.

Ordinary repairs have been made, and much painting has been done in the interior of the principal building.

The construction of a new slide has been commenced in the skating rink, and of a gallery in the tennis court. These works will be finished before the autumn. (Appendix 3, page 20.)

GEOLOGICAL MUSEUM.

The works given out for the alteration of this building have been completed to the satisfaction of the Department.

A portion of the rear of the building has been converted into a residence for the caretaker.

The glass cases, shelves, &c. are being prepared; this is being done partly by contract and partly by day's work under the superintendence of the Clerk of Works, as a part of the fittings brought from Montreal had to be utilized. (Appendix 3, page 20.)

DRILL SHED.

The contract for the fitting up of the drill halls, band rooms, museum, &c., has been executed.

The floors of the large drill hall, and of the artillery arsenal have been laid. (Appendix 3, page 20.)

HAMILTON.

POST OFFICE.

It is proposed to erect a building which will contain the Post Office and the offices of the Customs and the Inland Revenue. For this purpose the Department has acquired a site on King and John streets, and an adjacent lot having a frontage on the principal street. (Appendix 3, page 21.)

KINGSTON.

MILITARY COLLEGE.

Up to the present time the water required in the various College buildings was carted.

It has been decided to construct an outer room, 30 by 26 feet, in which will be placed a boiler and pump, by which the water necessary for domestic use and for fire protection will be brought from Navy Bay. The service pipes have already been laid. A contract was awarded for these works. (Appendix 3, page 21.)

PENITENTIARY.

Metal roofs have been placed on the blacksmith's shop and on the southern workshop.

A breakwater, 200 by 30 feet, has been constructed, forming a basin 100 by 100 feet, where vessels may be laden and discharged.

The ceiling of the Catholic chapel has been renewed.

A building, 150 by 20 feet, has been constructed for the storage of lumber. (Appendix 3, page 21.)

POST OFFICE.

A new partition, with lock boxes and a circular partition for general delivery have been constructed; changes have been made in the registered letter office. All these works have been done by contract. (Appendix 3, page 21.)

BRANTFORD.

POST OFFICE, ETC.

The work given out by contract in connection with this building has been finished, and the Post Office and offices of the Customs and Inland Revenue have been installed in it. (Appendix 3, page 21.)

WINDSOR.

POST OFFICE, ETC.

This building is completely finished, and the Post Office and offices of the Customs and Inland Revenue have been installed in it. (Appendix 3, page 21.)

ST. CATHERINES.

POST OFFICE, ETC.

The Government has acquired a site in a central position upon which a building will be erected in which will be contained the Post Office and the offices of the Customs and of the Inland Revenue. (Appendix 3, page 22.)

BELLEVILLE.
—**POST OFFICE, ETC.**

The Government has acquired a site in a central position upon which a building will be erected in which will be contained the Post Office and the offices of the Customs and the Inland Revenue. The plans are ready. (Appendix 3, page 22.)

PROVINCE OF QUEBEC.
— —**QUEBEC.**
— —**KENT AND ST. LOUIS GATES.**

The work on these gates is finished, with the exception of the pointing, which was postponed on account of the frost. (Appendix 3, page 22.)

FORTIFICATIONS.

Extensive repairs to the fortifications have been made during this, and will be continued during the coming year. (Appendix 3, page 22.)

CITADEL.

The tin roofing of the Officers quarters has been replaced by a roofing of galvanized iron. Several changes and necessary repairs in the interior have been made. (Appendix 3, page 22.)

TERRACE EXTENSION.

The construction of walls and piers under the Terrace has been continued. (Appendix 3, page 22.)

MARINE HOSPITAL.

Extensive repairs have been made to this building, including among others the construction of new drains, which was absolutely necessary; the floors have also been renewed. (Appendix 3, page 22.)

CUSTOM HOUSE.

The work of constructing attic rooms beneath the roof of the building, to serve for a lodging for the caretaker and for store-rooms, is being proceeded with. (Appendix 3, page 22.)

CARTRIDGE FACTORY.

Part of the building known as the " Artillery Barracks " has been converted into a cartridge factory. (Appendix 3, page 23.)

LABORATORY, ETC.

The Government has caused to be prepared plans, which have been approved by the military authorities, for changes in and additions to the present laboratory, which is situated on the Plains of Abraham and adjoining the Citadel.

A site has also been selected and plans prepared for a new group of detached buildings which will be surrounded by a suitable fence and be situated between the Laboratory and Tower No. 1. (Appendix 3, page 23.)

LEVIS FORTS.

Plans for general repairs to these forts have been prepared in the Department. (Appendix 3, page 23.)

CHAMPLAIN STREET ROCK.

The dangerous condition of the rock which overhangs Champlain street, below the Citadel, has obliged the Government to purchase the houses situated on the north side of the street, and to demolish them for the purpose of constructing a retaining wall. This work is in course of construction. (Appendix 3, page 23.)

MONTREAL.

INLAND REVENUE OFFICES.

Plans for an addition to the rear of this building, on Custom House square, have been prepared. (Appendix 3, page 23.)

ST. VINCENT DE PAUL PENITENTIARY.

A new wing, 126 by 46 feet, has been erected on the north side; this will contain 132 cells; it is hoped that the work will be completed in the spring of 1882.

Water has been introduced into the residences of the officers of the institution, and supplied to three hydrants outside of the boundary wall.

General repairs have been made. (Appendix 3, page 23.)

THREE RIVERS.

OLD BARRACKS.

The plans of the modifications and repairs necessary for the conversion of this building into Government offices have been prepared. (Appendix 3, page 23.)

ST. JOHN'S.
POST OFFICE, CUSTOM HOUSE, ETC.

The Post Office is now installed in this building.

Tenders have been invited for the furnishing and fitting of the Custom House. (Appendix 3, page 24.)

GROSSE ISLE.

QUARANTINE STATION.

A contract has been entered into for the erection of a hospital which will accommodate eighty invalids. The hospital will be situated on the eastern extremity of the Island. (Appendix 3, page 24.)

PROVINCE OF NEW BRUNSWICK.

DORCHESTER.

GENERAL PENITENTIARY FOR THE MARITIME PROVINCES.

A contract has been entered into for the erection of fifteen semi-detached buildings; these will provide lodgings for the officers and will contain the hospital, the bakery, the laundry, the workshops, the ice-house and the cellars; a contract has also been entered into for the erection of a wing which will contain 200 cells.

The water supply for the Penitentiary proper, and for use in case of fire, is completely organized. The fencing, the sentry-boxes and the guard-room are finished. (Appendix 3, page 24.)

ST. JOHN.

CUSTOM HOUSE.

This building is almost finished, and is occupied. (Appendix 3, page 24.)

POST OFFICE.

This building is almost finished, and is occupied. (Appendix 3, page 24.)

FREDERICTON:

POST OFFICE, ETC.

This building is finished and occupied. (Appendix 3, page 25.)

PROVINCE OF NOVA SCOTIA.

HALIFAX.

GOVERNMENT HOUSE.

Tenders have been invited for the renewing of the roof of this building. (Appendix 3, page 25.)

LUNENBURG.

MARINE HOSPITAL.

This building is finished and occupied. (Appendix 3, page 25.)

PRINCE EDWARD ISLAND.

GOVERNMENT HOUSE AT CHARLOTTETOWN.

Tenders have been invited for the painting of this building and the renewing of the roof. (Appendix 3, page 25.)

PROVINCE OF MANITOBA.

PARLIAMENT BUILDING AND LIEUTENANT GOVERNOR'S RESIDENCE.

Contracts have been awarded for the erection of these two buildings, which will be of brick obtained on the spot, with a facing of white brick and cut stone. The

Italian style of architecture has been adopted, modified so as to meet the exigencies of the climate. (Appendix 3, pages 25, 26.)

IMMIGRANT HOSPITAL.

A contract has been awarded for the erection of this building. (Appendix 3, page 26.)

BRITISH COLUMBIA.

PUBLIC BUILDINGS AT NEW WESTMINSTER.

The Department has caused plans to be prepared for these buildings, in which will be contained the Post Office, the Telegraph, Savings Bank, Inland Revenue and Customs Offices, and those of the Indian Department. (Appendix 3, page 26.)

VICTORIA.

POST OFFICE, ETC.

A contract has been awarded for the reconstruction of the front of this building and for general repairs. (Appendix 3, page 26.)

HARBORS AND RIVERS.

PRINCE EDWARD ISLAND.

COLVILLE BAY.

Fifteen miles from the eastern point of Prince Edward Island and the eastern terminus of the Government railway.

The works on the breakwater was finished in the month of May last. (Appendix 5, page 23.)

ST. PETER'S BAY.

On the north shore of the island, forty-three miles west of the eastern point.

The works at the breakwater and on the beach were finished at the end of the year. (Appendix 5, page 28.)

WOOD ISLAND.

In the County of Queen's, at the southern extremity of the island.

The amount voted by Parliament, at its last session, has been expended in prolonging by 124 feet the breakwater constructed in 1878-79. (Appendix 5, page 28.)

POWNAI.

At the head of Pownal Bay, in the County of Queen's.

The dredge "Prince Edward" has been employed to open a passage from the public wharf to the main channel, and to form a basin to the east of the wharf. The passage and basin have a depth of nine feet of water at low tide. (Appendix 5, page 28.)

HILLSBOROUGH RIVER.

Opposite Charlottetown is the confluence of the Elliott, York and Hillsborough Rivers.

The Hillsborough River is navigable fifteen miles above Charlottetown. But at Carr's Point there was a small shoal which has been removed, the work having been done by the dredge "Prince Arthur." (Appendix 5, page 29.)

NINE MILE CREEK.

At the entrance of Hillsborough Bay.

The dredge "Prince Edward" was employed to open a passage between deep water and the bay, as far as the public wharf, to admit of the entering of vessels at low tide. (Appendix 5, page 29.)

CRAPAUD.

A small harbor at the entrance of the Brocklesby River.

On the 23rd of May last the channel commenced in 1874-75 was continued by the dredge "Prince Edward" as far as the loading wharf at the village. (Appendix 5, page 29.)

MALPEQUE.

Forty miles from West Cape and 90 miles from East Bay on the northern head of the Island.

Sheet piling has been placed at the extremity of the breakwater, and a breastwork of piles, brush and stone, upon a depression of the Royalty Sands, so as to prevent the sea from breaking through between the mainland and the breakwater. (Appendix 5, page 29.)

TIGNISH.

Near the northern extremity of the Island.

The southern breakwater has been repaired and sheet piling placed at the two ends. (Appendix 5, page 29.)

MIMINIGASH.

On the western coast of the Island.

The breakwater to the north of the "Run" having been injured by a storm, it has been repaired.

NOVA SCOTIA.

MAIN-A-DIEU.

A small harbor of refuge in the County of Cape Breton.

A breakwater which will be 250 feet long is being constructed. (Appendix 5, page 29.)

COW BAY.

Thirty miles south-east of Sydney, C.B.

Considerable repairs and additions have been made to the breakwater at this place. (Appendix 5, page 30.)

LITTLE GLACE BAY.

On the eastern coast of Cape Breton.

The deepening of the harbor here situated was continued until the 15th August, 1880, the dredge "St. Lawrence" being used for the purpose. (Appendix 5, page 30.)

GABARUS.

A small cove on the south shore of Gabarus Bay, Cape Breton.

Last year the work of enlarging and deepening, begun in 1873, was continued, to allow of the passage of fishing boats. (Appendix 5, page 30.)

INDIAN ISLANDS BEACH.

These islands are situated on the north side of East Bay, which is a continuation of Bras d'Or, Cape Breton. They are connected by beaches, the longest of which is one mile in length and forms an excellent harbor. A passage has been made through this beach for fishing boats. (Appendix 5, page 30.)

PETIT DE GRAT.

Isle Madame, County of Richmond, C.B.

This is a passage from the Atlantic into St. Peter's Bay and is intersected by a strong beach, through which a channel has been partially opened for fishing boats. The grant voted has been absorbed by these works. (Appendix 5, page 30.)

PORT HOOD.

On the west coast of Cape Breton.

The wharf constructed by the Local Government prior to 1867 is very much exposed and had suffered greatly from storms. The grant voted has been expended in making repairs. (Appendix 5, page 30.)

BUBYING ISLAND, CANSO HARBOUR.

This island, which the old Acadians called "l'Isle des Morts," at one time afforded shelter against south-west winds; but it was gradually worn away by the sea until it became a mere shoal.

The Department have replaced it by a breakwater 280 feet in length, which affords to vessels the same shelter formerly afforded by the island. (Appendix 5, page 31.)

ARISAIG.

On the south shore of Northumberland Straits.

\$200 has been expended in repairing the breakwater constructed many years ago at this point by the Local Government. (Appendix 5, page 31.)

MERIGONISH.

The harbor of Merigonish is eight miles to the east of Pictou harbor.

In April last a wharf 150 feet in length was finished at French River. (Appendix 5, page 31.)

NEW GLASGOW.

On the East River, eight miles above the harbor of Pictou.

The channel opposite the shipyards has been deepened and improved. (Appendix 5, page 31.)

PICTOU ISLAND.

Eight miles from the entrance to Pictou harbor.

Part of the grant voted has been expended in repairing the wharf at the lower extremity of the Island. (Appendix 5, page 31.)

RIVER JOHN.

It falls into John Bay 12 miles to the north of the Harbour of Pictou.

Work has been continued at the opening up of the channel through the bar at the mouth of the river. (Appendix 5, page 31.)

TATAMAGOUCHE.

The River Tatamagouche falls into the bay of that name on Northumberland Strait.

A channel has been opened through the flats as far as Patterson's Wharf, and the channel of the west branch of the river has been improved as far as Campbell's Mills. (Appendix 5, page 31.)

PARTRIDGE ISLAND RIVER.

In the County of Cumberland, N.S.

The work of straightening and improving the channel of this river has been continued. (Appendix 5, page 32.)

WINDSOR.

In the County of Hants, 45 miles N.W. of Halifax.

On the 15th August, 1880, the works mentioned in last year's Report were completed (removal of mud bank off the railway wharf), and also a 150 feet passage for vessels drawing fifteen feet of water. (Appendix 5, page 32.)

BROOKLYN.

At the head of Liverpool Bay, County of Queen's.

The Department has here built a breakwater which forms a port of refuge; temporary repairs have been made on the slope of this breakwater, which faces the river. (Appendix 5, page 32.)

ANNAPOLIS.

Shire Town of the County of Annapolis.

With the amount placed at its disposal the Department has effected the removal of the reef situated south of the wharf. (Appendix 5, page 32.)

METEGHAN.

Meteghan Cove is situated 30 miles north of Yarmouth.

The breakwater begun in 1874 has been finished. (Appendix 5, page 32.)

NEW BRUNSWICK.

BATHURST.

The Port of Bathurst is 3 miles long and 2 miles wide, and is remarkably safe.

The chief channel is obstructed by three sand banks, from which 13,027 cubic yards were removed during the season of 1880, by means of the dredge "Canada." (Appendix 5, page 32.)

GRAND ANSE.

A small bay on the south side of the Bay of Chaleurs.

A sum of \$195.89 has been expended in repairing the flooring of the breakwater. (Appendix 5, page 32.)

SHIPPEGAN.

The grant has been expended in repairing the dam across the West Cove, which had been injured by a storm on the 21st October, 1879. (Appendix 5, page 33.)

HORSESHOE SHOAL, MIRAMICHI.

At the entrance of the Miramichi by the Gulf of St. Lawrence.

During the season of 1880, 15,837 cubic yards of material were removed from this shoal by the dredge "St Lawrence." The work is to be continued for two seasons more. (Appendix 5, page 33.)

RICHIBUCTO.

40 miles north of Shediac.

The breakwater has been repaired. (Appendix 5, page 33.)

BUCTOUCHE.

At the mouth of the river of that name.

By means of the dredge "Canada," 5,445 cubic yards of mud, clay and shells have been removed. (Appendix 5, page 33.)

POINT DU CHIENE.

Terminus of the railway, on the Gulf of St. Lawrence.

The work of repairing the railway wharf was begun. At the close of the fiscal year the work was far advanced. (Appendix 5, page 33.)

SACKVILLE.

At the head of the Bay of Fundy.

During the autumn of 1880 the necessary works for strengthening a strip of swamp known as "Ram Pasture Neck," which might have filled up the Harbor of Sackville, were completed. (Appendix 5, page 33.)

HARBOR OF ST. JOHN.

At the end of the year 1880 the breakwater at the entrance of the harbor, which was damaged by the great storm of 1878, underwent repairs. (Appendix 5, page 33.)

OROMOCTO.

The Oromocto shoals, in the River St. John, were a great obstacle to navigation. The Provincial Government expended, prior to 1867, large sums of money in deepening the channel through them, and since that time the Dominion Government has carried on the work.

In 1878-79 a sheer dam was commenced, in order to divert the current on these shoals, and in 1880 an addition of 600 feet was made to it. At the close of the fiscal year this work was almost finished. (Appendix 5, page 34.)

RIVER ST. JOHN.

The work connected with the improvements at Red Rapid, on the Tobique and on the St. John River proper, was continued. (Appendix 5, page 34.)

 QUEBEC.

ETANG DU NORD.

At the western extremity of "Grindstone Island," one of the Magdalen Islands.

In consequence of the time required for procuring the necessary timber, it was not until the close of the year that the work of constructing a breakwater, 450 feet in length, for the protection of fishing boats, could be commenced. (Appendix 5, page 34.)

NEW CARLISLE.

Capital town of the County of Bonaventure, north of the Bay of Chaleurs.

The work of constructing a wharf at this place could not be commenced until the 1st June, 1881. (Appendix 5, page 34.)

CARLETON.

In the county of Bonaventure, on the north shore of the Bay of Chaleurs.

At its last Session, Parliament voted a further sum for continuing the work on the pier at this point. (Appendix 5, page 34.)

ESCOUMAINS.

In the County of Saguenay, 24 miles from Tadousac and 68 from Murray Bay.

At the entrance of the channel over 200 rocks, varying from 3 to 15 tons in weight, have been removed, and schooners can now pass without difficulty. (Appendix 5, page 34.)

FISH-DAMS, TADOUSAC.

Tadousac is the capital town of the County of Saguenay.

There is here a fish-breeding establishment, several of the fish passes of which have been raised and repaired. (Appendix 5, page 35.)

ANSE ST. JEAN.

Twenty-four miles from the mouth of the Saguenay River.

The grant voted by Parliament has been expended in completing the pier begun in 1876, by the Local Government, and which is now 366 feet in length. (Appendix 5, page 35.)

ST. ALPHONSE DE BAGOTVILLE.

At the head of Ha! Ha! Bay.

The head of the pier at this place has been strengthened. A few years ago the part next the river was burnt; it has been temporarily repaired, but will have to be rebuilt. (Appendix 5, page 35.)

RIVER SAGUENAY.

In the course of the year rocks have been removed from the channel below Chicoutimi, thus facilitating the passage of vessels up to that locality. (Appendix 5, page 35.)

CHICOUTIMI.

This town is situated at the head of navigation on the Saguenay.

An extension has been made to the pier, thus facilitating the loading of vessels during the period of freshets. (Appendix 5, page 35.)

RIVER DU LOUP (*en bas*.)

108 miles from Quebec, on the south shore of the St. Lawrence.

The pier has undergone repairs. (Appendix 5, page 35.)

RIVER OUELLE.

75 miles from Quebec, on the south shore of the St. Lawrence.

The pier has undergone the repairs mentioned in the report of last year. (Appendix 5, page 35.)

CAP À L'AIGLE.

On the north shore of the St. Lawrence, 3 miles from Murray Bay.

At the close of the year one-half of the pier begun, under contract, by parties representing the municipality, the latter guaranteeing \$3,000 for the work, was constructed. (Appendix 5, page 36.)

LES EBOULEMENTS.

Sixty-nine miles from Quebec on the north shore of the St. Lawrence.

The pier at this place has undergone various repairs. (Appendix 5, page 36.)

ISLE AUX COUDRES.

Twelve miles from Baie St. Paul, on the north shore of the St. Lawrence.

In the month of November last, about one-third of a pier, 163 feet in length, had been built at this place, the municipality furnishing \$4,000 for the work, and the Government a like sum. (Appendix 5, page 36.)

ST. THOMAS DE MONTMAGNY.

Thirty miles from Quebec, on the south shore of the St. Lawrence.

The work mentioned in the Report of last year has been completed. (Appendix 5, page 36.)

GROSSE ISLE.

This island is situated 29 miles from Quebec, on the St. Lawrence.

The amount voted has been expended in raising and repairing the wharf at the Quarantine station. The work was still going on at the close of the fiscal year. (Appendix 5, page 36.)

SAINTE FAMILLE.

On the Island of Orleans, 17 miles from Quebec.

The work on the blocks and the removal of the boulders in the vicinity of the wharf was continued. A further vote will be necessary in order to connect the blocks with the shore. (Appendix 5, page 36.)

ST. JEAN, ISLAND OF ORLEANS.

On the Island of Orleans, 20 miles from Quebec.

In the month of November last, the work of repairing the pier, rendered necessary by the action of the ice, was finished. (Appendix 5, page 36.)

SAINT LAURENT.

On the Island of Orleans, 15 miles from Quebec.

The wharf has undergone various repairs. (Appendix 5, page 37.)

DUMOINE CHANNEL.

One of the channels of the River St. Lawrence, about 3 miles from Sorel.

Two piers have been constructed in order to hold back the ice at the break-up in the spring. (Appendix 5, page 37.)

RICHELIEU RIVER.

Falls into the St. Lawrence, 45 miles from Montreal.

The work of deepening has been carried on at St. Ours, St. Denis, Belœil and the entrance of the Chambly Canal. (Appendix 5, page 37.)

BERTHIER (*en haut.*)

On the north shore of the St. Lawrence, 45 miles from Montreal.

The grant voted has been expended in deepening, on the Vanasse, Church and Lévêque Shoals, in order to enable vessels to reach the wharf at Berthier. (Appendix 5, page 37.)

RIVER L'ASSOMPTION.

Near the village of Repentigny.

Dredging has been done here in order to deepen the channel, which is navigable only for vessels of light draught. (Appendix 5, page 37.)

BEAUHARNOIS.

Chief town of the county of that name, 20 miles above Montreal, on the south shore of Lake St. Louis.

Dredging was carried on here from the 26th May to the 30th June. (Appendix 5, page 37.)

THE CEDARS.

On the north shore of the St. Lawrence, 30 miles from Montreal.

At the end of the fiscal year, the construction of a wharf was begun for the convenience of steamers navigating the St. Lawrence. (Appendix 5, page 37.)

RIVER A LA GRAISSE (RIGAUD.)

It falls into the Ottawa at a point 15 miles from Rigaud.

The work of dredging has been continued, but is not yet finished. (Appendix 5, page 37.)

RIVER DU NORD.

It falls into the Ottawa at the head of the Lake of Two Mountains.

At the rapids a number of boulders have been removed, giving a channel of 58 feet wide and 4½ feet deep, at low water. (Appendix 5, page 38.)

SALMON RIVER.

This river falls into the Ottawa from the north. The work of dredging has been continued in order to secure a depth of 6 feet at low water. (Appendix 5, page 38.)

ONTARIO.

HAWKESBURY.

In the County of Prescott on the south shore of the Ottawa River.

Dredging has been executed in order to deepen and complete the channel begun near Grant's Point and extending to the wharves of the village. (Appendix 5, page 38.)

GANANOQUE.

On the north shore of the St. Lawrence, 18 miles below Kingston.

A small sum has been expended in deepening the Gananoque River. (Appendix 5, page 38.)

COBOURG.

On Lake Ontario, 72 miles east of Toronto.

One-half of an arm, 150 feet in length, in extension of the western pier, has been constructed. (Appendix 5, page 38.)

TORONTO.

The work of dredging the entrance to the harbor has been continued and 41,623 cubic yards of sand and clay have been removed. (Appendix 5, page 38.)

BONDEAU.

A harbor of refuge on Lake Erie, 140 miles west of Port Colborne.

In order to repair the breaches made in the sand beach on the west side of the entrance to the harbour, a contract was entered into with Messrs. F. B. McNamee & Co., for the construction of 2,000 feet of pile protection work, and at the close of the year one-third of the work had been done. (Appendix 5, page 38.)

PORT ALBERT.

On the east coast of Lake Huron, about nine miles from Goderich.

The basin has been enlarged, and, by means of the dredge "Challenge," 18,706 cubic yards of different material removed. (Appendix 5, page 39.)

KINCARDINE.

The harbor of Kincardine is an artificial basin, situated thirty-one miles north of Goderich.

Messrs. Conlon & Canan have completed the execution of their contract for the removal from the entrance to the harbor of the *detritus* brought in from Lake Huron and for restoring it to its normal depth. (Appendix 5, page 39.)

INVERHURON.

On Lake Huron, seven miles from Kincardine.

The pier has undergone slight repairs. (Appendix 5, page 39.)

BIG BAY.

On Georgian Bay, some fifteen miles from Owen Sound Harbor.

The pier has been extended 117 feet. (Appendix 5, page 39.)

OWEN SOUND.

At the mouth of the River Sydenham, on Georgian Bay.

The work of improving the channel leading to this harbor has been continued. (Appendix 5, page 39.)

MEAFORD.

On Georgian Bay, eighteen miles from Collingwood.

The local authorities having enlarged the harbor in 1880, the dredge "Challenge" has been engaged in deepening the new basin. (Appendix 5, page 39.)

COLLINGWOOD.

On Georgian Bay, in the County of Simcoe.

The work of deepening the entrance channel, the necessity of which was shown in the Report of 1878-79, has been continued. (Appendix 5, page 40.)

LITTLE CURRENT.

Little Current is the passage between Cloche and Great Manitoulin Islands.

The navigation was rendered difficult by rocks impeding the passage. The grant voted has been expended in removing the rocks and in deepening the channel; but the work will have to be continued. (Appendix 5, page 40.)

DES JOACHIMS BRIDGE.

The proposed bridge over these rapids will connect the County of Pontiac, P.Q., with the County of Renfrew, Ontario.

The Government of Ontario, which is to contribute towards this work, having delayed its approval of the plans, the work had not been commenced at the close of the fiscal year. (Appendix 5, page 40.)

SURVEYS AND EXAMINATIONS.

During the fiscal year surveys and examinations were made at various localities in Prince Edward Island, Nova Scotia, New Brunswick, Quebec and Ontario. Reports of these operations have, with a few exceptions, been forwarded to the Department. (Appendix 5, page 40.)

DREDGING.

The dredging plant owned by the Department is as follows:—

IN THE MARITIME PROVINCES.

The hopper dredge	" St. Lawrence."		
"	"	" Canada."	
The dipper dredge	" New Dominion,"	and 10 scows.	
"	"	" Cape Breton,"	7 "
"	"	" Prince Edward,"	3 "
"	"	" George McKenzie,"	3 "

IN THE PROVINCE OF QUEBEC.

The dipper dredge "Queen of Canada," with 2 scows and 1 lifter.
 " " "Nipissing," and 2 scows.
 The steam tug "Dennis."

IN ONTARIO.

The dipper dredge "Challenge" and 3 scows.
 The steam tug "Trudeau."

IN BRITISH COLUMBIA.

An elevator dredge and 4 scows.
 The steam tug "Georgie."

The dredges were employed during the fiscal year, in the following localities:—

The "St. Lawrence," at Little Glace Bay, N.S., at the Horse Shoe Shoal, at the entrance to Miramichi, N.S., and East River, N.S.

The dredge removed a total of 41,330 cubic yards of material. (Appendix 5, page 41.)

The "Canada," at River du Loup (*en bas*), Bathurst, N.B., Pictou, N.S., and Buctouche N.B.

It removed a total of 24,570 cubic yards of material. (Appendix 5, page 42.)

The dredge "New Dominion" was not used this year. The machinery is in good order, but the hull must be renewed. (Appendix 5, page 42.)

The "Cape Breton" was employed at River John, N.S., New Glasgow, N.S., and Tatamagouche, N.S.

It removed a total of 43,120 cubic yards of material. (Appendix 5, page 42.)

The "Prince Edward" was employed at Pownal, Nine Mile Creek, Carr's Point, and Crapaud.

It removed 46,355 cubic yards of material. (Appendix 5, page 43.)

The "George McKenzie" was employed at St. Peter's Canal, C.B., Port Hawkesbury, Ragged Point, N.S., and Mabou, C.B.

It removed a total of 24,730 cubic yards of material.

The assignee of the works of St. Peter's Canal paid to the Department the sum of \$13,778.23, for the use of this dredge. (Appendix 5, page 43.)

Dredge No. 1 was lent by the Department of Railways and Canals and employed on the River L'Assomption, the Richelieu River, and the Chambly Canal, P.Q.

It removed a total of 34,340 cubic yards of material. (Appendix 5, page 43.)

The "Queen of Canada" was employed at River à la Graisse, Grant's Point Salmon River, and Beauharnois.

It removed a total of 33,785 cubic yards of material. (Appendix 5, page 44.)

The "Nipissing" was employed at Berthier (*en haut*) and at the close of the fiscal year had removed a total of 21,524 cubic yards of material on the Vanasse, Church, and Levesque Shoals. (Appendix 5, page 44)

The "Challenge" was employed at Meaford and Port Albert.

In the first of these places it removed 39,02½ cubic yards, and in the second, 18,706 cubic yards of stone, clay, sand and gravel.

The plant will need various repairs. (Appendix 5, page 45.)

PUBLIC WORKS IN BRITISH COLUMBIA.

During the past fiscal year the works necessary for the improvement of the navigation of the River Naas were commenced, consisting of the removal of trunks of trees and other obstacles. The channel of the Fraser River was also deepened by dredging.

The surveys necessary before the commencement of the works for the improvement of the navigation of the River Skeena were completed.

Mr. Tiedmann, Architect, was instructed by the Government to make the surveys and prepare the plans necessary for the construction of a Customs wharf at Victoria.

The contract awarded to Mr. Spence for the removal of the "Beaver Rock," in Victoria Harbor has been withdrawn from him, and the Department is having the work continued under the superintendence of Mr. Thomas Reece. An expenditure of about \$750 will now suffice to give a depth over the whole of that reef of 12 feet 6 inches of water.

The repairs to the Post Office were finished, partly under a contract entered into with the Department and partly by day's work. The expenditure was kept within the limits of the amount voted. (Appendix 6, pages 59-78.)

SLIDES AND BOOMS.

The Government Slides were constructed to facilitate the floating of timber in places where nature offered obstacles to navigation.

The districts where the cutting of timber is carried on, and where the Government has caused works to be constructed, are situated on the Rivers Saguenay, St. Maurice, Ottawa and Trent, on Georgian Bay and on some tributary rivers.

RIVER SAGUENAY.

The works on this river consist of one slide 5,840 feet in length, with a boom of 1,344 feet, and dams, piers and bulkhead. The slide was constructed to avoid the Rapids between Lake St. John and the River Saguenay.

The works extend over a distance of about 60 miles and are constructed on La Petite Décharge, the lesser of the two overflowing streams from Lake St. John. They were commenced in 1856 and completed in 1860.

Of the slide 570 feet have been re-constructed, and to 4,390 feet considerable repairs have been made.

In addition various other repairs have been made and works of maintenance done. (Appendix 7, page 79.)

RIVER ST. MAURICE.

The slides and booms on this river and the Vermilion, one of its tributaries, are met in the order following:—

Stations.	Distance from Three Rivers.
Booms at mouth of river.....	0 miles.
Grès Falls.....	16 "
Shawenegan Falls.....	23 "
Grand' Mère Falls.....	29 "
Little Piles Falls.....	31½ "
La Tuque Falls.....	100 "
Plamondon Eddy....	106 "
River Vermilion:—	
Mouth of river.....	116 "
Iroquois Falls.....	121 "

The water was very low last spring in the River St. Maurice and its tributaries, and of 300,000 logs got out during last year, only 60,000 could be brought down.

The pay of the staff and the cost of maintenance amounted to \$14,699.14 during the year.

A sum of \$5,451.14 was placed at the disposal of the Superintendent to meet outlay for repairs. Of that grant a sum of \$233.32 remains available.

The several works were not seriously damaged last spring. (Appendix 8, page 81.)

THE OTTAWA DISTRICT.

For the descent of timber in this district the Government works are situated on the following rivers :—

On the Ottawa.....	11 stations.
“ Gatineau.....	1 “
“ Madawaska.....	15 “
“ Coulonge.....	2 “
“ Black.....	1 “
“ Petewawa.....	31 “
“ River du Moine	12 “

The following is a table of distances from Ste. Anne's Lock at the outlet of the River Ottawa to the mouths of its principal tributaries ; also to the stations where slides or other works have been constructed.

Places.	Distance from Ste. Anne.
Carillon.....	27 miles.
Grenville.....	40 “
Nation River.....	63 “
River du Lièvre.....	79 “
“ Gatineau.....	96 “
Chaudière Falls	98 “
Little Chaudière	100 “
Remous.....	102 “
Lake Deschênes	105 “
River Quio	129 “
Chats Station.....	131 “
Head of Chats.....	134 “
River Mississippi.....	134 “
“ Madawaska	136 “
“ Bonnechère.....	148 “
Les Chenaux	152 “
Portage-du-Fort	156 “
Mountain Station.....	161 “
Calumet.....	163 “
River Coulonge.....	184 “
“ Black.....	193 “
“ Snake.....	204 “
“ Petewawa	218 “
Des Joachims.....	236 “

Places.	Distance from Ste. Anne.
River du Moine.....	244 miles.
Rocher Capitaine.....	253 "
Deux Rivières.....	266 "
River Mattawan.....	286 "
" Antoine.....	293 "
" Beauchêne.....	315 "
" Porc-Epic.....	326 "
" Grand Opemiconne	333 "
" Keepawa	349 "
" Montreal.....	355 "
Fort Temiscamingue.....	367 "
River Ottetail.....	381 "
" Blanche.....	388 "
" des Quinze.....	389 "

RIVER OTTAWA.

List of slide and boom stations on the River Ottawa.

The distances given are measured on the latest maps, following the channel, by which lumber is floated down the river.

Names of Stations.	Distance from mouth of Ottawa at Ste. Anne.
1. Carillon.....	27 miles.
2. Chaudière { North side, Hull, } { South side, Ottawa. }	98 "
3. Chaudière (Little).....	100 "
4. Remous	102 "
5. Deschênes Rapids.....	104½ "
6. Chats Station.....	131 "
7. Head of Chats	134 "
8. Chenaux	152 "
9. Portage-du-Fort	156 "
10. Mountain.....	161 "
11. Calumet.....	163 "
12. Joachims Rapids.....	249 "
13. Rocher Capitaine.....	253 "

The works of these thirteen stations consist of:—

2,000	lineal feet of canal.
4,234	" " slides.
29,855	" " booms.

8,665	lineal feet of dams.
405	“ “ bulkheads.
1,981	“ “ bridges.
52	piers.
4	slide-keepers' houses.
3	storehouses.

The following works were executed during the fiscal year ended 30th June last.

Considerable repairs were made to the slides and booms at Hull and the Chaudière. The wood work and the cables of Union Bridge received two coats of paint.

At Rocher Capitaine the damage done to the booms and piers by the high water in the spring was repaired.

At the Chats slides, general repairs.

At the Chenaux station the booms, which the pressure of the timber had considerably injured, were strengthened.

At the Calumet station the works suffered considerably and the foundations had to be strengthened.

At the Mountain station considerable repairs were made.

At the Joachims station the flooring and piers were repaired.

At the Portage-du-Fort station the guide boom was renewed. (Appendix 9, pages 83 and 84.)

RIVER GATINEAU.

The River Gatineau flows from the north, and discharges into the Ottawa at a point about 96 miles above the junction of that river with the St. Lawrence at Sta. Anne, and 2 miles below the City of Ottawa. The length of the Gatineau is about 400 miles, and it drains an area of about 9,000 square miles.

The Government works are all situated at one station, about a mile from its confluence with the Ottawa. They consist of:—

3,071	lineal feet of canal.
4,133	“ “ booms.
150	“ “ bridge.
10	piers.
1	boom-men's house.
1	storehouse.

A fence has been built between the Government property near the pond and that belonging to the Reverend Oblats Fathers.

The pier of the bridge over the new canal has been strengthened and the booms anchored. (Appendix 9, page 84.)

RIVER MADAWASKA.

The River Madawaska is 240 miles long. It waters an area of about 4,100 square miles and discharges into the River Ottawa 136 miles above Ste. Anne.

List of the slide and boom stations on the Madawaska, numbered from the mouth of the river upwards:—

- | | |
|---------------------|----------------------|
| 1. Mouth of river. | 9. High Falls. |
| 2. Arnprior. | 10. Ragged Chute. |
| 3. Flat Rapids. | 11. Boniface Rapids. |
| 4. Bulmer's Island. | 12. Duck Island. |
| 5. Burnstown. | 13. Bailey's Chute. |
| 6. Long Rapids. | 14. Chain Rapids. |
| 7. Springtown. | 15. Opeongo Creek. |
| 8. Calabogie Lake. | |

The works at these stations consist of:—

1,750	lineal feet of slides.
18,179	“ “ booms.
4,080	“ “ dams.
182	“ “ bridges.
43	piers.
1	storehouse.

The channels through which the timber passes have been widened and deepened.

RIVER COULONGE.

The river waters an area of 1,800 square miles, and its length is 160 miles. It discharges into the River Ottawa, 184 miles above Ste. Anne, on the north shore.

The following is a list of the Government works on the river:—

Boom at mouth.....	300 feet long and 1 support pier.
Booms at Romain's rafting ground .	400 “ 3 “
Booms at head of High Falls' Slide...	1,848 “ 6 “
Single Stick Slide.....	2,900 “

In the month of May, 1880, the High Falls slide was considerably damaged. Repairs were then made provisionally, and these were completed last winter. (Appendix 9, page 84.)

BLACK RIVER.

This river empties into the Ottawa at a point 193 miles above Ste. Anne. Its length is 128 miles, and the area which is watered by it is about 1,120 square miles.

The works consist of:

- 1,139 lineal feet of single stick boom.
- 873 " slide.
- 346 " glance pier.
- 135 " flat dam.

The slide which, having a very sharp decline, is greatly damaged by the timber which passes over it with very great rapidity, was repaired. (Appendix 9, page 84.)

RIVER PETEWAWA.

The length of the Petewawa is about 138 miles, and the area of the territory watered by it is 2,200 square miles.

It flows from the south and discharges into the Ottawa, 219 miles above Ste. Anne. Seven miles from its mouth it separates into two branches. On these seven miles there are five stations; on the north branch 19 stations. All the works on the south branch were abandoned in accordance with the Order in Council, dated 27th July, 1871.

List of the slides and booms on this river, in the order in which they occur from the mouth upwards:—

1. Mouth of the River.
2. First Chute.
3. Second Chute.
4. Third Chute.
5. Bois Dur.

NORTH BRANCH.

- | | |
|---|--------------------------|
| 1. Half Mile Rapid. | 4. Thompson's Rapids. |
| 2. Crooked Chute. | 5. Lake Traverse Slides. |
| 3. Between High Falls and Lake Traverse (a slide and series of dams and booms.) | 6. Sawyer's Rapids. |
| | 7. Meno Rapids. |
| | 8. Below Trout Lake. |

- | | |
|----------------------------|--|
| 9. Strong Eddy. | 16. Head of Long Sault. |
| 10. Cedar Islands. | 17. Between Long Sault and Cedar Lake (south shore.) |
| 11. Foot of Devil's Chute. | 18. Between Long Sault and Cedar Lake (north shore.) |
| 12. Devil's Chute. | 19. Cedar Lake. |
| 13. Elbow of Rapids. | |
| 14. Foot of Long Sault. | |
| 15. Middle of Long Sault. | |

The works at these 24 stations are as follows :—

ON THE MAIN RIVER.

2,963 lineal feet of slides.
 8,469 " " booms,
 2,077 " " dams.
 10 piers.

ON THE NORTH BRANCH.

1,080 lineal feet of slides.
 2,671 " " booms.
 1,131 " " dams.
 23 piers.

During the year the boom piers at the mouth of the river were strengthened and repaired.

The slide at Bois Dur Station was repaired.

Considerable repairs were made to the works situated between Crooked Chute and Cedar Lake. (Appendix 9, page 84.)

RIVER DU MOINE.

The length of this river is about 120 miles, and it waters to the north an area of about 1,600 square miles. It flows into the River Ottawa at a point about 256 miles above Ste. Anne.

The works on this river are : a pier and a boom at the mouth, a single stick slide and a series of dams from the mouth upwards. These works may be detailed as follows:—

4,000 lineal feet of slides,
 800 " " booms,
 1,324 " " dams, and
 6 piers.

Repairs have been made to the long slide at High Falls and to the dams at Ryan's Chutes Nos. 1 and 2. (Appendix 9, page 84.)

TRENT RIVER NAVIGATION.

The booms, piers and slides and all such portions of the works as are connected with the lumbering operations on the River Trent at Chisholm's Rapids, Ranney's Falls, Middle Falls, and Crook's Rapids, were transferred to a company formed purposely for the management and maintenance of those works, with the right of levying tolls thereon, at the rate of five shillings per crib, at each of the slides, except at Chisholm's and at Crook's Rapids, where the works constructed do not facilitate the descent of timber.

This rate was altered by an Order in Council, on the 8th of December, 1866, fixing the tolls to be levied at Ranney's Falls, Middle Falls, and Heely's Falls, at one cent for each log of 13 feet in length, and a proportionate sum on pieces of greater length; and one dollar on each crib of square timber.

The company are not liable for the renewal of the works, in case of their failure from decay of materials, or their destruction by fire, flood or any other cause. It is their duty to keep an exact account of all the moneys collected by them, and to transmit the same to the Minister of Public Works, as provided by the Orders in Council passed on the subject.

The extraordinary repairs which from time to time were required have been executed at the expense of the Government, as also new works at localities other than those mentioned.

The following table gives the distances of navigable and unnavigable reaches:—

	Navigable.	Unnavigable.
From Trenton, Bay of Quinté, to Nine Mile Rapids....		9
“ Nine Mile Rapids to Percy Landing.....	19½	
“ Percy's Landing to Heely's Falls Dam.....		14½
“ Heely's Falls Dam to Peterboro.....	51½	
“ Peterboro to Lakefield		9½
“ Lakefield to Burleigh.....	12	
“ Burleigh Rapids.....		1
“ Burleigh Rapids to Buckhorn Rapids.....	7	
“ Buckhorn Rapids.....		1
“ Buckhorn Dam to Lindsay	36½	
	126½	34½
“ Lindsay to Port Perry at the head of Lake Scugog.	28½	
	155½	34½
Total distance, Bay of Quinté to Port Perry	190 miles.	
Passing to Fenelon Falls the distance from Buckhorn Dam to Fenelon is.....		31½

The following is a list of the works now in use:—

	Distance from Trenton in miles.
<i>Chisholm's Rapids.</i>	
The works here consist of a canal and lock, a dam and slide	15½
<i>Percy Landing.</i>	
A retaining boom for saw logs here.....	28½
<i>Campbellford.</i>	
Guide booms	34½
<i>Middle Falls.</i>	
The works consist of 4 dams and 2 slides.....	37½
<i>Crow Bay.</i>	
A retaining boom.....	38
<i>Heely's Falls.</i>	
A dam and one slide are in operation here	42½
<i>Crook's Rapids, Hastings.</i>	
The works consist of a lock, dam and slide for timber.....	34½
<i>Whitlaw's Rapids.</i>	
These works, situated below Peterboro, consist of a lock, dam and canal.....	92½
<i>Little Lake.</i>	
These works consist of three piers and a boom	94
<i>Burleigh.</i>	
Timber slides.....	116
<i>Buckhorn Rapids.</i>	
This dam is important, in keeping to a high level the water of the lakes west of it as far as Bobcaygeon, including Lakes Pigeon, Ball, Buckhorn and Chemong. The dam is effective.....	125
<i>Bobcaygeon.</i>	
There are two dams here with canal, lock and slide. The dams keep up the water to the same level as far as Fenelon Falls, and to the reach as far as Lindsay Lock.....	140½
<i>Fenelon Falls.</i>	
A large slide and booms.....	155½

In accordance with the terms of the Act 47 Vic., Chap 7, the canals and locks in the District of Newcastle are now under the control of the Department of Railways and Canals; whereas the slides, dams and booms remain under the control of the Department of Public Works.

The following repairs have been effected at the various stations :—

At Fenelon Falls the planking of the slide has been renewed.

The following repairs are now necessary :—

1. Raising by three layers the walls of the slide. 2. Prolonging the range of piers, upwards beyond the slides, to a distance sufficient to guide with certainty the logs into the entrance of the slide.

A commencement has been made towards removing the obstructions in the Scugog River, and a lighthouse has been erected at its mouth.

At Lindsay, on the Scugog River, a fish-leap has been built at the request of the Department of Marine and Fisheries.

At Bobcaygeon, it is a matter of urgent necessity to remove the obstructions found in the river at those points where it intersects the canal, inasmuch as the ten or twelve steamboats running on Sturgeon Lake find it difficult to enter the canal.

At Buckhorn the slide is in want of repairs in various directions, and the time has come for renewing the boom.

At Burleigh, the dam, the slide, and the waste-weir required considerable repairs.

At Lakefield, the channel has been cleaned out, by the employment of a lifting barge, and in this way a depth of water of 4 feet 8 inches has been obtained. The slide at this station belongs to private parties and is very badly kept up, to the injury of the public.

Peterborough is situate 52 miles from Heely's Falls, and on this stretch six steamboats are constantly running. Above the falls is one series of rapids as far as Lakefield, and on these rapids there are sawmills whose refuse is filling up the above mentioned navigable section. This abuse has given rise to complaints for several years past, and the resident engineer has received instructions to make a report on the subject.

At Little Lake, the boom and piers have undergone some repairs. Little Lake is situate one mile from Peterborough, and the saw-mill refuse will finally choke it up if a dredge is not sent to dig out a channel.

At Whitlaw's Rapids, a new waste-weir has been built and certain repairs effected at the request of the signers of the petition No. 84,294, addressed to this Department. The obstructions or banks known as "Yankee Bonnet," "Dangerfield," and "Robin-

son's Island," have been removed. Thanks to this work there are now four more inches of water on the sill of the lock at Whitlaw's Rapids.

At Hastings, the Department has had built a cofferdam on Flat Rock, raised 600 cubic yards of stone from the bed of the river, cleaned out the channel below the locks, and repaired the slide.

At Heely's Falls the slide requires considerable repairs. It has not been repaired for many years.

The resident engineer recommends that the Department should undertake the necessary repairs at "Middle Falls," and "Chisholm's Rapids," two stations too much neglected by the Trent Slides Committee. (Appendix 19, pages 143-147.)

TELEGRAPH AND SIGNAL SERVICE.

BRITISH COLUMBIA.

Since the 1st January, 1881, the Government has been in possession of 430 miles of telegraphic lines and of 16 knots of sub-marine cables purchased from the "Western Union Telegraph Company." This purchase has given a three-fold advantage:—1st. The Government has no longer to pay the subsidy of \$4,000 to the Company, nor the annual sum of \$2,500 for the maintenance of the line which traverses Washington Territory, nor, lastly, a sum of nearly \$6,000 per annum for the maintenance and repairs of the six sub-marine cables *vid* St. Juan Island.

2nd. The same Company pays \$1,200 per annum for services rendered at the Relay Station of New Westminster, and collects all the receipts at the Victoria Station, representing about \$1,000 per annum.

3rd. The Government and the public profit by a reduction of about \$5,000 on the charge for despatches.

In British Columbia there are now about 676 miles of telegraphic lines and 36 knots of double sub-marine cables. (Appendix 10, page 88.)

The receipts from these lines and cables which in 1878-79 amounted to only \$5,320, will, in 1881-82, probably reach \$18,000 or \$20,000. (Appendix 10, page 88.)

GULF OF ST. LAWRENCE.

The sub-marine cables between the Island of Anticosti and the Coast of Gaspé, and the Magdalen Islands and Cape Breton have worked very well. The Bird Rock cable has three times suffered damage and been repaired, and a very stout cable is kept in reserve for any injury which may henceforth arise.

During the year a line of 214 miles on the Island of Anticosti has been completed, a line of 84 miles on the Magdalen Islands, and further a cable of 9 miles in length, between Etang-du-Nord and House Harbor. All these works have cost 12½ per cent. less than the estimated expenditure. (Appendix 10, page 89.)

The Honorable Mr. Fortin, who asked for the creation of this telegraphic system, suggests that it should be extended on the north shore as far as Forteau Bay, in the Straits of Belle Isle, or rather as far as Pointe Amour, situate on the east side of the bay, and upon which is a lighthouse and alarm whistle. This recommendation is suggested by the fact that steamships and sailing vessels which frequent the River St. Lawrence all pass through the Straits of Belle Isle. Forteau Bay, which is always accessible, will also be included in the telegraphic system of Canada and the United States which will be an inestimable benefit for the fishing boats which frequent the desolate north shore. Moreover, since steam vessels make the passage from Moville, in Ireland, to Forteau Bay in five days, this would consequently be the shortest way to transmit to Canada, by steamship, the news from Europe, which would give an incontestible superiority to the Canadian lines, and would be of enormous advantage to our fishing stations.

The Honorable Mr. Fortin further recommends that the telegraphic system be extended to the shores of our great lakes by means of telegraph and signal stations. These recommendations are warmly supported by the representatives of the principal Marine Assurance Companies, by the Boards of Trade of Montreal, Quebec and Lévis, by General Hazen, Director General of the Signal Service in the army of the United States and by the Consul for Sweden and Norway at Quebec. Norway and Sweden possess a similar system very complete in its organization. (Appendices 10, page 89 ; 11, page 105 ; 12, pages 106-121, and 23, page 157.)

NORTH SHORE, RIVER ST. LAWRENCE.

Baie St. Paul has been connected with Chicoutimi by a telegraphic line 92 miles long, and Murray Bay with Mille Vaches by a line of 84 miles. The Saguenay river is crossed by a cable of special construction, being one knot in length. (Appendix 10, page 89.)

NOVA SCOTIA.

The telegraphic lines in operation on the coasts of Nova Scotia now make up a length of 339 miles. (Appendix 10, page 89.)

BAY OF FUNDY.

The submarine cable between Grand Manan and Campobello has been repaired. It had been cut a mile from the shore, probably by the anchor of some vessel. The cable which unites Campobello to Eastport, and which corrosion or contact with rocks containing veins of copper had damaged, has been repaired. Lastly, a line 24 miles in length has been constructed on the Island.

SIGNAL SERVICE.

Two very simple semaphores have been erected, the one on the Brandy Pots and the other at River du Loup (*en bas*). They are visible at a distance of from seven to eight nautical miles. In this way the problem of how to establish communication by means of signals between the lighthouses on the islands in sight of the eastern coast of Nova Scotia and the telegraph stations erected between Canso and Halifax, has been solved.

The code of signals mentioned in the Report of last year has been sent to twenty stations in the River and Gulf of St. Lawrence. (Appendix 10, page 89.)

TELEPHONES.

It will soon be possible to employ the telephone with its most recent improvements throughout the public service. (Appendix 10, page 90.)

QUEBEC HARBOR IMPROVEMENTS.

The sum paid to the contractors for these works, Messrs. Peters, Moore & Wright, has now reached \$653,621.69.

During the last fiscal year the piling and crib-work, as well as the concreting of the wet dock wall have been done. The masonry has been finished up to the level of the superstructure, and the dredges have raised 200,000 cubic yards of material from the channels of the tidal basin.

About the middle of October, 1881, the 1,500 foot wharf was completed, only 17 months have been occupied in working at this enormous structure. The first portion of this great work has been almost perfected. (Appendix 13, pages 122, 124.)

GRAVING DOCK AT ST. JOSEPH DE LEVIS.

Parliament voted \$500,000 for the construction of this dock. This sum has been expended, saving a balance of \$62,393.08. Nothing more remains to be done except the extra works at the entry, considered necessary, and the placing in position of the boilers and the travelling caisson.

In the Resident Engineer's Report will be found the particulars of the work done and the sums paid out during the last fiscal year. (Appendix 13, pages 124 and 125.)

OPERATIONS OF THE LIFTING BARGE, HARBOR OF QUEBEC.

On the 24th May the barge resumed work. It proceeded in the first place to the shoal called "Fly Bank," in order to continue the lifting of rocks impeding navigation. It has raised 96 rocks, representing a total weight of 19 tons. Adding these figures to the number and weight of the rocks lifted during the past year, from the same place, there results a total of 610 rocks, representing a weight of 1,957 tons.

The services of the barge have been twice required, in order to assist vessels which could not weigh their anchors. In both these instances it was ascertained that these vessels had dropped anchor upon a nest of chains and anchors, which must be raised in order to prevent similar accidents.

A similar nest has been found near the western point of the Island of Orleans. As in the past, bits of copper have been found attached to the surface of the rocks when raised, which is an additional proof that vessels have touched these rocks.

The Harbour Commissioners recommend that the Government should obtain a vote of twelve thousand dollars (\$12,000) in order to repair the barge, and continue these clearing out operations energetically. (Appendix 14, pages 129-131.)

DEEPENING CHANNEL BETWEEN QUEBEC AND MONTREAL.

By the Act 36 Vic., chap. 60 (1873), and by Order in Council 31st May, 1873, the Montreal Harbor Commission was authorized to carry out this work. The ship channel is being dredged in order to give it a depth of 25 feet. The places where the heaviest work has been done are:—Cape Charles and Cape Roche, where rock dredging is engaged in; Point Champlain, on Lake St. Peter; Contrecoeur and Montreal, where the dredging is in earth and mud. The gross amount of dredging everywhere represents a total of 1,220,937 cubic yards for the last fiscal year.

The accounts for expenditure made by the Harbor Commission for all these works are only made up on the 31st December of each year. (Appendix 15, pages 135-137.)

At the request of this Department, the Montreal Harbor Commissioners have had prepared by the Engineer in Chief a Report showing the present condition of the ship channel between Montreal and Quebec, the probable cost of completing the works which remain unfinished, and the state in which the fleet of dredges, the dredging plant, the workshops, &c., are now to be found. (Appendix 16, pages 138-139.)

ROADS.

During the fiscal year the culverts and bridges of the Temiscouata Road were renewed and repairs effected on various portions of this road. This highway, 67 miles in length, reaches from River-du-Loup, on the River St. Lawrence, as far as the boundary line between the Provinces of New Brunswick and Quebec, and serves as a direct outlet for the country lying between Woodstock, N.B., and River-du-Loup, on the River St. Lawrence. The traffic over this route is considerable, especially during the winter. (Appendix 18, page 141.)

PURCHASES, SALES AND LEASES.

Appendix 20 (pages 148-150) contains a statement of the sales and purchases made by the Department during the last fiscal year, and a statement of the leases entered into with various individuals.

ARBITRATIONS.

During the fiscal year two claims only were referred to the official arbitrators. (Appendix 21, pages 151-152.)

BREAKWATERS ON THE GASPÉ COAST.

The Honorable Dr. Fortin recommends the construction of breakwaters at various points on the coast of Gaspé, with the view of facilitating the working of our sea fisheries and so increasing their production. (Appendix 22, page 153.)

OPENING AND CLOSING OF NAVIGATION.

Appendix 24 (pages 160-161) gives the dates of the closing of navigation at the most important ports of the Dominion, and shows the depth of water at low tide at those ports.

THE DEPARTMENTAL STAFF.

Appendix No. 25 (page 162) gives a list of persons who filled, in the Department, from the 1st July, 1867, to the 30th June, 1881, the offices of Minister, Deputy Minister, Secretary, Chief Engineer, and Chief Architect.

Respectfully submitted,

HECTOR L. LANGEVIN,

Minister of Public Works.

OTTAWA, 17th January, 1882.

DOMINION OF CANADA.

REPORT

OF THE

MINISTER OF PUBLIC WORKS

FOR THE

FISCAL YEAR ENDED 30TH JUNE, 1881.

APPENDICES.



APPENDIX No. 1.

STATEMENT showing the amount Expended by the Department of Public Works
Dominion of Canada, during Fiscal Year ended 30th June, 1881.

Name of Work.	Con- struction.	Repairs.	Staff and Main- tenance.	Total.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.
PUBLIC BUILDINGS.				
Generally.....	14,966 31			14,966 31
<i>Nova Scotia.</i>				
Halifax Dominion Building.....	363 37	537 20		900 57
do Penitentiary.....		410 50		410 50
do Quarantine Station (Lawlor's Island).....	327 70	463 86		791 56
Lunenburg Marine Hospital.....	2,883 30			2,883 30
Pictou Custom House.....		1,075 22		1,075 22
Sydney Quarantine Hospital.....	30 50			30 50
Yarmouth Quarantine Station.....		20 00		20 00
<i>Prince Edward Island.</i>				
Charlottetown Dominion Building.....		1,424 47		1,424 47
do Marine Hospital.....	1,800 00			1,800 00
<i>New Brunswick.</i>				
Chatham Custom House.....		528 63		528 63
Dorchester Penitentiary.....	73,274 17			73,274 17
Fredericton Magazine.....		133 79		133 79
do Post Office.....	6,070 64			6,070 64
Partridge Island Marine Hospital.....	1,372 50			1,372 50
St. John Custom House.....	58,415 77			58,415 77
do Penitentiary.....		1,321 16		1,321 16
do Post Office.....	47,477 71			47,477 71
do do (old).....		30 25		30 25
do Savings Bank.....	2,896 72			2,896 72
Woodstock Post Office.....	4,636 00			4,636 00
<i>Quebec.</i>				
Grosse Isle Quarantine Station.....	2,554 13			2,554 13
Montreal Custom House.....		5,389 58		5,389 58
do Examining Warehouse.....		2,214 82		2,214 82
do Immigrant Sheds.....		75 00		75 00
do Inland Revenue Offices.....	576 79	3 94		580 73
do Post Office.....		3,100 50		3,100 50
do Public Buildings.....		38 75		38 75
Quebec Artillery Barracks.....	1,649 74			1,649 74
do Citadel (repairs to roof).....		2,831 00		2,831 00
do do "Cliff".....	26,727 54			26,727 54
do Citadel Buildings.....		7,145 01		7,145 01
do Custom House.....	626 88	698 25		1,325 13
do Drill Shed.....		32 00		32 00
do Durham Terrace Extension.....	14,101 50			14,101 50
do Marine Hospital.....	2,038 90	163 00		2,201 90
do Military Buildings.....		901 00		901 00
do Post Office.....		4,767 82		4,767 82
do Public Buildings.....		336 00		336 00
do Weights and Measures Offices.....		316 30		316 30

APPENDIX No. 1—Continued.

Name of Work.	Con- struction.	Repairs.	Staff and Main- tenance.	Total.
PUBLIC BUILDINGS—Continued.				
<i>Quebec.</i>				
Quebec and Lévis Fortifications.....	39,814 70			39,814 70
Sherbrooke Post Office, etc.....	8,588 75			8,588 75
St. Helen's Island Magazine.....		110 50		110 50
St. John's Post Office, &c.....	3,774 23			3,774 23
St. Vincent de Paul Penitentiary.....	15,437 45			15,437 45
Three Rivers Custom House.....		225 99		225 99
do Old Barracks.....	3,138 34			3,138 34
<i>Ontario.</i>				
Belleville Public Buildings.....	5,637 31			5,637 31
Brantford Post Office, &c.....	10,557 94	375 50		10,933 44
Guelph Custom House, &c.....		298 68		298 68
Hamilton Custom House.....		747 32		747 32
do Post Office.....	25 19	635 26		660 45
Kingston Custom House.....		292 34		292 34
do Fortifications.....	6,706 24			6,706 24
do Military College.....	6,016 41			6,016 41
do Penitentiary.....	14,109 11			14,109 11
do Post Office.....		657 68		657 68
do Public Buildings.....		123 20		123 20
London Custom House.....		449 15		449 15
do Post Office.....		1,612 80		1,612 80
Niagara Barrack Buildings.....		913 20		913 20
Ottawa Drill Shed.....	3,442 73	1,727 28		5,170 01
do Geological Museum.....	39,240 51			39,240 51
do Post Office.....	5,042 06	200 00		5,242 06
do Public Buildings.....	12,231 86	72,740 02		84,971 88
do do Gas.....			17,763 00	17,763 00
do do Grounds.....			3,998 06	3,998 06
do do Heating.....			36,038 25	36,038 25
do do Removal of snow.....			921 22	921 22
do do Water.....			9,000 00	9,000 00
do Supreme Court.....	7 53			7 53
Port Robinson Inland Revenue Office.....		69 53		69 53
Prescott, Fort Wellington Barracks.....		446 50		446 50
Rideau Hall.....		15,439 50		15,439 50
do Fuel and light.....			9,012 10	9,012 10
St. Catharines Post Office.....	6,090 35			6,090 35
Toronto Custom House.....		935 53		935 53
do Drill Shed.....		124 15		124 15
do Examining Warehouse.....		1,434 61		1,434 61
do Immigrant Sheds.....		135 00		135 00
do Post Office.....		974 92		974 92
do Public Buildings.....		191 69		191 69
Windsor Post Office.....	19,522 61			19,522 61
<i>Manitoba.</i>				
Fort Osborne Barracks.....		190 00		190 00
Manitoba Public Buildings.....		45 00		45 00
Stoney Mountain Penitentiary.....	10,314 72	1,090 55		11,405 27
Winnipeg, Clerk of Works and Architect's Office..		498 25		498 25
do Custom House, &c.....		1,182 65		1,182 65
do Immigrant Shed and Hospital.....	7,461 61			7,461 61
do Lieut.-Governor's Residence.....	746 79	*4,000 00		4,746 79
do Parliament Building.....	2,543 93			2,543 93

* Rental.

APPENDIX No. 1—Continued.

Name of Work.	Con- struction.	Repairs.	Staff and Main- tenance.	Tota
	\$ cts.	\$ cts.	\$ cts.	\$ cts.
PUBLIC BUILDINGS—Concluded.				
<i>North-West Territories.</i>				
Battleford Buildings	11,578 16			11,578 16
<i>British Columbia.</i>				
New Westminster Custom House		34 62		34 62
do Penitentiary	5,678 90			5,678 90
Victoria Custom House	13 50	27 82		41 32
do Post Office	9,540 37	27 32		9,567 69
do Public Buildings		20 00		20 00
HARBORS AND BREAKWATERS.				
<i>Newa Scotia.</i>				
Annapolis Harbor	750 00			750 00
Arnsaig Pier		200 00		200 00
Burying Island, Canso Harbor	5,000 00			5,000 00
Cow Bay Breakwater	17,780 36	75 09		17,855 45
Digby Pier		188 57		188 57
Gabarus	1,100 00	75 00		1,175 00
Indian Island Beach	1,096 45			1,096 45
Ingonish South		608 00		608 00
Liverpool (Brooklyn) Breakwater		263 84		263 84
Main-à-Dieu Breakwater	66 10			66 10
Merigomish Pier	1,065 60			1,065 60
Metaghan Breakwater	37 79			37 79
Oak Point (now Kingsport)		1 50		1 50
Partridge Island River	2,000 00			2,000 00
Petit de Grat	1,007 30			1,007 30
Pictou Island	745 49			745 49
Port Hood Pier	3,000 00			3,000 00
<i>Prince Edward Islan^d.</i>				
Colville Bay (Souris)	12,948 39			12,948 39
Malpeque Breakwater	1,400 00			1,400 00
Miminigash Breakwater	998 77			998 77
New London Breakwater		57 10		57 10
St. Peter's Bay Breakwater	2,195 35			2,195 35
Tignish Harbour	2,997 03			2,997 03
Wood Islands	35 31			35 31
<i>New Brunswick.</i>				
Grande Anse		195 89		195 89
Pointe du Chêne Breakwater	273 21			273 21
Richibucto Harbor	1,200 00			1,200 00
Roche Bay		10 00		10 00
Sackville Harbor	750 00			750 00
Shippegan Harbor	2,000 00			2,000 00
St. John Harbor	2,222 78			2,222 78
do River	4,099 14			4,099 14
Tobique River	1,000 00			1,000 00

APPENDIX No. 1—Continued.

Name of Work.	Con- struction.	Repairs.	Staff and Main- tenance.	Total.
HARBORS AND BREAKWATERS—Continued.				
<i>Maritime Provinces.</i>				
Harbors and Rivers generally		7,993 03		7,993 03
<i>Quebec.</i>				
Anse St. Jean Pier	1,500 07			1,500 07
Bagotville	3,897 70			3,897 70
Baie St. Paul		13 00		13 00
Berthier (<i>en haut</i>) River	3,000 00			3,000 00
Cap à l'Aigle Pier	1,653 25			1,653 25
Carleton Pier	1,137 91			1,137 91
Cedars Pier		1,047 39		1,047 39
Chenal du Moine Pier	1,927 97			1,927 97
Chicoutimi Pier	1,999 91			1,999 91
Eboulements Pier		1,028 63		1,028 63
Escoumains, removal of boulders	1,189 80			1,189 80
Etang du Nord, Magdalen Islands	1,165 11			1,165 11
Grosse Isle Harbor	6,645 14			6,645 14
Harbors, &c., generally		1,349 09		1,349 09
Isle aux Coudres Pier	1,683 50			1,683 50
L'Islet Pier		50 82		50 82
Montreal Harbor		146 00		146 00
Piers below Quebec		3,078 04		3,078 04
Piers and Booms, Belœil		52 00	82 05	134 05
Quebec Harbor		46 50		46 50
Rivière du Lièvre	3,604 98			3,604 98
Rivière du Loup Pier		1,341 63		1,341 63
Rivière Ouelle Pier		2,444 09		2,444 09
River St. Lawrence	268 39			268 39
do removal of chains and anchors		7,885 84		7,885 84
St. Dominique Pier	1,925 99			1,925 99
Ste. Famille Pier	2,365 56	465 16		2,830 72
St. Jean-Port-Joli Pier		10 00		10 00
St. Jean (Isle d'Orleans) Pier		470 93		470 93
St. Laurent do do		456 82		456 82
St. Thomas (Montmagny) do	3,639 35	104 52		3,743 87
Tadoussac Fish-hatching Dams	582 14			582 14
<i>Ontario.</i>				
Big Bay, Lake Huron	500 00			500 00
Cobourg Harbor	4,301 06			4,301 06
Collingwood Harbor	7,990 00			7,990 00
Des Joachims Rapids Bridge	750 69			750 69
Harbours, &c., generally	4,336 90			4,336 90
Kincardine Harbor	6,009 25			6,009 25
Little Current, Lake Huron	4,816 22			4,816 22
Morpeth Harbor	421 80			421 80
Otonabee River	1,105 86			1,105 86
Owen Sound Harbor	6,929 98			6,929 98
Port Albert Harbor, Lake Huron	2,480 96			2,480 96
Rondeau Harbor	5,069 96			5,069 96
Toronto Harbor	7,188 56			7,188 56
Trent River	1,897 43			1,897 43
<i>Manitoba.</i>				
Assiniboine River	19 00			19 00

APPENDIX No. 1—Continued.

Name of Work.	Con- struction.	Repairs.	Staff and Main- tenance.	Total.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.
HARBORS AND BREAKWATERS—Concluded.				
<i>British Columbia.</i>				
Cowichan River.....	670 00	.....	.....	670 00
Fraser River.....	312 25	.....	.....	312 25
Harbors, &c., generally .....	.....	72 00	.....	72 00
Nasas River	610 59	.....	.....	610 59
Victoria Harbor	939 61	.....	.....	939 61
DREDGE VESSELS.				
Dredges, repairs.....	.....	14,097 67	.....	14,097 67
Dredging, purchase of plant.....	15,221 57	.....	.....	15,221 57
DREDGING.				
Maritime Provinces.....	\$42,000 00			
Quebec—				
Beauharnois	\$870 55	.....	.....	.....
Berthier (<i>en Asut</i>).....	1,189 67	.....	.....	.....
Generally	2,377 64	.....	.....	.....
Laprairie River.....	91 70	.....	.....	.....
L'Assomption	1,700 36	.....	.....	.....
Ottawa River (Calumet)	296 62	.....	.....	.....
Rivière à la Grasse (Ri- gaud)	1,592 90	.....	.....	.....
Rivière du Nord	926 81	.....	.....	.....
do Richelieu.....	3,439 41	.....	.....	.....
do Saguenay (Chi- coutimi).....	3,327 95	.....	.....	.....
do Salmon (North Shore Ottawa River).....	746 16	.....	.....	.....
	16,559 77	.....	.....	.....
Ontario—				
Gananoque.....	245 17	.....	.....	.....
Generally.....	2,167 03	.....	.....	.....
Goderich.....	1,330 00	.....	.....	.....
Hawkesbury	1,005 67	.....	.....	.....
Newford	1,882 61	.....	.....	.....
Penetanguishene.....	999 82	.....	.....	.....
	7,630 30	.....	.....	.....
British Columbia—				
Fraser River.....	7,323 28	.....	.....	.....
Generally.....	222 00	.....	.....	.....
	7,545 28	.....	.....	.....
	73,735 35	.....	.....	73,735 35
SLIDES AND BOOMS.				
Saguenay District Works.....	.....	6,210 39	853 68	7,064 07
St. Maurice do	6,877 33	3,831 27	14,995 41	25,603 01
Ottawa do .....	.....	.....	19,086 06	19,086 06
Newcastle do .....	.....	.....	529 00	529 00
River Richelieu (maintenance of buoys).....	.....	.....	393 75	393 75

APPENDIX No. 1—*Concluded.*

Name of Work.	Con- struction.	Repairs.	Staff and Main- tenance.	Total.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.
SLIDES AND BOOMS—<i>Concluded.</i>				
Ottawa River Slides.....	\$2,153 08	1,019 68		1,019 68
Gatineau do	361 38		383 49	383 49
Madawaska do	1,994 25			
Coulonge do	2,427 10			
Black do	382 85			
Petawawa do	2,851 22			
Dumoine do	1,127 46			
South Nation	122 19			
Ottawa Suspension Bridge.....	35 32	468 02	11,454 85	11,922 87
ROADS AND BRIDGES.				
Isle aux Noix (Roadway and Bridging).....	838 67			838 67
Temiscouata Road		1,100 43		1,100 43
MISCELLANEOUS.				
Arbitrations.....			4,162 31	4,162 31
Relief of Fishermen, East Coast Labrador.....			437 24	437 24
Surveys			24,228 95	24,228 95
TELEGRAPH LINES.				
Land and Cable Telegraph Lines, Lower St. Law- rence.....	175,343 30			175,343 30
Telegraph Lines, Baie St. Paul to Chicoutimi, &c. do Maritime Provinces.....	12,940 51			12,940 51
do British Columbia.....	4,030 00			4,030 00
do Prince Edward Island, subsidy.....	53,765 71		29,801 83	83,567 54
Agent and contingencies, B.C.....			1,946 66	1,946 66
			1,690 90	1,690 90
Totals.....	1,014,391 47	208,358 85	175,327 96	1,398,078 28
WORKS AUTHORIZED BY SPECIAL ACTS OF PARLIAMENT.				
St Lawrence River (deepening between Quebec and Montreal).....	Nil.			Nil.
Quebec Harbor Improvements.....	202,000 00			202,000 00
Lévis Graving Dock.....	175,000 00			175,000 00
Esquimalt do B.C.....	9,891 00			9,891 00
Totals.....	386,891 00			386,891 00
Grand Totals.....	1,401,282 47	208,358 85	175,327 96	1,784,969 28

O. DIONNE,
Accountant.

DEPARTMENT OF PUBLIC WORKS,
OTTAWA, 18th November, 1881.

APPENDIX No. 2.

TABLE OF DISTANCES:

ST. LAWRENCE NAVIGATION.

FROM STRAITS OF BELLE-ILE TO DULUTH, AT HEAD OF LAKE SUPERIOR, BY WATER.—A.

From	To	Sections of Navigation.	Statute Miles.	
			Inter-mediate.	Total to Straits of Belle-Ile.
Straits of Belle-Ile	Cape Whittle	Gulf of St. Lawrence.....	240	240
Cape Whittle	West Light, Anticosti.....	do	201	441
West Light, Anticosti.....	Father Point	River St. Lawrence.....	202	643
Father Point.....	Rimouski	do	6	649
Rimouski	Bic	do	12	661
Bic.....	Isle Verte	do	39	700
Isle Verte (opp. Saguenay)	Quebec	do	126	826
Quebec	Three Rivers.....	do to Tidewater	74	900
Three Rivers	Montreal.....	do	86	986
Montreal.....	Lachine.....	Lachine Canal	8½	994½
Lachine	Beauharnois.....	Lake St. Louis.....	15½	1,009½
Beauharnois	St. Cécile.....	Beauharnois Canal	11½	1,021
St. Cécile.....	Cornwall.....	Lake St. Francis.....	32½	1,053½
Cornwall	Dickinson's Landing	Cornwall Canal	11½	1,065½
Dickinson's Landing	Farran's Point.....	River St. Lawrence.....	5	1,070½
Farran's Point.....	Upper end of Croyle's Island.	Farran's Point Canal	½	1,071
Upper end Croyle's Island.	Williamsburg or Morris-	River St. Lawrence.....	10½	1,081½
Williamsburg	burgh	Rapid Plat Canal	4	1,085½
Rapid Plat	Rapid Plat	River St. Lawrence.....	4½	1,090
Point Iroquois Village.....	Point Iroquois Village	Point Iroquois Canal.....	3	1,093
Presqu'île	Point Cardinal, Edwards-	Junction Canal	2½	1,095½
Point Cardinal	burgh	Galops Canal	2	1,097½
Galops Rapids	Head of Galops Rapids	River St. Lawrence	7½	1,105
Prescott.....	Prescott	do	59	1,164
Kingston	Kingston	Lake Ontario	170	1,334
Port Dalhousie	Port Dalhousie	Welland Canal	27	1,361
Port Colborne	Port Colborne.....	Lake Erie.....	232	1,593
Amherstburgh	Amherstburgh	River Detroit	18	1,611
Windsor	Windsor	Lake St. Clair.....	25	1,636
Foot of St. Mary's Island..	Foot of St. Mary's Island	River St. Clair.....	33	1,669
Sarnia.....	Sarnia	Lake Huron.....	270	1,939
Foot of St. Joseph's Island.	Foot of St. Joseph's Island....	River St. Mary	47	1,986
Sault St. Mary	Foot of Sault St. Mary	Sault St. Mary Canal.....	1	1,987
Head of Sault St. Mary	Head of Sault St. Mary	River St. Mary.....	7	1,794
Point aux Pins.....	Point aux Pins.....	Lake Superior.....	390	2,384

Of the 2,384 miles from the Straits of Belle-Ile to the Head of Lake Superior, 71½ miles are artificial navigation, and 2,312½ open navigation.

Straits of Belle-Ile to Liverpool, 1,942 geographical, or 2,234 statute miles.

The total fall from Lake Superior to Tidewater is about 600 feet.

APPENDIX No. 2—Continued.

QUEBEC TO LIVERPOOL, *viâ* STRAITS OF BELLE-ILE AND MALIN HEAD, NORTH OF IRELAND.—B.

From	To	Sections of Navigation.	Geographical Miles.	Statute Miles.
Quebec	Saguenay	River St. Lawrence..	106	122
Saguenay	Father Point.....	do	53	61
Father Point.....	Lighthouse, west end Anticosti...	do	176	202
West end of Anticosti	Cape Whittle, Labrador Coast....	Gulf of St. Lawrence	175	201
Cape Whittle	Belle-Ile Lighthouse, east entrance of Straits.....	do	209	240
Belle-Ile	Malin Head, North of Ireland	Atlantic Ocean.....	1,750	2,013
Malin Head	Liverpool	do and Irish Sea	192	221
Total from Quebec to Liverpool, <i>viâ</i> Belle-Ile and Malin Head, North of Ireland...			2,661	3,060

HEAD OF LAKE SUPERIOR TO LIVERPOOL, *viâ* STRAITS OF BELLE-ILE AND NORTH OF IRELAND.—C.

Sections of Navigation.	Geographical Miles.	Statute Miles.
Head of Lake Superior, at Fond du Lac, to Quebec.....	1,355	1,558
Quebec to Liverpool, <i>viâ</i> Straits of Belle-Ile and North of Ireland.....	2,661	3,060
Total from head of Lake Superior to Liverpool, <i>viâ</i> Belle-Ile and Malin Head, North of Ireland.....	4,016	4,618
N.B.—Route <i>viâ</i> Straits of Belle-Ile shorter than <i>viâ</i> Cape Race.....	158	182

Straits of Belle-Ile, 80 miles long by 14 average breadth.

APPENDIX No. 2.—Continued.

QUEBEC TO LIVERPOOL, *via* CAPE RACE AND MALIN HEAD, NORTH OF IRELAND.—D.

From	To	Sections of Navigation.	Geographical Miles.	Statute Miles.
Quebec	Saguenay.....	River St. Lawrence..	106	122
Saguenay.....	Father Point.....	do ..	53	61
Father Point.....	Métis Point.....	do ..	22	25
Métis.....	Cap Ste. Anne des Monts.....	do ..	71	82
Cap Ste. Anne des Monts	Cap de la Madeleine.....	do ..	46	53
Cap de la Madeleine.....	Fame Point.....	do ..	29	33
Fame Point.....	Cap des Rosiers	do ..	25	29
Cap des Rosiers	Cap St. Pierre de Miquelon.....	Gulf of St. Lawrence	343	394
Cap St. Pierre de Miquelon	Cape Race.....	Atlantic Ocean.....	182	152
Cape Race.....	Malin Head.....	do do	1,800	2,070
Malin Head.....	Liverpool.....	do and Irish Sea	192	221
Total from Quebec to Liverpool, <i>via</i> Cape Race and Malin Head, North of Ireland			2,819	3,242

HEAD OF LAKE SUPERIOR TO LIVERPOOL, *via* CAPE RACE AND NORTH OF IRELAND.—E.

Sections of Navigation.	Geographical Miles.	Statute Miles.
Head of Lake Superior, at Fond du Lac, to Quebec.....	1,355	1,553
Quebec to Liverpool, <i>via</i> Cape Race and North of Ireland.....	2,819	3,242
Total from head of Lake Superior to Liverpool, <i>via</i> Cape Race and Malin Head, North of Ireland	4,174	4,800
N.B.—Route <i>via</i> Cape Race longer than <i>via</i> Straits of Belle-Ile.....	168	182

APPENDIX No. 2.—Continued.

LAKE NAVIGATION.—F.

Names of Lakes, and of Rivers connecting the same.	Statute Miles.			Depth in Feet.		Area, Square Miles.	Elevation above Sea at Three Rivers. Feet.
	Greatest Length.	Greatest Breadth.	Average Breadth.	Greatest.	Mean.		
Superior	390	160	80	900	32,000	600	
St. Mary's River	55	4	1	60	30	532	
Michigan	345	84	58	1,000	22,400	580	
Green Bay	100	25	18	500	2,000	580	
Mackinaw Straits	} Not added below. }		20	10	200	40	580
Georgian Bay	130	55	40	500	578	578	
Huron	270	105	70	900	450	23,000	
St. Clair River	33			50	35		
St. Clair Lake	25	25	20	27	15	360	
River Detroit	25	3	1	37	29		
Lake Erie	250	60	38	204	90	10,000	
Niagara River	35	3	1	30			
Lake Ontario	190	52	40	600	412	6,700	
Lake St. Francis	33	5	4	80	36	132	
Lake St. Louis	15	7	5	68	30	75	
Lake St. Peter	30	9	7	40	8	200	
River St. Lawrence, connecting Lakes between Kingston and Three Rivers	186				20		
Total length of Lake Navigation .	2,172	Inclusive of River portions .			96,867		
do do .	1,778	Exclusive of River portions .					

FROM PRINCE ARTHUR LANDING (LAKE SUPERIOR) TO FORT GAREY (WINNIPEG), BY THE DAWSON ROUTE.— G

	Statute Miles.	
	Inter- mediate.	Total.
Prince Arthur's Landing to Shebandowan	45	45
Lake Skebandowan to North-West Angle	312	357
North-West Angle to Fort Garry (Winnipeg)	95	452

The steamboat voyage from Collingwood to Prince Arthur's Landing is 532 miles.

APPENDIX No. 2.—*Continued.*

DISTANCE to Liverpool, from Halifax (Nova Scotia), St. John (New Brunswick), Portland (State of Maine), and Quebec, as measured on Colton's Map of 1861.—H.

Halifax to Liverpool, *vid* Cape Clear.

FROM	TO	Sections of Navigation.	DISTANCE IN MILES.	
			Geographical.	Statute.
Halifax, Nova Scotia	Cape Clear.....	Across Atlantic to S.W. end of Ireland.	2,200	2,530
Cape Clear.....	Liverpool.....	Up St. George's Channel.....	330	380
		Total	2,530	2,910

St. John to Liverpool, *vid* Cape Clear.

St John, New Brunswick..	Cape Sable.....	Across Bay of Fundy to S.W. end of Nova Scotia.	180	207
Cape Sable.....	Cape Clear.....	Across Atlantic to S.W. end of Ireland.	2,310	2,656
Cape Clear.....	Liverpool.....	Up St. George's Channel.....	330	380
		Total.....	2,820	3,243

Portland to Liverpool, *vid* Cape Sable and Cape Clear.

Portland, State of Maine....	Cape Sable.....	Across Bay of Fundy to S.W. end of Nova Scotia.	210	243
Cape Sable.....	Cape Clear.....	Across Atlantic to S.W. end of Ireland...	2,310	2,656
Cape Clear.....	Liverpool.....	Up St. George's Channel.....	330	380
		Total.....	2,850	3,278

Quebec to Liverpool, *vid* Cape Race and North of Ireland.

Quebec.....	Cape Race.....	River and Gulf of St. Lawrence to S.W. Point of Newfoundland.....	827	951
Cape Race.....	Malin Head.....	Across Atlantic to North end of Ireland.	1,800	2,070
Malin Head.....	Liverpool.....	Down North Channel.....	192	221
		Total	2,819	3,242

Quebec to Liverpool, <i>vid</i> Straits of Belle-Ile and Malin Head, North of Ireland.....	2,661	3,060
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For further details, see pages 9, 10 and 11 of Appendix.

APPENDIX No. 2.—Continued.

TABLE OF DISTANCES from the Principal Seaports in North America, to Liverpool, Havre, Havana and Rio Janeiro.—I.

		Geographical Miles.
Quebec	to Liverpool.	{ <i>Via</i> Belle-Ile..... 2,649
		{ " Cape Race..... 2,808
	Havre....	{ " Belle-Ile..... 2,810
		{ " Cape Race..... 2,939
	Havana.....	2,891
Rio Janeiro.....	5,546	
Boston	to Liverpool.....	2,895
	Havre.....	2,993
	Havana.....	1,530
	Rio Janeiro.....	4,935
New York	to Liverpool.....	3,095
	Havre.....	3,228
	Havana.....	1,240
	Rio Janeiro.....	4,885
Philadelphia	to Liverpool.....	3,275
	Havre.....	3,358
	Havana.....	1,190
	Rio Janeiro.....	4,990
Baltimore	to Liverpool.....	3,450
	Havre.....	3,543
	Havana.....	1,160
	Rio Janeiro.....	5,000
Richmond	to Liverpool.....	3,380
	Havre.....	3,473
	Havana.....	1,090
	Rio Janeiro.....	4,930
New Orleans	to Liverpool.....	4,780
	Havre.....	4,838
	Havana.....	595
	Rio Janeiro.....	5,315

APPENDIX No. 2.—Continued.

TABLE OF DISTANCES from Quebec to Labrador along North Shore of the St. Lawrence.—J.

FROM	TO	Intermediate Mileage.	Total Mileage from Quebec.	REMARKS.
Quebec	Beauport	3	3	Provincial Highway.
Beauport	Montmorency Falls	4	7	do
Montmorency Falls	Ange Gardien	3	10	do
Ange Gardien	Château Richer	6	16	do
Château Richer	Ste. Anne de Beaupré	6	22	do
Ste. Anne de Beaupré	St. Joachim	5	27	do
St. Joachim	St. Tite des Caps	9	36	do
St. Tite des Caps	St. Paul's Bay	24	60	do
St. Paul's Bay	Les Eboulements	9	69	do
Les Eboulements	St. Irénée	9	78	do
St. Irénée	Pointe à Pic	9	87	do
Pointe à Pic	Murray Bay	3	90	do
Murray Bay	Cap à l'Aigle	3	93	do
Cap à l'Aigle	St. Fidèle	6	99	do
St. Fidèle	St. Siméon or Black River	10	109	do
St. Siméon	Port au Persil	8	117	do
Port au Persil	Pointe au Bouleau	9	126	do
Pointe au Bouleau	Anse du Portage	5	131	do
Ferry Anse du Portage (across mouth of River Saguenay)	Anse à l'Eau	1	132	do
Anse à l'Eau	Tadousac	1	133	do
Tadousac	Les Petites Bergeronnes	9	142	do
Les Petites Bergeronnes	Escoumains	9	151	do
Escoumains	Mille Vaches	18	169	do
Mille Vaches	Portneuf	9	178	Beach used.—2 portages.
Portneuf	Sault au Cochon	7	185	do
Sault au Cochon	Ilet de Jérémie	18	203	Track req. through forest.
Ilet de Jérémie	Betsiamits	7½	210½	Beach used.
Betsiamits	Pointe aux Outardes	12	222½	do
Pointe aux Outardes	Manikuanagan	15	237½	Track req. through forest.
Manikuanagan	River Godbout	27	264½	do do
River Godbout	Pointe des Monts	12	276½	do do
Pointe des Monts	Trinité	7	283½	Beach used.
Trinité	Ilet Caribou	7½	291	do
Ilet Caribou	Baie des Kani	22	313	do
Baie des Kani	Jambon	8	321	Track req. through forest.
Jambon	River Ste. Marguerite	12	333	do do
River Ste. Marguerite	Sept Isles	12	345	do do
Sept Isles	River Moisy	19	364	Beach used.
River Moisy	River à la Truite	8	372	do
River à la Truite	Cormoran	8	380	do
Cormoran	Pigou	7	387	do
Pigou	River au Bouleau	7	394	Fine Beach, short portage.
River au Bouleau	River Matemek	7	401	do do
River Matemek	River Chaloupe	8	409	do do
River Chaloupe	River Shaldrac	7	416	do do
River Shaldrac	River Tonnerre	7	423	do do
River Tonnerre	Portage du Loup-Marin	8	431	do do
Portage du Loup-Marin	River Magpie	7	438	do do
River Magpie	River St. Jean	7	445	do do
River St. Jean	Longue Pointe	9	454	do do
Longue Pointe	Poste de Mingan	5	459	do do
Poste de Mingan	Pointe aux Esquimaux	18	477	do do
Pointe aux Esquimaux	Nataskuan	64	541	do do
Nataskuan	Tshikaska	18	559	
Tshikaska	Mecatina	75	634	
Mecatina	Bonne Espérance	99	733	
Bonne Espérance	Blanc Sablon	24	757	Boundary of Labrador, Canada.

APPENDIX No. 2.—Continued.

POPULATION of various Settlements between Tadousac and Labrador, on the North Shore of the St. Lawrence.—K.

NAME OF PLACE.	POPULATION.		
	1864.	Census of 1871.	Census of 1881.
	Number of Families.	Number of Persons.	Number of Persons.
Tadousac.....	Not obtained.	765	1,542
Escoumains.....	do	1,023	520
Mille Vaches.....	do		1,115
Portneuf.....	40	1,790	
Sault au Cochon.....	2		
Îlet de Jérémie.....	1		
Betsiamits.....	100 to 120	552	
Pointe aux Outardes.....	5		
Manikugan.....	3	86	
River Godbout.....	15 to 20		
Pointe des Monts.....	3	106	243
Trinité.....	3		
Rivière Ste Marguerite.....	2		
Sept Isles.....	30 to 40	191	
Rivière Moisy.....	15 to 20	336	241
Rivière à la Truite.....	2		
Cormoran.....	2		
Pigou.....	6		
Rivière au Bouleau.....	2		
River Matemek.....	2		
River Chaloupe.....	2		
River Shaldrake.....	6		
River Tonnerre.....	5		
Rivière du Loup-Marin.....	3		
River Magpie.....	6		
River St. Jean.....	12 to 15		
Longue Pointe.....	12 to 15		
Poste de Mingan.....	100 to 120	560	
Pointe aux Esquimaux.....	75	862	1,775
Nataskuan.....	44	358	489
Mecatina.....	Not obtained.	280	410
Bonne Esperance.....	do	266	341

NOTE.—Population of settlements given in Census of 1871 and Census of 1881 include intermediate places.

APPENDIX No. 2—Continued.

DISTANCES—New Road—Quebec to Lake St. John.—L.

FROM	TO	Intermediate Mileage.	Total Mileage.
Quebec.....	Boundary Post.....	18	
Boundary Post.....	1st Camp, Lachance (Stoneham).....	8	23
1st Camp, Lachance (Stoneham).....	2nd do Noël.....	11½	34½
2nd do Noël.....	3rd do Lac des Roches.....	9	43½
3rd do Lac des Roches.....	4th do Lake Jacques Cartier.....	14	57½
4th do Lake Jacques Cartier.....	5th do Pikauba.....	13	70½
5th do Pikauba.....	6th do Bédard.....	12	82½
6th do Bédard.....	7th do Rivière Upika.....	12	94½
7th do Rivière Upika.....	8th do do Pika.....	10½	104½
8th do do Pika.....	9th do do aux Ecorces.....	11	115½
9th do do aux Ecorces.....	10th do Lake Belle Rivière.....	10½	126
10th do Lake Belle Rivière.....	St. Jérôme, at lower end of Lake St. John, on south side.....	14	140
St. Jérôme.....	Chicoutimi.....	50	

Mail passes three times a week. Winter and Summer.

Time : 20 hours, Quebec to Lake Jacques Cartier (per mail).

do 28 hours, Lake Jacques Cartier to St. Jérôme (per mail).

Total 48 hours, Quebec to Lake St John (per mail).

Total distance 140 miles, Quebec to Lake St. John.

GREAT CIRCLE or Air Line Distances in Geographical Miles, as per Map of the Dominion of Canada. Published by order of the Hon. the Minister of the Interior, the 1st November, 1878.—M.

FROM	TO	MILES.
Yokohama (Japan).....	Port Simpson.....	3,865
do	Port Moody (Burrard Inlet).....	4,374
do	San Francisco.....	4,470
San Francisco	New York.....	2,228
do	Montreal.....	2,202
Burrard Inlet	do	1,992
Port Simpson.....	do	2,194
St. John (N'fd).....	Cape Clear.....	1,670
do	Tory Island	1,693
Montreal.....	Quebec (River St. Lawrence).....	145
do	Cape Race (via St. Paul).....	1,013
do	Belle Isle.....	892
Belle Isle	Tory Island.....	1,657
Cape Race.....	do	1,736
do	Cape Clear.....	1,708
Tory Island.....	Liverpool.....	240
Cape Clear.....	do	310
Halifax.....	Cape Race.....	470
Portland.....	do	767
Boston.....	do	808
New York	do	1,010

APPENDIX No. 2.—Concluded.

A TABULAR View of the River St. John, from Fredericton to the Great Falls, from a Report, dated St. John, N.B., August 21, 1826, on a Survey of the River St. John, from Fredericton to the Grand Falls, by Robert Foulis, C.E. and D.P.S.—N.

DISTANCES OF PLACES.	Miles.	Chains.	Links.	Ascent from Level in inches.	No. of Rapids.	Velocity of Current in Rapids, per 66 feet.	Medium Velocity of current, per 66 feet.	Depth of Channel.	GEOLOGICAL.
From Fredericton to confluence of Tide below Chapel Bar.....	4	77	59				72	From 6 0 to 11.....	Sand, gravel, appearance of freestone, accidental blocks of granite.
do Confluence of tide to French Chapel.....	5	15		43	2	22"	58	do 1 9 to 8.....	Gneiss, clay-slate, roofing slate.
do French Chapel to Cliff's Bar.....	7	52		129	3	28	1.26	do 2 9 to 10.....	do gravel, clay.
do Cliff's Bar to head of Bear Island Bar.....	5	70	40	227	4			At Bear Island from 1.9 to 7½	do red granite.
do Bear Island to Mackawickak.....	8	54			2	30	46	From 2 6 to 9.....	Variety granite.
do Mackawickak to Meductic.....	4	68	50	56	2	Meductic Rapids, 12	60	do 5 0 to 10.....	Large grained granite veined with quartz.
do Meductic to Eel River.....	9	25		220	3	20	48	do 2 9 to 8.....	Graphite and porphyritic granite.
do Eel River to Griffith's Island.....	9	43		168	4	55	55	do 2 0 to 7.....	Volcanic stones, detached.
do Griffith's Island to McMullan's.....	12	26		144	4	28	60	do 1 9 to 6½.....	do cellular.
do McMullan's to Presqu'île.....	8	77		375	3	24	45	do 3 0 to 8.....	Gneiss-trap.
do Presqu'île to Rivière de la Chute.....	14	71		765	3			do 3 0 to 7.....	Limestone, slate.
do Rivière de la Chute to Tobique.....	12	12			3			do 2 6 to 9.....	Trap.
do Tobique to Great Falls.....	21	12			8	15	42	do 2 0 to 33.....	Transition limestone.
Total Distance.....	125	39	47	2127	45	Total Length, 10½ miles.			
Perpendicular height of Great Falls.....						74 feet.		Depth of water in Upper Basin.....	20 feet.
Descent through Rocky Chasm.....						45 feet 6 inches.		do Lower do.....	33 feet.
Total descent of Falls.....						119 feet 6 inches.		Length of cut necessary for Tunnel from Upper to Lower Basin, 836 yards.	
Height of Hill at Portage, from level of Upper Basin.....						120 feet 7 inches.			
do Lower do.....						240 feet 1 inch.			

APPENDIX No. 3.

REPORT OF THE CHIEF ARCHITECT.

DEPARTMENT OF PUBLIC WORKS,
OTTAWA, 17th September, 1881.

(No. 17431.)

SIR,—I have the honor to report as follows upon the new works and general repairs executed in connection with the "Public Buildings" under the control of the Department, during the fiscal year ending 30th June, 1881.

THOMAS S. SCOTT,
Chief Architect.

F. H. ENNIS, Esq.,
Secretary, Department of Public Works,
Ottawa.

PROVINCE OF ONTARIO.

OTTAWA.

PARLIAMENT GROUNDS, &c.

These have been kept in good order.

Additional accommodation being found necessary for the propagation of plants and flowers for the grounds, a contract has been entered into with Messrs. Veale and Adams, Ottawa, for the erection of a glass house 68 feet x 19 feet, to be erected adjoining the present one.

The frontage to Parliament Grounds on Wellington street has been boulevarded and shade trees planted.

PARLIAMENT BUILDING.

The enlargement of gallery for reporters in Commons Chamber mentioned in my last report has been completed.

The Commons and Senate Chambers have been painted and decorated by Mr. McKay, Painter and Decorator, Ottawa; portion of this work was necessitated by the fire which occurred in roof of Commons Chamber in the fall of 1879.

Drawings prepared by and work done under the superintendence of this Department.

WESTERN BLOCK DEPARTMENTAL BUILDING.

The four additional rooms mentioned in my last report as required by Post Office Department in basement of extension have been completed by the contractor, Mr. F. Toms, Ottawa.

An enlargement of the windows for the better lighting of large room on ground floor occupied by Post Office Department, has been carried out by the contractor, Mr. W. Palen, Ottawa.

Drawings prepared by and work done under the superintendence of this Department.

EASTERN BLOCK DEPARTMENTAL BUILDING.

The large fire proof vault for Department of Finance mentioned in my last report has been satisfactorily completed by the contractor, Mr. F. Toms, Ottawa.

Portion of the cut stone work to main tower shewing signs of decay it has been decided to remove and renew same by day work, it being impossible to decide on the extent of the work required unless by removal of stone by stone.

Work done under the superintendence of this Department.

NEW SUPREME COURT.

It having been decided to close the Government workshop situate on the Parliament Grounds, at the corner of Bank and Wellington streets, tenders have been asked for for the conversion of same into Supreme Court, and galleries for the reception of pictures donated to the Government by the Royal Canadian Academy.

The present Supreme Court room in the Parliament Building will now be used as an adjunct to the Parliament Library as originally intended.

The external appearance of the old workshops building will be very slightly altered except by putting in gable windows to light the Court room on first floor, and by forming entrances on Bank street.

The ground floor will contain picture gallery 36 x 20 feet, with entrance for public to picture gallery and Court from Bank street; six rooms for use of Judges with private entrance from Bank street, Registrar's office, Clerk's office, Precis Writer's office, spare office, vault, water closets, lavatories, etc.

The first floor will contain picture gallery 36 x 20 feet, Barrister's room, Barrister's library, Court Room 48 x 36 feet and 24 feet high with vaulted ceiling, Judges' library, Judges consulting room, and waiting room.

The conversion of portion of drying shed in workshops yard into a laboratory and photometric gallery for Department of Marine and Fisheries, will be included in the above contract.

Plans and specifications prepared by this Department.

RIDEAU HALL.

The usual and necessary repairs to buildings generally have been made, and a large amount of painting, &c., to interior of main building has been executed by Mr. Wm. Howe, Ottawa. A new toboggan slide, additional room to curling rink, and the erection of a gallery in tennis court have been commenced and will be completed before fall.

Drawings prepared by and work done under the superintendence of this Department.

GEOLOGICAL MUSEUM.

The contract work on this building has been satisfactorily completed by the contractor, Mr. Askwith, Ottawa.

A portion of the rear buildings has been fitted up as a residence for caretaker.

The show-cases, counters and fittings are in course of preparation under contract by Mr. Askwith and Mr. Burns, and part by day work under superintendence of the Clerk of Works, the latter being found necessary owing to the utilization of portion of the old fittings removed from Montreal.

Drawings prepared by and work done under the superintendence of this Department.

DRILL SHED.

The contract for fittings to armories, band rooms, museum &c., awarded Messrs. Veale and Adams, Ottawa, has been completed by them.

The floor of drill hall and gun shed has been planked. Contractor, Mr. Clemow, Ottawa.

Gas has been introduced throughout the building. Contractor, Mr. Roche, Ottawa.

An amount has been placed in Estimates for latrines, winter sashes, footpaths, &c., which will be completed by the ensuing fall.

Drawings prepared and work done under the superintendence of this Department.

HAMILTON.**POST OFFICE, &C.**

It being considered desirable to centralize the various Government offices in this City, a site has been secured with a frontage on King street of 94 feet 4 inches, and on John street of 137 feet, and an adjoining lot with a frontage on Main street of 28 feet 11 inches by 136 feet 10 inches deep.

It is proposed to erect buildings on this site for Post Office, Customs and Inland Revenue Departments.

KINGSTON.**MILITARY COLLEGE.**

Water for use at several of the College buildings being heretofore only obtainable by means of water carts, it has been decided to erect a detached boiler and pump house 30 feet by 26 feet, with residence for engineer over the same, and to pump water from Navy Bay in close proximity to the lake for domestic and fire purposes, the service pipes being already laid. Contract for the erection of the building has been entered into with Mr. John Waddell, contractor, Kingston.

Drawings prepared by the Department. Local Architects, Messrs. Power and Son.

PENITENTIARY.

The blacksmith shop has been re-roofed with metal.

The roof of south workshop has been strengthened and re-roofed with metal.

Breakwater 200 feet long by 30 feet wide has been constructed forming a basin 100 x 100 feet for the use of vessels loading and unloading. Ceiling of Catholic chapel has been renewed.

Building 150 feet by 20 feet for storage of lumber has been erected.

Mr. John Bowes of this Department, Superintending Architect.

POST OFFICE.

New screen to public lobby with lock boxes, general delivery circle and alterations to Registered letter office have been made under contract by Mr. Thos. Overend, contractor, Kingston.

Drawings prepared by this Department. Local Architects, Messrs. Power and Son.

BRANTFORD.**POST OFFICE.**

The contract work on this building is now completed and Customs and Inland Revenue offices occupied.

Contractor for fittings, Mr. John Graham.

Contractor for heating apparatus, Mr. W. L. Appley, Ottawa.

Local Architect, Mr. John Henry.

Drawings prepared by this Department.

WINDSOR.**POST OFFICE, CUSTOMS AND INLAND REVENUE OFFICES.**

This building is now completed and occupied.

Contractor for building, Mr. F. Toms, Ottawa.

Contractors for fittings, Messrs. Bailey and Walker.

Contractors for heating apparatus, Messrs. Bonnett and Wright, Toronto.

Local Architect, Mr. W. Scott.

ST. CATHARINES.

POST OFFICE, CUSTOMS AND INLAND REVENUE OFFICES.

A site for this building has been secured in a central situation, with a frontage of 80 feet on Queen street and 154 feet on King street.

Plans for the proposed building are now in course of preparation by Mr. R. C. Windeyer, Architect, Toronto.

BELLEVILLE.

POST OFFICE, CUSTOMS AND INLAND REVENUE OFFICES.

A site for this building has been secured in a central situation with a frontage of 103 feet on Bridge street, and 116 feet on Pinnacle street. Plans for the proposed building are now in course of preparation by Mr. R. C. Windeyer, Architect, Toronto.

PROVINCE OF QUEBEC.

QUEBEC.

KENT AND ST. LOUIS GATES.

Work on these gates is now completed, with the exception of pointing which was delayed on account of frost.

Contractor, Mr. H. J. Beemer.

Plans, &c., prepared by this Department.

QUEBEC FORTIFICATIONS.

Extensive repairs to the fortification walls are in progress in sections under the immediate supervision of the Department and under contracts with the following contractors, viz: Messrs. Owen Kelly, C. Jobin, W. J. Piton, II. Hatch, Joseph Mathieu, Thos. Pampalon and John O'Leary.

Further extensive works have been arranged for execution during the ensuing fiscal year.

CITADEL.

The tin roofing to officers quarters has been removed and roofs recovered with galvanized iron.

Sundry necessary internal alterations and repairs have been executed.

DURHAM TERRACE EXTENSION.

Additional portions of this work, viz: the building of walls and piers under terrace has been proceeded with under contract by Messrs. Pampalon & O'Leary, under the immediate superintendence of this Department.

MARINE HOSPITAL.

Considerable repairs have been made to this building including new drainage which was urgently required, and further repairs and renewal of flooring will be required which will be executed after the close of navigation this fall.

Contractor, Auguste Laberge, Quebec.

Works done under the immediate superintendence of this Department.

CUSTOM HOUSE.

The space in roof of this building is now being converted into attic rooms for caretaker and storage purposes, under contract, by Mr. O'Leary, Quebec, under the immediate superintendence of this Department.

POST OFFICE.

The lot adjoining Post Office belonging to the Government, known as the Motz property, is being graded and retaining walls built next streets and steps. Contractor, Mr. H. Hatch, Quebec.

Work done under the immediate superintendence of this Department.

CARTRIDGE FACTORY.

Portion of buildings known as Artillery Barracks are being converted into Cartridge Factory, under contract with Mr. H. Hatch and Mr. Mathieu, contractors, Quebec, under the immediate superintendence of this Department.

LABORATORY AND FULMINATE MIXING BUILDINGS.

Drawings have been prepared by this Department, and approved of by Military Authorities for additional buildings and alterations to the present Laboratory Buildings situate on the plains adjoining the Citadel. A site has also been selected, and plans prepared for new group of detached buildings surrounded by suitable fencing and situate between Laboratory Buildings and Martello Tower No. 1. Tenders for these buildings will be asked for at an early date.

LEVIS FORTS.

Plans and specification have been prepared by this Department for general repairs to these forts. Tenders will be asked for at an early date.

CHAMPLAIN STREET CLIFF.

The dangerous state of the cliff on Champlain Street below the Citadel necessitated the purchase by the Government of the houses on the north side of the street and their demolition for the purpose of building a retaining wall.

This work is now in progress under contract by Mr. H. Hatch, contractor, Quebec, under the immediate superintendence of this Department.

• MONTREAL.

INLAND REVENUE OFFICES.

Plans, &c., for an extension in rear of this building on Custom House Square have been prepared, and tenders will be asked for at an early date.

Local Architect, Mr. A. Raza, Montreal.

ST. VINCENT DE PAUL PENITENTIARY.

A new north wing 126 feet by 46 feet 6 inches, and containing 132 cells, has been erected and will, it is expected, be finished and ready for occupation by the spring of 1882.

A large quantity of cut stone has been prepared for the new dining hall.

Water has been laid on to the officers dwellings, and to three fire hydrants outside the boundary walls.

General repairs have been made to the main building. Superintending Architect, Mr. John Bowes.

THREE RIVERS.

OLD BARRACKS.

Plans, &c., for alterations and repairs to this building for the purpose of converting same into Government offices have been prepared by the local Architect Mr. O. Z. Hamel, and tenders will be asked for at an early date.

ST. JOHN'S.

POST OFFICE, CUSTOM HOUSE, &c.

The Post Office portion of the building is now occupied. Tenders will be asked for at an early date for hot water heating apparatus, and for furniture and fixtures for Customs Department.

Superintending Architect, Mr. A. C. Hutchison, Montreal.

GROSSE ISLE.

QUARANTINE STATION.

Contract for the erection of an hospital to contain eighty patients, has been entered into with Mr. Askwith, contractor, Ottawa, and it is expected the building will be completed by the fall of 1881.

The building will be located at the east end of the Island, and will be erected of brick with external hollow walls and shingled roofs. On the ground floor will be two wards 60 x 25 feet for twenty patients each, and rooms for surgeon, nurses, waiting room, kitchen, stores, pantry, living room and convalescents day room; and on the first floor, two wards as on ground floor, three bed-rooms for staff, nurses room, day-room and rooms for linen, stores, &c.

Drawings, &c., prepared by and work executed under the immediate superintendence of this Department.

PROVINCE OF NEW BRUNSWICK.

DORCHESTER.

GENERAL PENITENTIARY FOR MARITIME PROVINCES.

Contract for the erection of 15 semi-detached houses for officers, bake-house, hospital, laundry, workshops, ice-house and root-houses has been awarded to Mr. A. E. Killam, Moncton. Works are now in progress and will it is expected be fully completed by the fall of 1881.

Contract for the erection of additional cell-wing 166 feet by 49 feet, to contain 200 cells, also a detached boiler-house, has been awarded to Messrs. T. McManus & Sons, of Memramcook, and works are now in progress.

The water supply to penitentiary proper and to the necessary fire hydrants, also the boundary fence, guards lookouts, and guard-house are completed.

Drawings prepared by this Department. Superintending Architect, Mr. W. Morgan Smith, St. John.

ST. JOHN CUSTOM HOUSE.

Works on this building are now nearly completed and building occupied.

The steam heating has been completed and hydraulic hoist, footpaths around building, and internal fittings are now being completed. Mr. Appley, Ottawa, contractor for heating. Mr. John McGourty, St. John, contractor for footpaths. A. Christin and Co. St. John, contractors for fittings.

Allan Brothers, St. John, contractors for time ball apparatus.

The space at west end of building has yet to be enclosed and the necessary side walks, &c., made on streets around building.

Contractors for building, Messrs. Williams, Anderson, and Williams, St. John. Superintending Architects, Messrs. McKean & Fairweather, St. John.

POST OFFICE.

Work on this building is now nearly completed and building occupied.

The steam heating, footpaths, hydraulic hoist and internal fittings are completed. Contractors for heating, Messrs. McAvity and Son, St. John. For footpaths, J. T.

McGee, St. John. For internal fittings, Mr. Thos. Fitzgibbon, St. John. For hydraulic hoist, Mr. Fensom, Toronto.

Contractors for building, Messrs. Jones, Booth, and Doddridge. Superintending Architect, Mr. W. Morgan Smith, St. John.

FREDERICTON.

POST OFFICE, &c.

This building is now completed and occupied. Grounds around building have been fenced, graded and approaches made.

Contractor for internal fittings, Mr. Joshua Limerick, Fredericton.

Contractors for building, Messrs. Snow & Scoullar. Drawings prepared by this Department. Superintending Architect, Mr. D. E. Dunham, St. John.

PROVINCE OF NOVA SCOTIA.

HALIFAX.

DOMINION BUILDING.

Tenders will be asked for at an early date for renewing the roof covering of this building.

LUNENBURG.

MARINE HOSPITAL.

This building is now completed and occupied.

Contractors, Messrs. Eli Hopps & John Mitchell. Clerk of works, Mr. Solomon Morash.

Drawings and specifications prepared by this Department.

PRINCE EDWARD ISLAND.

CHARLOTTETOWN.

DOMINION BUILDING.

Tenders will be asked for at an early date for the cleaning and painting of this building and for the renewal of roof covering.

PROVINCE OF MANITOBA.

PARLIAMENT BUILDINGS AND LIEUTENANT GOVERNOR'S RESIDENCE.

Contract for the erection of Parliament Buildings has been awarded to Messrs. J. & P. Lyons & Co., contractors, Ottawa, and for Lieutenant Governor's residence to Messrs. Bowles & Williams, contractors, Winnipeg.

Both buildings will be erected of local brick, the external walls being built hollow with facings of white brick and cut stone dressings and mansard roofs covered with shingles and galvanized iron. The style of architecture adopted is Italian, modified to suit the requirements of the climate.

The central portion of Parliament Building 86 feet by 44 feet and one wing 57 feet by 50 feet is at present only intended to be built; hereafter another wing of similar size can be erected as requirements necessitate.

The building will be four stories in height including basement, the floor of latter being however only 4 feet below the level of ground. The basement will contain boiler house, fuel room, store room, seven offices, vault, six water closets, lavatories and urinals. The ground floor will contain seven offices and the Legislative chamber, 40 feet by 40 feet, and 32 feet high with a gallery for the public three seats deep along the sides and one end.

The first and second floors will each contain nine offices with a vault on first floor only. Total number of offices, thirty-two, all of good size and well lighted.

The residence for Lieutenant Governor will be 60 feet by 60 feet, and four stories in height and will contain in basement, kitchen, scullery, still room, cellar, pantry, larder, furnace and fuel room. The ground floor will contain dining room, drawing room, breakfast room and library, all communicating with each other by folding doors and forming a suite of rooms 96 feet long by 20 feet wide, a serving room is provided adjoining the dining room with hoist from kitchen in basement. Business office for Lieutenant Governor is also provided on this floor. The first floor will contain six bed rooms, two dressing rooms, bath room, water closet and store closet. The attic floor is divided into nine bed rooms, four only of which will under present contract be finished.

Drawings and specifications prepared by this Department. Resident Architect, Mr. J. P. M. Lecourt.

IMMIGRANT BUILDINGS.

Contract for these buildings as described in my last report was awarded to Messrs. Bowles & Sutherland, Winnipeg.

Since work was commenced a two story addition 75 feet x 29 feet has been added to the building, giving extra sleeping and day accommodation.

Drawings and specifications prepared by this Department.
Resident Architect, Mr. J. P. M. Lecourt.

STONY MOUNTAIN PENITENTIARY.

Portion of this building has been provided with steam heating apparatus by Mr. J. Bertrand, contractor; the remaining portion will be tendered for this fall.

Plans have been prepared by this Department for various necessary out buildings including guards quarters, stabling, &c., and work is being executed by convict labor under competent instructors.

BRITISH COLUMBIA.

NEW WESTMINSTER PUBLIC BUILDINGS.

Plans have been prepared by this Department and tenders will be asked for at an early date for a building to accommodate Post Office, Telegraph, Savings Bank, Inland Revenue, Customs, and Indian Departments.

VICTORIA.

POST OFFICE, ETC.

Contract for the rebuilding of front to this building and general repairs and alterations has been awarded to Messrs. Smith & Clarke, Victoria.

Local Architect, Mr. H. O. Tiedman, Victoria.

GENERAL.

The several public buildings throughout the Dominion not herein particularly mentioned have been kept in good repair and condition, some having required large, and others smaller repairs, difficult to particularize, but involving a large amount of superintendence and attention.

I have the honor to be, sir,
Your obedient servant,

THOMAS S. SCOTT,
Chief Architect.

APPENDIX No. 4.

REPORT OF THE MECHANICAL ENGINEER.

(No. 458).

OTTAWA, 4th November, 1881.

SIR,—I have the honor to report that during the fiscal year 1880-81, no new works were undertaken in connection with the heating, ventilation, gas, water and bell services in the Parliament Building, Departmental Buildings, Rideau Hall, or Ottawa Post Office, the apparatus in these respective buildings being in efficient condition and requiring nothing beyond ordinary maintenance.

I have the honor to be, Sir,
Your obedient Servant,

Jno. R. ARNOLDI,
Mechanical Engineer.

F. H. ENNIS, Esq., Secretary,
Department of Public Works.

APPENDIX No. 5.

REPORT OF THE CHIEF ENGINEER.

No. 9254.

DEPARTMENT OF PUBLIC WORKS.
OTTAWA, 4th November, 1881.

SIR, —I have the honor to report on the Harbor works and surveys of the last fiscal year.

I have the honor to be,

Sir,

Your obedient servant,

HENRY F. PERLEY,
Chief Engineer.

F. H. EMMIS, Esq.,
Secretary, Public Works Department.

PRINCE EDWARD ISLAND.

COLVILLE BAY.

Colville Bay is situated about 15 miles from the Eastern Point of Prince Edward Island, and is the eastern terminus of the Government Railway.

The works of raising and strengthening a portion of the breakwater at this place were brought to a conclusion in May last.

ST. PETER'S BAY.

On the north shore of the Island about 43 miles to the westward from East Point.

The contract for raising the breakwater and constructing a beach protection of piles, brush and stone, 800 feet in length, was completed at the close of the year.

WOOD ISLANDS.

In Queen's County, the most southern point of the Island.

The Local Government has constructed a breakwater 2,250 feet in length on the eastern side of the Harbor at a cost of about \$13,000.

In 1878-79 the amount appropriated by Parliament was expended in the construction of a breakwater, 350 feet in length, on the western side of the harbor, and a further amount voted at the last session of Parliament has been expended in extending this work, 124 feet, which was finally completed in September last.

POWNAL.

Pownal, Queen's Co., is situated at the head of Pownal Bay, about 8 miles south east from Charlottetown.

The work done at this locality by the Dredge "Prince Edward" consisted in opening a passage 1,260 feet in length and 56 feet wide from the end of the public

wharf towards the main channel, and a basin on the eastern side of the wharf 90 feet wide and 250 feet in length, the whole having 9 feet of water at low tide.

HILLSBOROUGH RIVER.

Opposite Charlottetown, the Elliot, the York and the Hillsborough Rivers meet and empty through one common channel into Hillsborough Bay.

The Hillsborough empties from the eastward and is navigable to Mount Stewart 15 miles above Charlottetown, but was obstructed by a small shoal off Carr's Point, on which the "Prince Edward" worked between the 11th October and 16th November, removing 12,165 cubic yards of sand and silt.

NINE MILE CREEK.

Nine Mile Creek, Queen's Co., is situated just within the entrance and on the western side of Hillsborough Bay.

Between the 21st August and 11th October 1880, the "Prince Edward" was engaged in opening a passage from deep water in the Bay to the public wharf, to admit the approach of vessels at low tide.

CRAPAUD.

Crapaud, Queen's County, is a small harbor at the mouth of the Brockelsby River to the westward of Hillsborough Bay.

The channel carrying deep water up to the loading wharves at the village was commenced during the fiscal year 1874-75. On 23rd May last, the "Prince Edward" again resumed work in completing it to the wharves, and was so engaged at the close of the fiscal year.

MALPEQUE.

Malpeque is 90 miles from East Point and 40 miles from West Cape on the northern shore of the Island.

The outer end of the breakwater for a length of 100 feet has been strengthened by sheet piling; and a breastwork of piles, brush and stone has been constructed across a low part of the Royalty Sands to prevent the sea from breaking through between the main-land and the breakwater.

TIGNISH.

Tignish, Prince County, is situated near the northern extremity of the Island.

The southern breakwater has been repaired, and its outer end, and the block at the seaward end of the northern breakwater have been sheet-piled.

MIMINIGASH.

Miminigash is situated on the western coast of the Island, 15 miles south-westwardly from North Cape.

The breakwater on the northern side of the "Run" was damaged during a storm.

It has been thoroughly repaired, and the more exposed part sheet-piled.

NOVA SCOTIA.

MAIN-A-DIEU.

Is a small harbor in Cape Breton County, lying inside of Scattarie Island, which is much frequented by coasting vessels as a harbor of refuge.

A breakwater 250 feet in length is now in course of construction, with a view of

improving the shelter and shutting off the heavy ground swell formed during easterly storms.

COW BAY.

Cow Bay is about 30 miles south east of Sydney, C.B.

Very extensive repairs and additions have been made to the breakwater at this place.

Lying as it does in the mouth of the Bay and exposed to easterly storms from the Atlantic, it will, until a beach has fully formed on its seaward side, be exposed to damage, and require constant care and attention to preserve it in a state of usefulness.

LITTLE GLACE BAY.

Little Glace Bay is situated on the eastern coast of Cape Breton, about midway between Low Point and Cape Percy. The harbor is at the mouth of a small stream emptying into the Atlantic, and has been constructed and maintained by the Little Glace Bay Mining Company for the shipment of coal from their mines.

Further work of deepening the entrance to this harbor was prosecuted by the dredge "St. Lawrence" up to the 15th August, 1880.

GABARUS.

Gabarus is a small inlet on the southern side of Gabarus Bay, 10 miles to the westward of Louisburg, C.B.

In 1873 the entrance to this inlet was deepened to permit the passage of fishing boats.

During the past year this inlet has been enlarged and deepened, and further work done on the entrance.

INDIAN ISLANDS BEACH.

These islands are situated on the northern side of East Bay, a branch of the Bras d'Or, Cape Breton.

The two outer or most southern of these islands are joined to each other and the main land by beaches of sand and gravel, the longest of which is a mile in extent, and forms an excellent harbor opening to the eastward.

A passage has been partially opened through this beach for the accommodation of fishing craft seeking shelter or passing to and from the fishing grounds.

PETIT DE GRAT.

Petit de Grat, Ile Madame, Richmond County, C.B., is a passage from the Atlantic separated from St. Peter's Bay on the north by a stony beach.

The amount appropriated has been expended in partially opening a channel through this beach to admit of the passage of boats from Arichat and the southern shore of Ile Madame into fishing grounds in St. Peter's Bay.

PORT HOOD

Is situated on the western coast of Cape Breton, about 23 miles north of the northern entrance of the Gut of Canso, 43 miles south east from East Point, Prince Edward Island, and 23 miles north east from Cape George, Antigonish County, Nova Scotia.

This pier was built by the Local Government prior to 1867. It stands in an exposed position and has suffered severely from storms and the ravages of the *Teredo Nautilus* so much so that it sustained damage during the fall of 1879.

Such repairs have been effected as the amount of the appropriation would permit.

BURYING ISLAND, CANSO HARBOR.

Canso Harbor is at the extreme eastern end of the Province (Main-land) and southward of the entrance to the Gut of Canso.

This harbor from its natural situation has become a *rendez-vous* and harbor of refuge for American and Provincial fishing vessels. Lying off the harbor, and forming in past years a natural protection against south-easterly storms is, or properly was, Burying Island. It was many acres in extent, and in the early history of Acadia was a public burying ground, but year by year the sea gradually washed it away until it had become a source of danger to vessels entering.

The works undertaken by the Department consist in the construction of a breakwater 280 feet in length for the purpose of affording the same protection as the island did when of its original size.

ARISAIG

In Antigonish County, is on the southern shore of the Straits of Northumberland, about 15 miles westwardly from Cape George.

The sum of \$200 has been expended in repairing the breakwater at this place, built many years ago by the Local Government.

MERIGOMISH.

The Harbor of Merigomish is situated about 8 miles to the eastward of Pictou Harbor, and its entrance is between King Head and Merigomish Point.

A pier 150 feet in length at French River was completed in April last.

NEW GLASGOW.

New Glasgow is situated on the East River of Pictou, 8 miles above the Harbor of Pictou.

The dredge "Cape Breton" was employed during August, 1880, and May and June, 1881, in deepening and improving the channel of the river opposite the shipyards above the highway bridge and in front of the town.

PICTOU ISLAND.

This island lies 8 miles north-eastwardly from the entrance to Pictou Harbor.

A portion of the amount appropriated has been expended in placing the pier near the lower end of the island in a state of repair.

RIVER JOHN.

The River John empties into John Bay at the south-eastern corner of Amet Sound, Northumberland Straits, about 12 miles northwardly of the entrance to Pictou Harbor.

The work of opening a channel through the bar at the entrance to the river was in progress on the 1st July, 1880, and was continued by the dredge "Cape Breton" until the 5th of August, up to which date a further quantity of 5,090 cubic yards of fine sand was removed.

TATAMAGOUCHE.

The Tatamagouche River, Colchester County, empties into the south-west corner of Tatamagouche Bay, Straits of Northumberland.

The work done by the "Cape Breton" consisted in opening a channel through the "Flats" up to Patterson's wharf, and in deepening and improving the channel of the Western Branch of the river up to Campbell's Mills.

PARTRIDGE ISLAND RIVER.

In Cumberland County, N.S.

The straightening and improving of the channel of this river was continued up to 30th October last, at which date a further amount of 1,330 cubic yards had been removed from Mullin's Point, and 6,510 cubic yards, from Shannon's Point, making a total of 7,840 cubic yards of mud, sand and saw-dust.

As stated in the report of last year, this work was done by hand and during the periods of low tide.

WINDSOR.

Windsor, Hants County, is situated on the western side of the River Avon, 45 miles N. W. of Halifax.

The removal of a bank of mud in front of the railway wharf was alluded to in the report of last year, and the reasons for its removal therein stated.

The work authorized was brought to a close on the 15th August 1880, and a berth of 150 feet in length for vessels drawing 15 feet of water was completed.

BROOKLYN.

Brooklyn is situated at the head of, and on the eastern side of Liverpool Bay, Queen's County.

Here the Department have constructed a breakwater forming a harbor of refuge, and some temporary repairs were made during the year to the seaward slope.

ANNAPOLIS.

Annapolis is the shire town of Annapolis County and is situated at the head of Annapolis Basin.

The partial removal of a reef of rocks to the southward of the railway wharf, dangerous to vessels entering or leaving at low tide, has been effected with the amount placed at the disposal of the Department.

METEGHAN.

Meteghan Cove, Digby County, is situated on the east coast of St. Mary's Bay, 30 miles north of Yarmouth.

The breakwater at this place was commenced in 1874, and the work done during the past year consisted in the construction of an additional length of 50 feet to the spur at its outer end, thus finally completing the structure.

NEW BRUNSWICK.

BATHURST.

Bathurst Harbor is an extensive and well sheltered basin about 3 miles in length and 2 in width which is nearly all dry at low water, excepting the channels of the Nepisiguit and other streams which unite below the Town of Bathurst forming the main channel.

This channel is obstructed by the "Seal Bar" and "Ballast Bar," and at the entrance to the harbor at a mile outside of Alston Point the "Second Bar" exists.

Much work has been done on these bars by the dredge "Canada" to obtain 12 feet at low water, and between the 28th July and 10th November, 1880, 13,027 cubic yards of sand were removed from the "Seal" and "Ballast" Bars.

GRAND ANSE.

Grand Anse, Gloucester County, is a small bay on the south shore of the Baie des Chaleurs, about half way between Shippegan Sound and Bathurst Harbor.

The sum of \$195.89 was expended in repairing the flooring of the breakwater at this place.

SHIPPEGAN.

Shippegan is situated at the entrance to Baie des Chaleurs in Gloucester County, 70 miles eastwardly from Bathurst. The harbor lies between Shippegan Island and the main-land, and the works constructed some years ago are at the southern entrance.

The appropriation was expended in raising and repairing the dam across the East Gully, which was damaged during the gale of the 21st October, 1879, when the tide rose fully 4 feet above the highest point known, and 2 feet over the top of the dam.

HORSE SHOE SHOAL, MIRAMICHI.

The Horse Shoe Shoal lies directly within the entrance of the Miramichi from the Gulf of St. Lawrence, between Fox and Portage Islands.

It has for many years been a serious obstruction to vessels, and the opening of a channel will give a direct passage with an ample depth of water.

The dredge "St. Lawrence" operated on this shoal from the 30th August until the 30th October, 1880, removing a further quantity of 15,837 cubic yards of material.

It will require the use of this dredge for two full seasons to thoroughly complete this work.

RICHIBUCTO.

Richibucto is 40 miles north of Shediac, on the Straits of Northumberland.

The sand beach at the inner end of the breakwater continuing to wear away under the action of the sea, necessitated the construction of further works for its protection. What has been done will not, however, accomplish the full amount of protection required.

BUCTOUCHE.

The Harbor of Buctouche is at the mouth of the Buctouche River, Kent County.

The dredge "Canada" operated between the 28th May and 30th June last on the bar obstructing the entrance to the harbor to obtain a depth of 16 feet at low water, and up to the last date mentioned had removed 5,445 cubic yards of mussel mud, clay and shells.

POINT DU CHÊNE.

Point du Chêne, Westmorland County, is the terminus of the Intercolonial Railway in New Brunswick on the Gulf of St. Lawrence.

The railway wharf is 1,850 feet in length and was built in 1857-58, and added to in 1871-72. For the protection of the outer end a breakwater was constructed during 1875-76, and a contract has been entered into for an extension of the same for a further length of 600 feet. At the close of the fiscal year the work was well in hand.

SACKVILLE.

In Westmorland County, at the head of the Bay of Fundy, 40 miles from Moncton.

Further works for strengthening a narrow strip of marsh, known as the "Ram Pasture Neck" were completed during the fall of 1880.

These works were necessary to prevent an alteration in the course of the Tantramar River, and the destruction of the present harbor of Sackville, to which there is a branch of the Intercolonial Railway.

ST. JOHN HARBOR.

Some needed repairs were made at the close of 1880 on the breakwater at the entrance to the harbor.

Plans have been prepared for a reconstruction of that part of the work carried away by the great gale of 1878.

OROMOCTO.

The Oromocto Shoals, in the River St. John, 10 miles below Fredericton, are the principal obstruction to the navigation of the river by deep laden vessels during the periods of low water. For many years prior to 1867, the Provincial Government expended large amounts in deepening the channel, and since that date the Dominion has continued the work, but without any permanent results.

During 1878-79 a sheer-dam 1,600 feet in length was constructed for the purpose of confining and deflecting the current over the shoals; and during 1880 a further length of 600 feet of work was placed under contract in continuation of this dam to close the passage between Thatch Island and the main-land. At the close of the fiscal year this work was nearly completed.

RIVER ST. JOHN.

The further improvement of the Tobique at the Red Rapids and the Narrows was proceeded with during the low stage of water in that river.

On the main river the tow-paths were repaired, and some works for deflecting the current executed. Below the Grand Falls a number of boulders were removed from the channel.

QUEBEC.

ETANG DU NORD

Is at the western extremity of Grindstone Island, one of the Magdalen Islands in the Gulf St. Lawrence.

For the protection of vessels and boats engaged in fishing in the Gulf, the construction of a breakwater 450 feet in length was only commenced at the close of the year. This was due to the fact that the timber had to be procured on the main-land during the winter and shipped as soon after the opening of navigation as it was possible to obtain vessels.

NEW CARLISLE.

New Carlisle, the capital town of the County of Bonaventure, is on the northern side of the Baie des Chaleurs.

The construction of a pier at this place was not commenced until the 1st of June, 1881, and consequently only a reference can be made thereto. Delay in the commencement of the work was owing to the non-acquirement of the site.

CARLETON.

In Bonaventure County, is on the north shore of Baie des Chaleurs, 36 miles from Campbellton.

The amount appropriated was expended in the commencement of a landing pier at this place, towards the completion of which the locality offered twenty-five hundred dollars. A further sum was appropriated at the last session of Parliament for this work.

ESCOUMAINS.

In the County of Saguenay, on the north shore of the St. Lawrence, 24 miles from Tadousac and 68 from Murray Bay.

From the channel entrance to the harbor over 200 boulders, varying from 3 to 15 tons in weight, have been removed, and schooners can now enter and leave at half tide with ease and safety.

FISH DAMS, TADOUSAC.

Tadousac, the Capital Town of the County of Saguenay, is situated at the east side of the entrance of the River Saguenay, and is 130 miles below Quebec.

At this point a fish-breeding establishment is in operation, and several dams on the stream in connection therewith were partially raised and repaired.

ANSE ST. JEAN.

On the south-western shore of the River Saguenay, 24 miles from its mouth.

The pier at this place was commenced in 1876 under an appropriation made by the Local Government, which was expended in the construction of a block in 7 feet at low water.

The amount voted by Parliament was expended in completing works necessary for connecting this block with the shore, the total length of the pier now being 366 feet.

ST. ALPHONSE DE BAGOTVILLE.

At the head of Ha! Ha! Bay, on the south-west shore of the River Saguenay, 66 miles from its mouth.

The head of this pier has been strengthened by driving a close row of piling around the outer face and sides. Some few years ago a part of the inshore portion was burned down to low-water mark, and connection with the shore is maintained by a temporary structure which will require to be removed and the work rebuilt.

RIVER SAGUENAY.

During the year, the work of removal of boulders and rock from the channel of the river below Chicoutimi, was carried on when the lowness of the water offered facilities.

The removal of these obstructions has increased the depth of water, thus permitting vessels to reach Chicoutimi earlier in the tide than it was possible to do heretofore.

CHICOUTIMI.

The Town of Chicoutimi is situated on the southern side of the Saguenay River, 75 miles from its mouth, and at the head of navigation.

The head of the pier was lengthened on the up stream side by the construction of a block 40 feet in length, thus adding to the facilities for shipment of freight, and the safety of vessels during the periods of freshets.

RIVER DU LOUP (EN BAS).

108 miles below Quebec, on the south shore of the St. Lawrence.

A further length of 212 feet of this pier was raised during the summer and fall of 1880 and floored and ballasted, leaving a length of 216 feet still to be raised to a height of 3 feet 6 in. to complete the whole of the pier to the new level.

New sheathing and fenders are required and the iron straps on the corners will have to be replaced.

The dredging referred to in the last report was brought to a close on 23rd July, 1880.

RIVER OUELLE.

River Ouelle is 75 miles below Quebec, on the south shore of the St. Lawrence. It having been found that the outer face of the pier at this place had received serious damage by ice during the preceding winter, extensive repairs were made.

The necessity for this was referred to in the report of last year.

CAP À L'AIGLE.

Is situated on the north shore of the River St. Lawrence, in the County of Charlevoix, 3 miles from Murray Bay.

At this place a pier 279 feet in length was commenced under a contract with persons representing the municipality, which had guaranteed the payment of \$3,000 towards the construction of the work. At the close of the fiscal year one half of the undertaking had been completed.

LES EBOULEMENTS.

In the County of Charlevoix, is on the north shore of the St. Lawrence, 69 miles below Quebec.

This pier is one of the number built on the lower St. Lawrence prior to 1867. It was found necessary to effect certain repairs in November last to maintain it during the winter, and against the action of the ice in the spring.

These repairs were finally completed during the present year.

ILE AUX COUDRES.

Is 12 miles from Bay St. Paul on the north shore of the River St. Lawrence, in the County of Charlevoix.

In November last a contract was entered into with a large number of the residents of Ile aux Coudres on behalf of the municipality, which had guaranteed to furnish the sum of \$4,000, to supplement a like amount voted by Parliament, for the construction of a landing pier 163 feet in length, which on 30th June last was about one third completed.

ST. THOMAS, MONTMAGNY.

On the south shore of the St. Lawrence, 30 miles below Quebec.

The amount appropriated was expended in connecting the isolated block on the western side of the basin referred to in the report of last year, with the shore, thus completing the work.

GROSSE ISLE.

Grosse Isle is an island in the River St. Lawrence 29 miles below Quebec and opposite the village of St. Thomas, Montmagny.

The amount appropriated was expended in raising and repairing the eastern landing pier in connection with the Quarantine Station, and in extending it to 10 feet at low water. The work was still in progress at the close of the fiscal year.

STE. FAMILLE.

On the Island of Orleans, 17 miles below Quebec.

During the year, the block built in 1879 was extended a distance of 30 feet to 8½ feet at half tide; in building two blocks shorewards; in raising the portion built in 1879 to the height of the new work; and in the removal of boulders from the river which obstructed the approach to the wharf. A further expenditure will be made to complete the connection of these blocks with the shore.

ST. JEAN D'ORLEANS.

On the Island of Orleans, 20 miles below Quebec.

Owing to the action of ice during the preceding winter, the outer corners and end of this pier received considerable damage.

The necessary repairs by sheathing, fendering &c., were completed in November last.

ST. LAURENT.

On the southern shore of the Island of Orleans, 15 miles below Quebec.

The outer corners of this pier have been sheathed, and fenders and ladders placed on the sides. About 100 feet of the roadway has been renewed.

CHENAL DU MOINE.

This is one of the channels of the River St. Lawrence about 3 miles below Sorel.

Here, in former years great damage has been done during the breaking up of the ice in the spring which has swept over the farms causing much loss of property.

Two piers have been built as an experiment, for the purpose of arresting and breaking up the ice as it flowed on to the land. They were completed in March last, but owing to the low stage of water at the time the St. Lawrence broke up in the spring, the ice passed away by the usual channels.

RIVER RICHELIEU.

The Richelieu empties into the St. Lawrence on its southern side at Sorel, 45 miles below Montreal.

The channel was deepened below the Lock at St. Ours. Obstructions were removed above the Lock. The entrance to the wharves at St. Denis improved, the channel cleared at Belœil, and a depth of 8 feet obtained at low water at the entrance to the Chambly Canal.

BERTHIER (EN HAUT).

On the north shore of the River St. Lawrence, 45 miles N. E. of Montreal, and almost opposite Sorel at the mouth of the Richelieu.

The amount appropriated was expended in deepening to 9 feet below the usual low-water mark over the Vanasse, Church, and Levesque Shoals in the Berthier River, to admit of vessels coming to the wharves at Berthier.

RIVIÈRE L'ASSOMPTION

Is a River in Quebec which discharges above the village of Repentigny, where the united waters of the Rivers Jesus and Des Prairies enter the St. Lawrence.

A dredge in the service of the Department was engaged up to 14th August 1880 in deepening the channel of this river, which is navigable only for vessels of light draught.

BEAUHARNOIS.

The Chief Town of the County of Beauharnois is situated on the southern side of Lake St. Louis, River St. Lawrence, 20 miles above Montreal.

A Departmental dredge worked at this place from the 26th May until the 30th June last deepening to 9 feet at low water in front of the wharves, and in the channel leading thereto from the main river.

THE CEDARS.

A post village in the County of Soulanges, on the northern shore of the St. Lawrence, 30 miles above Montreal.

During the winter of 1880-81 the timber for a landing pier for the convenience of steamers plying on the St. Lawrence, was obtained, but the work of construction was only commenced at the close of the fiscal year.

RIVIÈRE À LA GRAISSE (RIGAUD.)

This river empties into the Ottawa on its southern side, about 15 miles above Vaudreuil.

The dredging of the channel was continued during the months of July, October and November to obtain 6 feet at low water. A large amount of work still remains to be done to complete this depth up to the Village of Rigaud.

RIVIÈRE DU NORD.

This river enters the Ottawa on its northern side at the head of the Lake of Two Mountains.

A number of boulders have been removed from the channel of the river at a point called the Rapids, about half a mile below the Village of St. Andrews, leaving a channel 58 feet wide with $4\frac{1}{2}$ feet at low water.

SALMON RIVER.

This river empties into the Ottawa on its northern side.

Dredging was prosecuted between the 21st September and 21st October 1880, to obtain 6 feet at low water.

ONTARIO.

HAWKESBURY.

Hawkesbury, in the County of Prescott, is on the southern side of the Ottawa.

The dredge "Queen of Canada" was engaged from 29th July to 20th September 1880, in deepening and completing a channel already commenced, from near Grant's Point on the Ottawa to the village wharves, and giving a depth of 6 feet at low water.

GANANOQUE.

Is on the northern shore of the St. Lawrence, 18 miles below Kingston.

A small amount was expended in deepening a portion of the mouth of the Gananoque River, to admit of the entrance of a larger class of vessels for grain freights.

COBourg.

Is situated on Lake Ontario, 72 miles east of Toronto.

An amount having been appropriated, a contract was entered into for the construction of an arm in a south-easterly direction 150 feet in length from the western pier.

At the close of the fiscal year one half of the work had been completed.

TORONTO.

Dredging the western entrance to the harbor was proceeded with from 11th August until the 24th November, 1880, at which time 27,023 cubic yards of sand and clay had been removed.

Prior to resuming the work in May last, it was found that the entrance had narrowed by the extension, during the winter, of the shoal from Hanlan's Point northward, and the dredge was engaged in the removal of the material deposited, and in further widening the entrance, and at the close of the fiscal year had removed 17,600 cubic yards, making a total of 44,623 cubic yards.

RONDEAU.

A harbor of refuge on Lake Erie, 140 miles west of Port Colborne the southern entrance of the Welland Canal.

Breaches having been made through the sand beach on the western side of the entrance to the harbor, a contract was entered into with Messrs. F. B. McNamee &

Co. for the construction of 2,000 feet of pile protection work, and at the close of the year one third of the work had been executed.

PORT ALBERT.

Port Albert is situated on the eastern shore of Lake Huron, about 9 miles north of Goderich and at the mouth of Nine Mile Creek, where a small pier has been constructed at the joint cost of the Municipality and the Dominion.

For the extension of the basin for shipping purposes, a row of close piling 300 feet in length has been driven from the eastern corner of the pier eastwardly, and a basin with 10 feet water has been formed by the removal of 18,706 cubic yards of material by the Departmental dredge "Challenge."

KINCARDINE.

The harbor of Kincardine is an artificial basin formed at the mouth of the River Penetangore, 31 miles to the northward of Goderich.

Under a contract existing with Messrs. Conlon & Canan, the entrance to the harbor, which had become reduced in depth by *detritus* brought in from Lake Huron, was restored to its normal depth, and the contract terminated.

INVERHURON.

Inverhuron is on Lake Huron, 7 miles north of Kincardine.

A small amount was expended in renewing 300 feet of the covering of the pier at this place, and replacing 200 feet of the waling, which had been destroyed by wear and tear.

BIG BAY.

Big Bay is situated on Georgian Bay, in the Township of Keppel, about 15 miles north of Owen Sound Harbor.

During the year the sum of \$1,121.41 was expended in extending the pier a distance of 117 feet into 11½ feet of water, of which amount the appropriation of \$500 formed a part, the balance having been provided by the municipal authorities of the Township of North Keppel.

OWEN SOUND.

The harbor of Owen Sound has been formed in the mouth of the River Sydenham, which empties into the head of Owen Sound, an arm of Georgian Bay on its western side.

The improvements undertaken at this harbor consist of the construction of two parallel rows of pile work, 200 feet apart, extending from the shore a distance of 600 feet, together with about 1000 feet of bank protection, and the dredging of the channel of the River Sydenham from the upper end of the steamboat wharf to its mouth, and from thence to 14 feet at low water, a total distance of 5,000 feet.

Towards the construction of these works, the Town of Owen Sound has contributed the sum of \$13,000, and at the close of the fiscal year one third of the work had been completed.

MEAFORD

Is situated on Georgian Bay, 18 miles to the westward of Collingwood and 20 to the eastward of Owen Sound. The harbor is formed by breakwaters extending from the shore, that on the western side having an arm 200 feet in length turned in an easterly direction.

During the summer of 1880, the Local Authorities, for the enlargement of the harbor, close-piled the western side of an inner basin over which there was but a

small depth of water. On the 1st July 1880 the dredge "Challenge" commenced the deepening of this basin to 11 feet, and continued until the 4th of October, having removed 39,022 cubic yards of clay and gravel, and a large number of boulders.

COLLINGWOOD.

Collingwood Harbor is situated on Nottawasaga Bay on the southern shore of Georgian Bay, and is the terminus of the Northern, Hamilton and North Western Railway.

The necessity for deepening the entrance to this harbor to 14 feet has been stated in the Departmental Report for 1878-79, at page 37 of the Appendix.

The work done up to the close of the fiscal year was towards the completion of the channel referred to therein, and amounted to the removal, by the use of a dredge alone, of 22,790 cubic yards of hard pan, clay and boulders, at an average cost of 43 cents per cubic yard.

LITTLE CURRENT.

Little Current is the passage between Cloche and Great Manitoulin Islands, about 140 miles from Collingwood, and is on the direct route from Collingwood to Sault Ste. Marie.

Owing to the existence of a rocky ledge, the navigable channel was much narrowed and intricate of navigation, so much so that deeply laden vessels were obliged to make the outside passage through Lake Huron, which in the fall of the year is attended with danger.

The amount appropriated has been expended in the improvement of this channel by the removal of boulders and the ledge itself, with explosives, which has given a certain measure of relief, but a further amount is necessary to complete the works undertaken.

DES JOACHIMS BRIDGE.

This proposed bridge will cross the River Ottawa, at the Des Joachims Rapids, between the Counties of Pontiac, Quebec, and North Renfrew, Ontario.

At the close of the fiscal year its construction had not been commenced, owing to a delay in the approval of the plans by the Government of Ontario.

SURVEYS AND EXAMINATIONS.

During the year, surveys and examinations were made at the undermentioned localities, and with a few exceptions, plans, reports and estimates have been forwarded.

Cascumpec Harbor,	Prince Co.,	P. E. I.
Summerside,	do	do
West Cape,	do	do
French River,	Queen's Co.,	do
Rustico Harbor,	do	do
Ile Madame,	Richmond Co.,	N.S.
Petit de Grat,	do	do
Great Village River,	Colchester Co.,	do
Windsor,	Hants Co.,	do
Cape St. Mary,	Digby Co.,	do
Petite Rivière,	Lunenburg Co.,	do
Port Medway Islands,	do	do
Port Mouton,	Queen's Co.,	do
Coffin's Island,	do	do
Eagle Head,	do	do
Jones Harbor,	Shelburne Co.,	do
Jordan River,	do	do

Louis Head Harbor,	Shelburne Co.,	N. S.
Port L'Hebert	do	do
Cocagne,	Kent Co.,	N.B.
Charlo,	Restigouche Co.,	do
Fort Dufferin,	St. John Harbor,	do
Quaco,	St. John Co.,	do
St. Andrews,	Charlotte Co.,	do
Anse du Portage,	Saguenay Co.,	Quebec.
L'Anse à l'Eau,	do	do
Lake St. John,	Chicoutimi Co.,	do
Matane,	Rimouski Co.,	do
Baie St. Paul,	Charlevoix Co.,	do
Cap à l'Aigle,	do	do
Isle aux Coudres,	do	do
Les Ecureuils,	Portneuf Co.,	do
St. Pierre les Bocquets,	Nicolet Co.,	do
St. Ours,	Richelieu Co.,	do
St. Denis,	St. Hyacinthe Co.,	do
St. Hilaire,	Rouville Co.,	do
Missisquoi Bay,	Missisquoi Co.,	do
River Yamaska,	do	do
River St. Francis,	do	do
River St. Louis,	Beauharnois Co.,	do
Cedars,	Soulanges Co.,	do
St. Zotique,	do	do
Lake Temiscamingue,	River Ottawa,	do
Des Joachims Br'dge,	do	do
Portsmouth Harbor,	Frontenac Co.,	Ontario.
Belleville,	Hastings Co.,	do
River Moira,	do	do
Presqu'île to Bay of Quinté,	Prince Ed. Co.,	do
Whitby,	Ontario Co.,	do
Pigeon Bay,	Essex Co.,	do
Pelee Island,	do	do
River Thames,	do	do
Point Edward,	River St. Clair, Lambton Co.,	do
Goderich,	Huron Co.,	do
Kincaidine,	Bruce Co.,	do
Southampton,	do	do
Warton,	do	do
Meaford,	Grey Co.,	do
Collingwood,	Simcoe Co.,	do
Little Current,	Algoma Co.,	do
Neebish Rapids,	do	do
River Kaminstiquia,	do	do
Prince Arthur's Landing,	do	do
Courtenay River,	do	B. C.

DREDGING.

The "St. Lawrence."

On 1st July, 1880, this dredge was operating at Little Glace Bay, Cape Breton deepening and improving the entrance to the harbor, continuing there until 15th August, at which date 10,587 cubic yards of clay, mud, stone, &c., had been removed, making a total of 13,387 cubic yards.

On 30th August, work was resumed on the channel through the Horse Shoe

Shoal, at the entrance to the Miramichi, N.B., and carried on until 30th October, resulting in the removal of 15,838 cubic yards of sand, clay and stone.

Work on the East River, Pictou, N.S., began on the 9th November, and closed on the 25th when the weather had become unfit for work. The material removed amounted to 4,900 cubic yards.

This dredge was placed on the slip at Pictou for general repairs. The hull was strengthened by placing a heavy belting of timber and angle irons around it, the engine and boiler, and machinery were thoroughly over-hauled and placed in working order.

On 3rd May last, the dredge was taken off the slip, and proceeded to the Horse Shoe Shoal, arriving on the 18th, but owing to stormy weather, was unable to commence work until the 26th, continuing until the 30th June, having removed up to that time 10,005 cubic yards of sand, clay and stone.

The total amount dredged during the year amounts to 41,330 cubic yards.

For work done during the previous year for private dredging, and mentioned in the last report (App. p. 28,) the sum of \$325.00 was received and placed to the credit of the Receiver General.

The "Canada."

At the commencement of the year this dredge was engaged at River du Loup (*en bas*), Quebec, in deepening along the western front of the wharf, and remained until the 22nd July, removing 2,318 cubic yards of mud, clay and stone, and a total of 2,588 cubic yards.

On 28th July, work was resumed on the Seal and Ballast bars, Bathurst Harbor, N.B., and continued until 10th November, removing 13,027 cubic yards of sand.

A riving in the harbor of Pictou, N. S., on the 16th November, work was commenced at the Intercolonial Railway wharf, Pictou Landing, and carried on until the 24th, 450 cubic yards of sand and mud having been removed.

This dredge was laid up in Pictou Harbor during the winter, and the repairs found to be necessary to the vessel and machinery were executed.

On 26th April last, the season's work was commenced at the coaling wharves, Middle River, Pictou, and continued until 20th May, removing 3,330 cubic yards of mud, stone, and gravel.

Arriving at Buctouche, Kent County, N. B., work was commenced on the bar obstructing the entrance to that harbor on the 28th May, and up to the close of the year, 5,445 cubic yards of mussel mud, clay and shells, were removed.

During the year this dredge removed a total of 24,570 cubic yards of materials of various kinds.

The "New Dominion."

This dredge was not placed in commission during the fiscal year. The machinery is in fair order, a new hull is needed, as the present one from age and decay is unsafe for use.

The "Cape Breton."

This dredge was engaged on the bar at the entrance to the River John, Pictou County, N.S., at the commencement of the year, and remained there until the 5th August, up to which date 5,090 cubic yards of fine sand had been removed.

On the 12th August, work was commenced at New Glasgow, Pictou County, N.S., in deepening the channel of the East River, opposite the ship yards above the highway bridge, and on the 27th it was completed, 5,345 cubic yards of sand and gravel having been removed.

Arriving at Tatamagouche, Colchester County, N.S., the work of improving and deepening the river was commenced on the 1st of September, and continued until the 15th November, when work for the season ceased, and the dredge and scows were removed to winter quarters in River John. The work done at Tatamagouche consisted in opening a channel through the flats up to Patterson's wharf, and in deepening and improving the channel of the western branch of the river up to Campbell's Mills, removing 17,130 cubic yards of mud, sand and gravel.

During the winter repairs were executed on the dredge and scows.

On the 23rd May, 1881, this dredge was taken to New Glasgow, and resumed the work of improving the channel of the East River, and up to the 30th June, had removed a further quantity of gravel amounting to 15,555 cubic yards.

The total number of cubic yards of material removed during the year amounts to 43,120 cubic yards.

Two of the scows attached to this dredge are unfit for work and not worth repairing.

The " Prince Edward."

On the 1st July 1880, this dredge was working at Pownal, Queen's County, P.E.I., in opening a passage for vessels from the main channel to the public wharf, and remained until it was completed on the 14th August, when a further quantity of 11,430 cubic yards of clay and mud had been removed, making a total at this place of 23,610 cubic yards.

From Pownal, this dredge was removed to Nine Mile Creek in the same County, where the work of opening a passage from deep water to the public wharf was commenced on the 21st August, and continued until the 11th October, 9,750 cubic yards of clay, gravel and stone having been removed.

At the last mentioned date the plant was taken to Carr's Point, on the Hillsborough River and placed at work improving the channel at that place, removing up to the 16th November, 12,165 cubic yards of sand and silt. Up to the 20th, 750 cubic yards of mud, sand and silt were removed from the river opposite Hickey's wharf, and as at that date the river closed, the dredge and scows were frozen in, and remained there until the 12th of May last.

On the 23rd May, work was resumed at Crapaud, Queen's County, and continued until the 30th June, at which time 12,240 cubic yards of sand, mud, and sandstone in ledge, had been removed, making a total of 46,355 cubic yards during the year.

The " George McKenzie."

At the commencement of the year this dredge was working under an engagement with the Assignee of the contractor for the enlargement of the St. Peter's Canal, Cape Breton, and continued until the 2nd December, when the whole of the dredging was completed, and a further quantity of 23,562 cubic yards of very tough clay, mud, stones and boulders were removed.

At the last mentioned date this dredge and scows were taken to Port Hawkesbury in the Straits of Canso, and placed on the slip at that place, on which they remained during winter, and received necessary repairs.

On the 23rd May, the plant was towed to Ragged Pond, Guysboro County, N.S., and on arrival it was found that, owing to the great changes in the channel which had taken place during the preceding winter and spring, it would be useless to attempt making any improvement—orders were therefore given to proceed to Mabou, Inverness County, Cape Breton, where work was commenced on the 2nd June, in opening a channel to 14 feet through the shoal off the entrance to the harbor, and at the close of the year, having experienced much unfavorable weather, only 1,168 cubic yards of clay, stone and sand were removed.

The total quantity of work done by this dredge during the year amounts to 24,730 cubic yards.

The sum of \$13,778.23 was received from Mr. J. T. Kennedy, assignee, for the use of this dredge and scows, and for tug service at the St. Peter's Canal.

Dredge " No. 1."

The use of this dredge and scows was obtained from the Department of Railways and Canals, and on the 1st July 1880, they were employed in deepening through shoals in the River l'Assomption, L'Assomption County, Quebec, to 6 feet at low water

and continued to the 14th August, having removed up to that date 11,720 cubic yards of clay and sand.

Between the 16th August, and 3rd September, this dredge was engaged in deepening to 6 feet at low water, the approaches from the main channel of the River Richelieu to the wharves at St. Denis.

From the 4th to the 15th September, the work of removing obstructions in the channel of the Richelieu, at Belœil Bridge, amounting to 1,060 cubic yards was accomplished.

The completion of the work at St. Denis, occupied from the 16th September until the 6th October, at which time a total of 13,180 cubic yards of clay and stones had been removed.

From the 7th to the 30th October, the lower entrance to St. Ours lock was deepened to 9 feet at low water, and an obstruction above the upper entrance removed, the total dredging amounting to 5,240 cubic yards of clay and earth.

The entrance to the Chambly Canal was deepened between the 1st and 20th November, to 8 feet at low water by the removal of 3,140 cubic yards of clay and sand.

The total quantity dredged during the season amounts to 34,340 cubic yards. This dredge has been handed back to the Department of Railways and Canals.

“ The Queen of Canada.”

At the commencement of the fiscal year this dredge was engaged in deepening the channel of the Rivière à la Graisse, Rigaud, Quebec, and remained until the 20th of July, when it was taken to deepen the entrance to Calumet Bay, on the northern side of the Ottawa, to 6 feet at low water to permit the entrance of the steamer plying to Hawkesbury in connection with the Q. M. O. & O. Railway. This work was completed on the 28th July, by the removal of 1,375 cubic yards of clay.

Between the 29th July and 20th September, the deepening and completing to 6 feet at low water of a channel already commenced from near Grant's Point on the Ottawa, to the village of Hawkesbury, Ontario, was carried on, and 13,800 cubic yards of clay, sand and stones removed.

From the 21st September to the 21st October dredging to the extent of 7,775 cubic yards of clay and sand was prosecuted at Salmon River a small branch of the Ottawa, emptying from the northern side, to obtain 6 feet at low water.

Work on the Rivière à la Graisse was resumed on the 25th October and continued until the 6th November, up to which date 4,575 cubic yards of clay and stone had been removed during the year.

This dredge and scows were wintered in Tate's Dry Dock, Montreal, where they received thorough repair.

The work of the season of 1881 commenced on the 26th May at Beauharnois, Quebec, in dredging to 9 feet at low water, deepening in front of the wharves, and also the channel leading thereto from the main river. This work was in progress on the 30th June last, up to which date 6,260 cubic yards of clay had been removed.

The total work of this dredge during the year amounts to 33,785 cubic yards.

The “ Nipissing.”

This dredge with the tug, “ Dennis,” and two large dump scows were purchased in July, 1880, and after being put in working order, was placed at Berthier *en haut* on the 1st August, following, to open a channel to 9 feet at low water through the Vanasse, Church, and Levesque Shoals which exist in one of the channels of the St. Lawrence, called the Berthier river. Work ceased on the 10th of November, when the plant was taken to Montreal, and wintered in Tate's Dry Dock. On the 2nd June, 1881, work was resumed at Berthier and continued until the close of the fiscal year, the quantity removed to that time being 21,524 cubic yards of clay, and a very fine description of sand which was found to be very difficult to retain in the scows.

The "Challenge."

On the 1st July, 1880, this dredge and its attendant tug "Trudeau" and scows were at Meaford, Georgian Bay, and continued there until the 4th October, in opening an inner basin to 11 feet at low water for the protection of which the municipality had defrayed the cost.

The materials removed were clay, gravel, and a large quantity of boulders, amounting in the whole to 39,022 cubic yards.

This dredge and plant wintered at Sarnia and was taken on the 9th of May last to Goderich for work at Port Albert, but owing to the want of shelter at that place and the prevalence of stormy weather, work was not commenced until the 18th, and continued up to the 30th June ult. in opening up the head of the harbor to 10 feet at low water, and placing a portion of the dredged materials behind the close pile work constructed by the Department. The quantity dredged amounted to 18,706 cubic yards, and consisted of clay, gravel and sand.

DREDGING PLANT.

The dredging plant belonging to the Department is as follows.

IN THE MARITIME PROVINCES.

The steam hopper dredge	—	"St. Lawrence."	
"	"	"Canada."	
The dipper dredge	—	"New Dominion,"	and 10 scows.
"	"	"Cape Breton,"	7 "
"	"	"Prince Edward,"	3 "
"	"	"George McKenzie,"	3 "

IN QUEBEC.

The dipper dredge "Queen of Canada," 2 scows and 1 stone-lifter.

" " "Nipissing" and 2 scows.

The steam tug "Dennis."

IN ONTARIO.

The dipper dredge "Challenge" and 3 scows.

The steam tug "Trudeau."

IN BRITISH COLUMBIA.

An elevator dredge and 4 scows.

The steam tug "Georgia."

With reference to this plant it may be stated that, with the exception of the "New Dominion" and a few scows, it is in good order and condition. The state of the hull of the "New Dominion" has been previously referred to. One of the scows attached to the "Prince Edward" was condemned during the year and sold at public auction.

Two of the scows with the "Cape Breton" have become useless and should be broken up, and the iron work used in the construction of new ones, which are much needed.

A scow attached to the "Challenge" should be condemned and replaced by another. Repairs will be required to the hull and machinery of the tug "Trudeau."

CLASSIFICATION of Disbursements of the following Dredges during the Year ended 30th June, 1881.

"ST. LAWRENCE."

Items.	July.	August.	September.	October.	November.	December.	Jan.	Feb.	March.	April.	May.	June.	Grand Totals.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Wages.....	521 15	502 74	509 33	519 33	610 37	509 33	286 33	325 52	370 16	420 77	499 12	639 20	5,613 35
Coal.....	.....	235 10	.....	642 25	88 00	84 07	.....	.....	.....	.....	.....	.....	1,049 42
Water.....	.....	.....	.....	8 00	.....	3 70	.....	.....	.....	.....	.....	.....	11 70
Provisions.....	.....	198 27	155 61	69 67	156 96	22 62	.....	.....	.....	.....	.....	45 29	648 42
Stores.....	18 16	76 12	.....	0 60	58 02	.....	.....	.....	.....	5 90	.....	.....	168 80
Repairs.....	82 00	92 75	130 00	.....	.....	.....	5 00	.....	.....	.....	95 00	.....	828 93
Pilotage.....	3 19	4 24	.....	130 00	77 00	.....	.....	.....	.....	.....	.....	.....	606 75
Contingencies.....	.....	.....	.....	13 55	13 00	3 23	7 25	.....	5 65	14 54	.....	.....	64 65
Totals	624 50	1,109 22	794 94	1,383 40	903 35	622 95	298 58	325 52	375 81	441 21	594 12	1,508 42	8,982 02
Working expenses.....	624 50	1,109 22	794 94	1,383 40	903 35	622 95	7 25	.....	.....	.....	594 12	684 49	6,101 27
Repairs, ordinary.....	.....	.....	.....	.....	.....	.....	291 33	325 52	375 81	441 21	.....	823 93	2,880 75
Totals	624 50	1,109 22	794 94	1,383 40	903 35	622 95	298 58	325 52	375 81	441 21	594 12	1,508 42	8,982 02

Wages.....	483 70	973 81	398 00	398 00	213 00	178 00	190 50	200 47	455 50	468 00	3,060 64
Coal.....	185 60	154 00	489 27	489 27	33 00	96 00	.....	.....	.....	78 00	1,088 87
Provisions.....	.....	48 73	185 95	185 95	95 03	29 31	.....	9 80	.....	70 56	505 60
Stores.....	.....	32 30	31 27	43 69	47 65	.....	.....	.....	.....	25 84	180 45
Equipment.....	.....	.....	.....	.....	85 00	.....	.....	.....	.....	.....	85 00
Repairs.....	.....	.....	62 50	.....	95 50	4 70	.....	.....	.....	559 46	564 16
Pilotage.....	159 07	67 50	.....	.....	.....	.....	.....	.....	.....	.....	449 57
Contingencies.....	31 21	.....	5 53	.....	12 53	.....	.....	.....	.....	.....	49 27
Totals.....	869 58	676 04	1,116 99	527 55	682 31	327 31	190 50	300 27	455 50	1,187 85	6,790 60
Working expenses.....	869 58	676 04	1,116 99	527 55	682 31	327 31	190 50	300 27	455 50	628 39	5,052 36
Repairs, ordinary.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	559 46	1,738 24
Totals.....	869 58	676 04	1,116 99	527 55	682 31	327 31	190 50	300 27	455 50	1,187 85	6,790 60

" NEW DOMINION."

Wages.....	25 00	25 00	25 00	25 00	25 00	25 00	25 00	25 00	25 00	25 00	80 00	777 84
Repairs, ordinary, & wintering.....	25 00	25 00	25 00	25 00	25 00	25 00	25 00	25 00	25 00	25 00	80 00	777 84
Totals.....	25 00	25 00	25 00	25 00	25 00	25 00	25 00	25 00	25 00	25 00	80 00	777 84

" CAPE BRETON."

Wages.....	484 60	474 48	589 75	650 15	584 95	165 08	147 10	145 00	234 37	552 13	4,315 11
Coal.....	.....	66 00	.....	11 00	5 50	5 25	.....	.....	.....	.....	87 75
Water.....	88 50	48 80	43 50	39 00	25 50	.....	.....	.....	.....	.....	245 30
Stores.....	2 10	117 16	5 25	3 50	97 83	27 92	.....	.....	.....	.....	263 76
Repairs.....	0 60	.....	.....	.....	.....	.....	.....	.....	.....	970 92	971 52
Towage.....	679 00	830 00	75 00	.....	200 00	.....	.....	.....	.....	160 00	1,884 00
Contingencies.....	.....	.....	.....	.....	10 00	10 10	.....	.....	.....	.....	20 10
Totals.....	1,154 80	1,536 44	713 50	703 65	923 78	208 35	147 10	145 00	234 37	1 673 05	7,727 54
Working expenses.....	1,154 80	1,536 44	713 50	703 65	923 78	208 35	147 10	145 00	234 37	702 13	6,708 65
Repairs, ordinary.....	.....	.....	.....	.....	200 00	208 35	147 10	145 00	.....	970 92	1,968 89
Totals.....	1,154 80	1,536 44	713 50	703 65	923 78	208 35	147 10	145 00	234 37	1,673 05	7,727 54

* Not in commission. Expenditure in June for repairs for working, 1881-82.

HAND DREDGING AT WINDSOR, N.S.

Contingencies.....	1,150 17	884 50	1,155 52	820 96	708 06	1,145 00	165 00	140 00	147 50	140 00	310 32	2,401 01	27 50
Totals	1,133 35	884 50	1,070 07	800 50	627 30	837 50	.....	.....	.....	.....	310 32	884 00	9,101 04
Working expenses...	10 82	.....	76 85	11 46	78 76	307 50	155 00	140 00	147 50	145 00	.....	1,515 91	6,508 14
Repairs, ordinary	1,150 17	884 50	1,155 52	820 96	708 06	1,145 00	155 00	140 00	147 50	145 00	310 32	2,401 91	2,593 40
Totals .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9,161 94

Wages.....	535 25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	535 25
Towage.....	25 00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	25 00
Totals	560 25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	560 25
Working expenses...	560 25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	560 25
Totals	560 25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	560 25

"No. 1."*

Wages.....	395 25	368 75	413 75	297 00	.....	.....	.....	.....	.....	.....	.....	.....	1,943 50
Wood.....	7 50	.....	9 75	89 25	.....	.....	.....	.....	.....	.....	.....	.....	76 50
Stores	29 21	8 15	9 85	3 90	9 62	.....	.....	.....	.....	.....	.....	.....	60 83
Equipment.....	6 50	13 67	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20 17
Repairs.....	19 78	3 15	28 70	37 65	68 29	.....	.....	.....	.....	.....	.....	.....	157 57
Photage.....	.....	6 00	3 00	.....	.....	.....	.....	.....	.....	.....	.....	.....	9 00
Towage.....	30 00	302 00	903 00	150 00	.....	.....	.....	.....	.....	.....	.....	.....	1,355 00
Contingencies.....	.....	128 50	5 23	14 70	5 00	.....	.....	.....	.....	.....	.....	.....	183 45
Totals.....	488 24	830 22	1,415 65	482 75	589 16	.....	.....	.....	.....	.....	.....	.....	3,806 02
Working expenses...	468 46	827 07	1,388 95	415 10	520 87	.....	.....	.....	.....	.....	.....	.....	3,648 45
Repairs, ordinary	19 78	3 15	28 70	37 65	68 29	.....	.....	.....	.....	.....	.....	.....	157 57
Totals.....	488 24	830 22	1,415 65	482 75	589 16	.....	.....	.....	.....	.....	.....	.....	3,806 02

* This dredge and plant belongs to the Department of Railways and Canals, and was only loaned for the foregoing period.

CLASSIFICATION of Disbursements of the following Dredges, during the Year ended 30th June, 1881.

"QUEEN OF CANADA."

Items.	July.	August.	September.	October.	November.	Dec.	Jan.	Feb.	March.	April.	May.	June.	Grand Totals.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Wages.....	534 50	598 50	483 83	517 46	218 16					148 00	305 45	579 00	3,384 90
Coal.....	18 75	40 60	58 88	57 00	35 83						132 18		132 18
Wood.....	49 45	27 60	9 99		6 97						71 25	20 46	211 06
Stores.....	14 20	21 50		30 00							129 40		158 12
Equipment.....	61 00		15 00	12 29	44 50						1,442 33	15 95	187 00
Repairs.....					134 00						125 00		1,550 77
Towage.....													255 00
Wharfage.....													125 00
Contingencies.....	33 22		3 00		6 30						39 67		81 19
Totals.....	710 12	698 20	567 70	664 75	445 76					148 00	2,245 28	615 41	6,085 22
Working expenses.....	695 92	666 70	567 70	652 46	401 26					148 00	802 95	599 46	4,534 45
Repairs, ordinary.....	14 20	21 50		12 29	44 50							15 95	108 44
" extraordinary.....											1,442 33		1,442 33
Totals.....	710 12	698 20	567 70	664 75	445 76					148 00	2,245 28	615 41	6,085 22

"NIPISING."

Wages	641 59	434 10	408 11	414 00	275 68	.....	.....	.....	.....	202 05	382 24	410 93	3,168 70
Coal	35 00	345 43	273 00	203 13	62 26	.....	.....	.....	.....	.....	775 63	.....	1,694 45
Stores	80 47	2 18	13 01	8 95	47 88	.....	.....	.....	.....	.....	96 31	4 35	283 15
Equipment	350 60	5 50	.....	65 66	.....	.....	.....	.....	.....	.....	.....	.....	477 14
Repairs	1,357 43	16 10	21 25	6 80	36 50	.....	.....	.....	.....	.....	2,071 86	9 95	3,519 89
Pilotage	20 00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	200 00
Towage	100 00	.....	.....	.....	100 00	.....	.....	.....	.....	.....	.....	.....	200 00
Wharfrage .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	150 00	.....	150 00
Contingencies	162 55	40 00	6 50	12 25	4 15	.....	.....	.....	.....	.....	.....	6 75	232 20
Totals	2,747 64	843 31	721 87	710 79	526 47	.....	.....	.....	.....	202 05	3,531 42	431 98	9,715 53
Working expenses...	1,039 61	837 81	721 87	703 99	489 97	.....	.....	.....	.....	202 05	1,459 56	422 03	5,876 89
Repairs, ordinary .....	.....	5 50	.....	6 80	36 50	.....	.....	.....	.....	.....	.....	.....	98 75
" extraordinary	1,708 03	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,071 86	.....	3,779 89
Totals	2,747 64	843 31	721 87	710 79	526 47	.....	.....	.....	.....	202 05	3,531 42	431 98	9,715 53

"CHALLENGE."

Wages	331 00	331 00	328 73	260 57	40 00	40 00	40 00	40 00	40 00	40 00	40 00	40 00	2,232 79
Coal .....	.....	.....	.....	74 00	.....	.....	.....	.....	.....	.....	.....	.....	110 50
Wood	60 75	80 99	86 62	.....	.....	.....	.....	.....	.....	.....	.....	.....	417 36
Provisions	109 98	104 62	99 37	68 63	.....	.....	.....	.....	.....	.....	50 00	105 84	568 29
Stores	59 04	.....	22 64	.....	.....	.....	.....	.....	.....	.....	79 85	61 91	243 01
Equipment .....	.....	.....	16 43	.....	.....	.....	.....	.....	.....	.....	.....	.....	113 79
Repairs	150 30	11 65	31 59	10 78	.....	.....	.....	.....	.....	.....	11 63	.....	703 90
Towage .....	.....	.....	.....	750 00	.....	.....	.....	.....	.....	.....	.....	.....	911 00
Wharfrage .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	150 00	.....	30 00
Contingencies	50 90	.....	122 94	31 23	.....	.....	.....	.....	.....	.....	.....	.....	230 52
Totals	761 97	528 26	708 32	1,195 21	40 00	53 50	40 00	40 00	40 00	844 89	605 90	655 71	5,560 49
Working expenses...	611 67	576 61	676 73	1,841 43	40 00	53 50	40 00	40 00	40 00	360 93	605 90	640 09	4,856 59
Repairs, ordinary	150 30	11 65	31 59	10 78	.....	.....	.....	.....	.....	.....	.....	.....	219 94
" extraordinary .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	483 96	.....	.....	483 96
Totals	761 97	528 26	708 32	1,195 21	40 00	53 50	40 00	40 00	40 00	844 89	605 90	655 71	5,560 49

CLASSIFICATION and Quantities of Material removed by the following Dredges during the Year ended 30th June, 1881.

" ST. LAWRENCE."

Description of Material Dredged.	July.	August.	September	October.	November.	Dec.	Jan.	Feb.	March.	April.	May.	June.	Grand Totals.
Clay and stone.....	3,894	2,870	7,787½	7,700	4,900						2,888½	7,116½	6,694
Sand, ordinary.....	3,593½	350											25,842½
Mud.....			7,787½	7,700	4,900								8,793½
Totals.....	7,787½	3,150	7,787½	7,700	4,900						2,888½	7,116½	41,330

cubic yds.

" CANADA."

Gravel.....													990
Clay.....											986	1,845	1,845
Clay and stone.....	787½												787½
Sand, ordinary.....	4,027½	4,027½	3,690	4,050	810					720			12,577½
Mud.....	1,980				450						2,430	2,790	8,370
Totals.....	2,767½	4,027½	3,690	4,050	1,260					720	3,420	4,635	24,570

" CAPE BRETON."

Gravel.....					180								18,865
Sand, ordinary.....		3,130			280						2,015	13,540	280
Sand, very fine.....	4,470	2,835											7,305
Mud.....			7,060	6,840	2,770								16,670
Totals.....	4,470	5,965	7,060	6,840	3,230						2,015	13,540	43,120

[CLASSIFICATION and Quantities of Material removed by the following Dredges, during the Year ended 30th June, 1881.

"No. 1."

Description of Material Dredged.	July.	August.	September.	October.	November.	Dec.	Jan.	Feb.	March.	April.	May.	June.	Grand Totals.
Boulders	3,010	740	920	4,260	1,820								920
Clay	5,160	5,700	1,660	4,260	600								11,490
Clay and stone	2,070	740	4,320	2,620									15,780
Sand, ordinary													5,430
Sand, very fine					720								720
Totals.....	10,240	7,180	6,900	6,880	3,140								34,340

"QUEEN OF CANADA."

Description of Material Dredged.	July.	August.	September.	October.	November.	Dec.	Jan.	Feb.	March.	April.	May.	June.	Grand Totals.
Boulders	350		650	375	275								1,650
Gravel	5,437	3,125	3,600	1,025									1,025
Clay		275	1,700	3,825							770	4,745	21,502
Clay and stone		5,600		800								745	2,720
Sand, ordinary													6,888
Totals	6,275	9,000	5,950	6,025	275						770	5,490	33,785

Cubic Yds.

"NIPISSING."

Description of Material Dredged.	July.	August.	September.	October.	November.	Dec.	Jan.	Feb.	March.	April.	May.	June.	Grand Totals.
Clay		5,983	5,624	1,575	1,050								13,162
Sand, very fine				3,000								4,312	8,362
Totals.....		5,983	5,624	4,575	1,050							4,312	21,524

DETAILS of Dredging in the Maritime Provinces, and at Rivièr

Dredge.	Locality.	County.	NEW BRUNSWICK.		
			Quantity.	Cost.	Total Cost.
"New Dominion"	Not in commission		cub. yds.	\$ cts.	\$ cts.
"Canada"	Rivière du Loup	Temiscouata, Que.			
	Bathurst	Gloucester, N.B.	13,027	3,898 05	
	Buctouche	Kent, N.B.	5,445	1,629 24	
	Railway Wharf	Pictou, N.S.			
	Coal Wharves	do			5,527 29
"Cape Breton"	River John	Pictou, N.S.			
	New Glasgow	do			
	Tatamagouche	Colchester, N.S.			
"Prince Edward"	Pownal	Queen's, P.E.I.			
	Nine Mile Creek	do			
	Hillsborough River	do			
	Crapaud	do			
"St. Lawrence"	Horse Shoe Shoal	North'berland, N.B.	25,843	6,080 72	
	Little Glace Bay	Cape Breton, N.S.			
	East River	Pictou, N.S.			6,080 72
"Geo. McKenzie"	St. Peter's Canal	Richmond, N.S.			
	Mabou	Inverness, N.S.			
By hand	Windsor	Hants, N.S.			
			44,315		11,608 01

Dredge.	NEW BRUNSWICK.		NOVA SCOTIA.		P. E. ISLAND.	
	Quantity.	Cost.	Quantity.	Cost.	Quantity.	Cost.
	cub. yds.	\$ cts.	cub. yds.	\$ cts.	cub. yds.	\$ cts.
"New Dominion" (not in commission)						
"Canada"	18,472	5,527 29	3,780	1,131 03		
"Cape Breton"			43,120	8,366 69		
"Prince Edward"					46,335	9,298 53
"St. Lawrence"	25,843	6,080 72	15,487	3,644 20		
"Geo. McKenzie"			24,730	9,912 72		
By hand			3,300	560 25		
	44,315	11,608 01	90,417	23,621 89	46,335	9,298 53

du Loup (en bas), Quebec, during the Year ended 30th June, 1881.

NOVA SCOTIA.			P. E. ISLAND.			QUEBEC.			Quantity by each Dredge.	Total Cost.
Quantity.	Cost.	Total Cost.	Quantity.	Cost.	Total Cost.	Quantity.	Cost.	Total Cost.		
c. yds.	\$ cts.	\$ cts.	c. yds.	\$ cts.	\$ cts.	c. yds.	\$ cts.	\$ cts.	c. yds.	\$ cts.
										777 84
						2,318	693 44			
450	134 64									
3,330	996 39									
		1,131 03						693 44	24,570	7,351 76
5,060	987 63									
20,900	4,055 29									
17,130	3,323 77									
		8,366 69							43,120	8,366 69
			11,430	2,293 78						
			9,750	1,956 63						
			12,915	2,591 79						
			12,240	2,456 33						
					9,298 53				46,335	9,298 53
10,587	2,491 23									
4,900	1,152 97									
		3,644 20							41,330	9,724 92
23,562	9,451 22									
1,168	468 50									
		9,919 72							24,730	9,919 73
3,300		560 25							3,300	560 25
90,417		23,621 89	46,335		9,298 53	2,318		693 44	183,385	45,999 71

QUEBEC.		Total Quantity.	Cost of Dredging.	Cost of Superintendence.	Total Cost.	Cost per Cubic Yard.
Quantity.	Cost.					
cub. yds.	\$ cts.	cub. yds.	\$ cts.	\$ cts.	\$ cts.	cents.
			777 84		777 84	
2,318	693 44	24,750	6,790 60	561 16	7,351 76	29·922
		43,120	7,727 54	639 15	8,366 69	19·403
		46,335	8,587 97	710 56	9,298 53	20·068
		41,330	8,982 02	742 90	9,724 92	23·530
		24,730	9,161 94	757 78	9,919 72	40·112
		3,300	560 25		560 25	16·977
2,318	693 44	183,385	42,588 16	3,411 55	45,999 71	25·008

Details of Dredging in Ontario and Quebec, during the Year ended 30th June, 1881.

Dredge.	Locality.	County.	Province.	Quantity.	Total Quantity.	Total Cost.	Cost per Cubic yard.
					cubic yards.	\$ cts.	cents.
"No. 1."	Chambly.....	Chambly.....	Quebec.....	3,140	} 34,340	3,806 02	11 08
	Belœil.....	Verchères.....	do.....	1,060			
	St. Denis.....	St. Hyacinthe.....	do.....	13,180			
	St. Ours.....	Richelieu.....	do.....	5,240			
	L'Assomption.....	L'Assomption.....	do.....	11,720			
"Nipissing."	Berthier (<i>en haut</i>).....	Berthier.....	Quebec.....	21,524	21,524	9,715 53	45 13
"Queen of Canada"	Beauharnois.....	Beauharnois.....	Quebec.....	6,260	} 33,785	6,085 22	18 01
	Rigaud.....	Vaudreuil.....	do.....	4,575			
	Calumet.....	Argenteuil.....	do.....	1,375			
	Salmon River.....	Ottawa.....	do.....	7,775			
	Hawkesbury.....	Prescott.....	Ontario.....	13,800			
"Challenge"	Wearford.....	Grey.....	Ontario.....	39,022	} 57,728	5,560 49	9 63
	Port Albert.....	Huron.....	do.....	18,706			

APPENDIX No. 6.

REPORT ON PUBLIC WORKS IN BRITISH COLUMBIA, BY HON. J. W. TRUTCH, C.M.G.

No. 19306.

VICTORIA, B.C., 18th November, 1881.

SIR,—In obedience to your directions to me by Departmental letter No. 3983 of the 24th September last, I now have the honor to lay before you the enclosed statement of Public Works carried on under my charge in this Province, during the fiscal year ended 30th June last.

This statement has been prepared in accordance, as nearly as has been found practicable, with the instructions contained in Departmental letter No. 3350 of 7th September, 1880; but the special circumstances attending the initiation and execution of some of the works referred to have precluded a literal compliance with all the requirements therein prescribed.

I have omitted all mention of telegraph works in this statement as you will, of course, receive a full report thereon from the proper source of information on that service, the General Superintendent of Telegraph and Signal Services; and I therefore need only refer to my letters of 23rd May and 27th June, in which I have communicated to you such observations on this subject as I have felt it incumbent on me to present for your consideration.

The only new works actually undertaken during the last fiscal year under the Public Works Department in British Columbia, with the exception of those connected with the telegraph service, were 1st, the improvement of the navigation of Naas River by removal of snags; and 2nd, the deepening of the channel of Fraser River, by dredging at Woodward's Slough.

The first of these works has been carried on under the immediate supervision of Mr. H. E. Croasdaile, whose reports on the progress of the work as far as at present executed, have been forwarded to you in my several letters of 3rd August and 18th December, 1880, and ultimate reports of to-day's date.

As to the dredging work in Fraser River, a full report was conveyed to you in my letter of 28th December last, since which date and up to the present time the dredge vessels have remained laid up in the Coquitlem River about four miles above New-Westminster.

In relation to the proposed improvement of the channel of the Skeena River I have also placed you in possession of all the information I can furnish through my letter to you of 16th May last.

Nothing was done last year towards the construction of the contemplated Custom House Wharf at Victoria beyond a survey of the locality and the preparation of plans, specifications and estimates for the work by Mr. Tiedemann, on which I reported in my letter to you of 8th January last, and handed in to the Department at Ottawa on my arrival there in February.

My several letters to you of 17th May, 28th June and 16th September last have communicated so fully all the facts, and my views thereon, as to the work of the removal of "Beaver Rock," Victoria Harbor, that I have no further remarks to lay before you on this subject, which I could hope would be of any practical value.

The only other public work in the Province to which I have to allude, (as I suppose it unnecessary to comment upon the few small items of repairs of Public

Buildings generally which were executed during last fiscal year to an aggregate amount of cost of only \$191.53), is that of the repairs and alterations to the Post Office Building which were done mainly by contract approved by you, and partly by days work, the whole expenditure having, however, been kept within the prescribed limit authorized for the work.

The stability and suitableness of this building have been greatly increased by the work so done during the last fiscal year, and will be still more completely perfected when the additional work now being executed on the building has been carried out.

I have the honor to be,

Sir,

Your obedient servant,

JOSEPH W. TRUTCH.

The Hon. SIR HECTOR L. LANGEVIN, K.C.M.G., C.B.,
Minister of Public Works, Ottawa, Canada.

Name of Work.	Province, District or County.	Number and Date of Letter or Paper authorizing Expenditure.	Expenditure authorized.	Expenditure or Liability incurred from 30th June, 1880, to 1st July, 1881.	Amount required on 1st July, 1881, for completion of unfinished works.	Remarks.
Nass River Improvement.....	.....	Letter No. 1930, May 18, 1880.....	\$ cts. 1,000 00	\$ cts. 980 84	Nil.	
Skeena River do .....	.....	Letter No. 3069, Aug. 16, 1880.....	500 00	Nil.		No work done.
Wharf and Store-house at Custom House.....	Victoria	Letter No. 2865, Aug 3, 1880.....	Vote 5,000 00	Nil.	Nil.	do
Post Office Alterations.....	do	Telegram, Aug. 19, 1880.....	" 10,000 00	9,540 37		
Dredger.....	New Westminster District.	Telegrams, 4th, 13th and 16th Sept., 80.	" 9,000 00	Paid at { 1,600 00 Ottawa { 7,585 28	5,500	
Beaver Rock.....	Victoria Harbor.	Telegram, 16th April, 1881.....	" 10,000 00			939 61
Repairs to Public Buildings, general.....	.....	Letter No. 4564, Nov. 15, 1880.....	1,000 00	191 53		

JOSEPH W. TRUTCH,

18th November, 1881.

NAAS RIVER IMPROVEMENT.

No. 7056.

VICTORIA, B.C., 3rd August, 1880.

SIR,—I have the honor to enclose for your information copies of a letter to me from Capt. Croasdaile and of my reply of this day's date.

I trust you may concur in the approval I have conveyed to Captain Croasdaile of his suggestions as to the manner of executing the proposed work of removing snags from the Naas River.

Be pleased to instruct me as to the refund applied for by Captain Croasdaile of the sum of seventy-five dollars (\$75.00) expended by him this spring.

I have telegraphed to you to-day for the funds necessary to meet Captain Croasdaile expenditures on this work to the amount of the sum appropriated for the purpose, viz : \$1,000.00.

I have the honor to be, Sir,
Your obedient servant,

JOSEPH W. TRUTCH.

The Hon. HECTOR L. LANGEVIN, C. B.,
Minister of Public Works, Ottawa, Canada.

NAAS RIVER FISHERY, 9th July, 1880.

SIR,—I have the honor to acknowledge the receipt, on the 6th of this month, of your communication dated the 5th June, and I desire to express my acknowledgment of the confidence placed in me by being authorized to expend, in clearing the river of snags, the \$1,000.00 voted for that purpose.

In reply to your wish for information as to the most judicious way of carrying on the work, I beg to state that the river at present is too high for operations, but it generally falls considerably in August, and towards the end of that month or the beginning of September work could be advantageously commenced.

I think it would be advisable to do the work by day labor and under my own supervision, for this reason: that excepting those in my employment there are only two or three white men on the river who are workmen, and they are without scows or other necessary means for the work; and I would also suggest that a portion of the money only be expended this autumn and the remainder next spring, unless favorable weather should occur this year, when the work might be completed.

The implements and other appliances required will be: grappling irons, chains, windlass, blocks and tackles, etc., and two scows. The grappling irons I would propose making up here at my blacksmith's shop, the iron for which and some blocks and chains will have to be purchased in Victoria. The scows and other appliances I have here for the use of which I would charge a reasonable price. I would hope to get about ten miles of the lower channel cleared.

Requesting that you will be good enough to inform me if you approve of my suggestions, and also if I should give orders on you for payment of such supplies as I shall have to get from Victoria,

I have the honor to remain, Sir,
Your obedient servant,

HENRY E. CROASDAILE.

P.S.—This spring I had a small number of snags removed, the value of the work being about \$75.00. I trust I may be refunded this amount on producing vouchers.

The Hon. J. W. TRUTCH, Victoria, B.C.

VICTORIA, B. C., 3rd August, 1880.

SIR,—Referring to your letter of the 9th ultimo, which reached me yesterday, I beg to state that your proposal to have the work of clearing snags out of the Naas River carried out by day labour under your personal supervision is approved, and you are requested to undertake this work accordingly in the manner and on the terms suggested in your letter.

I have telegraphed to the Minister of Public Works for the funds to be expended on this work, the amount of which, as you were before apprised, is absolutely restricted to one thousand dollars (\$1,000.00) which sum is to cover all expenditure for labor, materials, tools, superintendence and otherwise connected with the work.

As soon as I am placed in a position to do so by the necessary funds being placed to my credit here, I shall be ready to honor your orders for payments within the limits above stated, provided all such payments are accompanied by duly receipted vouchers and pay rolls, blank forms for which are sent you herewith.

I will submit for the consideration of the Honorable the Minister your application to have refunded to you the sum of seventy-five dollars (\$75.00) expended by you this spring in removing snags from the Naas River.

I have the honor to be, Sir,
Your obedient servant,

JOSEPH W. TRUTCH.

HENRY E. CROASDAILE, Esq.
Naas River, B. C.

No. 10532.

VICTORIA, B.C., 18th December, 1880.

SIR,—I have the honor to transmit to you herewith, copy of a letter to me dated the 29th ultimo, but which has only reached me to-day, from Captain Croasdaile, conveying the information in relation to the Naas River which was called for by your instructions to me by Departmental letter No. 2865 of the 3rd August last, together with a copy of the Admiralty Chart of Naas River, on which Capt. Croasdaile has indicated by distinguishing colors, (1) the portions of the river from which the snags have been cleared or partially cleared under his superintendence, (2) those where such work has yet to be done, and (3) the shoal parts of the channel which require to be dredged and buoyed.

I visited Naas River in 1869 and again in 1872, but my opportunities of inspecting the channel of the river on those occasions were very restricted and my observations only cursory. I do not feel myself warranted therefore, especially after so long a period, in making any remarks or suggestions on the proposed improvement of the navigation of this river,

I may, however, observe that Capt. Croasdaile appears to have taken considerable trouble in ascertaining the facts, as to the depth of water, and the nature of the impediments in the channel, and to have carefully studied the best means of improving the river both with a view to its navigation, and to its facilities for increased catch of fish; and that I feel confident that under his supervision the money appropriated for this purpose will continue to be advantageously expended.

I have the honor to be, Sir,
Your obedient servant,

JOSEPH W. TRUTCH.

The Hon. HECTOR L. LANGEVIN, C. B.,
Minister of Public Works,
Ottawa, Canada.

VICTORIA, B.C., 29th Nov., 1880.

SIR,—In reply to the letter of your Secretary, requesting me to furnish you with particulars of the work to be done in improving the navigation of the Naas River and the benefits to be derived therefrom, I beg to state as follows:—

The nature of the improvements to navigation possible to be carried out with the amount (\$1,000.00) of the vote passed, is the removal of snags from the channel of the river; as to deepen it on the bars by dredging would be beyond accomplishment for the sum at present applicable.

The channel of the river has a great many snags in it, some of a large size and deeply embedded in the sand and mud and several feet below the surface of the water, which renders them dangerous for a steamer. These snags have been accumulating for many years, and when the old ones are once cleared away it will be comparatively easy to keep the channel clear in the future.

I think that the channel can be cleared for some ten or twelve miles sufficiently for all practical purposes for the amount voted, possibly for a little less, and, should the latter prove the case, I would suggest that any surplus left should be applied to buoying the river at the shortest places. The benefits to be derived are two-fold. In the first place it will be much safer for coasting steamers to run up the river; and as there is a large fishery some twelve miles from the mouth, besides a steam saw mill, and several trading posts, it will be greatly to the advantage of the residents on the Naas that steamboat communication should be facilitated.

Secondly, clearing the river of snags will tend to largely increase the yield of salmon from the river; as these obstructions greatly interfere with drift-net fishing, and as salmon curing is the principal industry of that district, a direct benefit will be derived.

I beg to hand herewith a chart of the river showing the channel, the part where snagging has already been carried on and the bars where I would advise buoys being placed, should a portion of the vote remain unexpended after removing the snags. I may mention that the soundings marked are only correct during dead low water in winter, when the sources of the river are nearly all frozen up. About April the river commences to rise, and from that month until October or November the river is very much deeper, steamers—one a gunboat—having ascended it some 15 miles.

I have, &c.,

HENRY E. CROASDAILE.

To Hon. J. W. TRUTCH,
Victoria, C.B.

VICTORIA, B. C., 18th November, 1881.

No. 19420.

SIR,—Referring to my last letter to you of the 18th December last, on the subject of the improvement of Naas River, by the removal of snags from the channel, I have now the honour to enclose for your information, copies of further reports on this work, dated respectively 3rd June last, and 18th instant, from Mr. H. E. Croasdaile, under whose superintendence this improvement has been carried on, giving an account of the work up to the present time.

I regret that I am unable to furnish you with any information on this work, beyond that afforded by Mr. Croasdaile's reports. I may add, however, that I should think it would be judicious if the Department, having undertaken this work and expended thereon the sum of \$1,000, would appropriate the further sum of \$500, as suggested by Mr. Croasdaile, on faith of the assurance he gives that for this outlay

the channel of the Naas River would be certainly cleared of snags and the navigation rendered free of risk from such impediments.

I have the honour to be, Sir,
Your obedient servant,

JOSEPH W. TRUTCH.

The Honourable

Sir HECTOR L. LANGEVIN, K. C. M. G., C. B.,
Minister of Public Works, Ottawa,
Canada.

NAAS RIVER, B. C., 3rd June, 1881.

SIR,—I have the honour to inform you, that I have had the work of clearing this river of snags, and marking the channel in places with buoys, carried on during portions of the last two months when the weather permitted. I should have had more work done, but that there was no one here competent or willing to act as foreman previous to the time of work commencing.

The navigation of the river has been very much improved, and the steamer *Grappler*, has this season been twice up it to a distance of thirteen or fourteen miles from the mouth, it being the first time a coasting steamer having anything like her draught of water has ascended the river.

There is still much work to be done to get the channel properly cleared, and I venture to hope you will use your influence and recommend that at least the residue of the vote passed for this river should be expended upon it this autumn.

I have had ten buoys laid down at the two most difficult crossings of the river and have two mushroom anchors still on hand, so that I can replace any of these buoys if necessary. I have also chain, hemp rope, two pairs of grappling tongs and one anchor in charge; a portion of the chain purchased last year I have used in anchoring the buoys. I am sending down vouchers for the work done, and have the honor to request that payment may be made to Mr. M. T. Johnson on my behalf.

I have the honor to be, Sir,
Your obedient servant,

HENRY E. CROASDAILE.

The Hon. J. W. TRUTCH,
Agent of the Dominion Government,
British Columbia.

Victoria, B.C., 18th November, 1881.

SIR,—In reply to your letter of the 16th inst. I have the honor to report for your information that since my last letter of 3rd June, little work has been done towards improving the navigation of the Naas river; the grant of money for that purpose having been almost entirely expended up to that date. I had, however, some more snags raised and removed and the buoys watched. Several of these latter had to be altered, as the channel of the river changed at one of the crossings. Several also were removed from their positions by strong winds and tides; and the anchor of one has been so embedded by a channel filling up, that it will be impossible to raise it. I have sent instructions to the river to have all the buoys taken on shore for the winter, as the drift ice would otherwise carry them away. The anchors I used for buoying the channel were only 200 lbs. weight, of the mushroom pattern. These I find are not sufficiently heavy to stand the strong current of the river. On the whole the navigation of the river has been greatly benefited by the small Govern-

ment aid granted. For the first time in its history the ordinary coasting steamers have been making trips up it for some 14 miles from April to October, and have only touched snags on one or two occasions. If the Government would make another grant of, say \$500, the channel might be perfectly cleared of these dangers to navigation; and a small yearly allowance of, say \$100, would suffice to place the buoys in the spring of each year, keep them in order and position, and remove them for safe keeping each autumn.

I have the honor to be, Sir,
Your obedient servant,

HENRY E. CROASDAILE.

Hon. J. W. TRUTCH, C.M.G.,
Victoria, B. C.

SKEENA RIVER IMPROVEMENT.

No. 14366.

VICTORIA, B. C., 16th May, 1881.

SIR,—I have the honor to transmit to you herewith, with reference to my letter of the 5th January last, a copy of a letter and accompanying plan from Mr. J. E. White to whom Mr. J. H. Turner referred my letter to him asking for a report on the obstructions to the navigation of the Skeena River.

It is so long since I visited the Skeena River, that I am unable to offer an independent opinion on this matter of improving the channel of this river; and the distance from Victoria to the Skeena is so considerable that I can hardly hope to have an opportunity of revisiting.

I can only, therefore, suggest that should you conclude to appropriate any money for the removal of the snags and other obstructions from the channel of this river, the expenditure of the sum appropriated may be entrusted to some person resident on the spot, as has been done in the case of the work now proceeding at Naas River under Mr. Croasdaile.

I have no doubt that the judicious expenditure at Skeena River of a similar sum to that appropriated for the work at the Naas would be productive of very material benefit to the navigation of the river and to the fishing interest there.

I have the honour to be, Sir,
Your obedient servant,

JOSEPH W. TRUTCH.

The Hon. H. L. LANGEVIN, C.B.,
Minister of Public Works,
Ottawa.

INVERNESS, B. C., 4th March, 1881.

SIR,—In reply to yours of 22nd October, 1880, to M. J. H. Turner, which was sent me by that gentleman to answer, I beg to enclose a rough sketch of that part of the Skeena River which most requires improvement, and to call your attention to the marks in red ink which note the locality of the obstructions to navigation. The said obstructions consist of huge trees which have from time to time been deposited in the bed of the channel of the river, discernible at low but generally covered at high water mark, thereby making it extremely dangerous to steamboats travelling up and down the river. In addition to the peril of navigation these obstructions greatly

retard the work and vastly increase the expense of the salmon fishing, which is now an established industry upon this river, by snagging the nets which causes a great loss of time to the canneries, and often a partial if not total loss of their valuable nets. In reply to your query "What would be the probable cost of the proposed improvements, and of the benefits to be derived thereupon," I beg to say that the benefits to be derived would be twofold; first, lessening the danger of navigation in the river, and secondly the vast assistance it would render to the canneries in the prosecution of their industry. I may here state that during the past four years the canneries themselves have been to great expense in removing some of the obstructions.

With regard to the probable cost of the proposed work it would be very difficult to estimate, but I think that fifteen hundred dollars judiciously expended would clear away the most prominent obstructions that are in the river, *vide* enclosed estimate.

I have the honor, &c.,

J. E. WHITE.

HON. JOSEPH W. TBUTCH,
Victoria, B.C.

Memo of sundries required for clearing Skeena river of obstructions to navigation.

1 large scow cost, say	\$300 00
1 crab winch "	150 00
1 pair 8 feet claws "	15 00
1 coil 6-inch rope "	30 00
1 anchor 250 lbs. "	30 00
1 " 150 " "	20 00
2 boats "	100 00
Wages 6 men @ \$50 each for 3 months	900 00
Wages for one man @ \$100 for 3 months	300 00
1 coil 3 inch rope	15 00

\$1,860 00

CUSTOM HOUSE WHARF, VICTORIA, B. C.

No. 11095.

VICTORIA, B. C., 8th January, 1881.

SIR,—I much regret that your instructions to me by Departmental letter No. 2,865, of 3rd August, should be still unfulfilled as regards the information required in relation to (1) The Custom House Wharf at Victoria; (2) Murderer's Bar, Fraser River; (3) The Black Canon, Thompson River, and (4) The Mouth of Skeena River.

Mr. Tiedemann has made a survey of the Government lots on which the Custom House at Victoria stands, and of the adjoining property, and has made profiles thereof, including soundings of the harbor and borings of the bottom extending to the outer limit of the proposed wharf. He is now engaged on a design for the wharf, and in framing estimates of the cost thereof. I fully expected to have received these plans and designs in time to forward them, with my observations thereon, by this mail.

Mr. Hamlin, of the Engineering Staff of the Canadian Pacific Railway, has made a survey of the Black Canon of the Thompson, as also of Murderer's Bar, in the Fraser, near which latter point he is now encamped, and I am expecting to receive from him sketches of both those localities with such information as he has been able to obtain on the spot, regarding these two impediments to steamboat navigation, and his suggestions for their removal or amelioration.

The very severe and stormy weather we have had lately has no doubt rendered it impracticable to do any office work in camp, and delayed Mr. Hamlin's completion

of these plans and reports. Immediately on receiving Mr. Hamlin's reports I should transmit them to you, and append such information and opinion as I can offer for your consideration regarding the contemplated works at the two points just named.

I confidently anticipate that I shall be in a position to forward to you reports on the above three subjects within the ensuing week or ten days, but I have no prospect of being able to obtain at present any sketch of Skeena Mouth, or reliable information as to the impediments to its navigation alluded to in your directions to me. Mr. J. H. Turner, to whom you directed me to apply, has, however, promised to supply a chart and report on this locality in the early spring.

I have the honor to be, Sir,
Your obedient servant,

JOSEPH W. TRUTCH.

The Hon. HECTOR L. LANGEVIN, C.B.,
Minister of Public Works,
Ottawa, Canada.

No. 11981.

OTTAWA, 23rd February, 1881.

SIR—With reference to my letter to you of the 8th ultimo, I beg to lay before you the enclosed copy of a report from Mr. Tiedemann and accompanying plans and designs for a wharf and landing stage opposite the Custom House at Victoria, British Columbia.

Should it be considered desirable to undertake the construction of this work, I beg to recommend that the plan first suggested by Mr. Tiedemann in his report now forwarded, or some modification thereof, be adopted, so as to provide a permanent structure, as far at least as the foundation is concerned, and that the sum of fifteen thousand dollars be appropriated for this purpose.

The formation of the bottom of the harbor at the site of the proposed wharf is well adapted for the construction of a crib foundation, whilst screw piles would in my opinion be entirely out of place under the conditions there existing.

I have the honor to be, Sir,
Your most obedient servant,

JOSEPH W. TRUTCH.

The Hon. HECTOR L. LANGEVIN, C.B.,
Minister of Public Works.

REMOVAL OF "BEAVER ROCK," VICTORIA HARBOR.

No. 14370.

VICTORIA, B.C., 17th May, 1881.

SIR,—I have the honor to report that upon the authority conveyed to me by telegraphic message dated 16th ultimo, I have determined Mr. Spence's contract for the removal of the "Beaver Rock," in Victoria Harbor, and have taken possession of the works and of the vessels, machinery and materials thereon; and further, that I have taken steps to continue and complete the work in question by workmen employed directly by Government under Mr. Spence as foreman.

I enclose copies of my correspondence with Mr. Spence on this subject.

As far as I can now ascertain, an expenditure of about fifteen hundred dollars (\$1,500) will be required to effect the removal of the amount of rock still remaining to be taken from the harbor bottom to fulfil the specification on which Mr. Spence's contract was based.

I beg, therefore, to ask authority to expend on this work the sum of \$1,500, being \$500 more than the limit of expenditure prescribed in the telegram above quoted.

The work will probably not be completed before the 1st July.

I have the honor to be, Sir,

Your obedient servant,

JOSEPH W. TRUTCH.

The Hon. H. L. LANGEVIN, C.B.,
Minister of Public Works, Ottawa.

VICTORIA, B.C., 13th May, 1881.

SIR,—Under the terms and conditions of your agreement with the Public Works Department of Canada, for the removal of "Beaver Rock," I notify you on behalf of the Honorable the Minister of Public Works, that your said agreement is hereby determined, and that it is my intention to take possession forthwith of the works executed under that agreement, and of all the vessels, machinery, tools and materials now upon or employed about the works, and to use the same in the completion of the work contracted for by you, by the labor of workmen to be employed by the Government under my direction.

I have the honor to be, Sir,

Your obedient servant,

JOSEPH W. TRUTCH.

THOMAS SPENCE, Esq.,
Victoria, B.C.

VICTORIA, B.C., 14th May, 1881.

SIR,—Your contract with the Department of Public Works of Canada, having been determined, as you were notified yesterday, and possession of the works and of the plant and materials thereon having been taken this day by me on behalf of the Honorable the Minister of Public Works, I now appoint you foreman of this work for the Dominion Government, and place you in charge of the said works and of the plant and materials thereon as the property of the Public Works Department.

You are hereby instructed to direct the continuance forthwith of the removal of the "Beaver Rock" so as to complete as soon as possible the work specified in your said contract, using the said plant and materials for that purpose, and employing such workmen as are requisite to secure the speediest and most economical accomplishment practicable of the said work.

Your salary whilst engaged on the above service will be at the rate of \$120 a month, all wages of the workmen employed by you to be at the usual rate payable for such work; viz:—for engineer \$3.25 per day, blacksmiths \$3.25, divers and miners \$3, and ordinary laborers \$2 per day, without board allowances. All wages will be paid at this office weekly on presentation of a pay list for the same duly certified by you.

You will obtain authority from this office by approved requisition for any supplies or materials you may find necessary for the accomplishment of the work.

I have the honor to be, Sir,

Your obedient servant,

JOSEPH W. TRUTCH.

THOMAS SPENCE, Esq.,
Victoria, B.C.

VICTORIA, B.C., 14th May, 1881.

SIR,—I have to acknowledge the receipt of your letter of this date appointing me to take charge for the Dominion Government of the work of removing the "Beaver Rock," and I beg to express my acceptance of that appointment and to assure you that I will use my best endeavors to carry the work to completion speedily. I have to mention to you that on the assurance you gave me three weeks since that the Government would take over and complete this work under my direction as foreman, I have employed men and carried on the work during the interval, and beg to hand you herewith a pay list of the amounts of wages severally due on this account, which I trust you will be able to pay to-day as the men have been working for the past fortnight entirely relying on my assurance, made to them depending on your word to me, that they would be paid by the Government.

I remain, Sir,
Your obedient servant,

T. SPENCE.

The Hon. J. W. TRUTCH,
Dominion Government Agent,
Victoria, B.C.

No. 15401.

VICTORIA, B. C., 28th June, 1881.

SIR,—Since the date, 17th ultimo, of my last letter to you in relation to the removal of "Beaver Rock," Victoria Harbor, this work has been progressing slowly; and an aggregate amount of about \$1,000 has been expended thereon since I took over the work, as reported in my letter just referred to.

I regret to state that Mr. Spence, the contractor for this work, died suddenly on the 4th inst.; another foreman, Mr. Thomas Preece, was thereupon engaged in his place.

I have caused a careful survey of the rock to be made by Mr. F. C. Gamble, Assistant Engineer, who is now attached to this office, and I enclose for your consideration copy of his report and accompanying plan.

These documents show that a very considerable amount of rock, about 350 cubic yards, still remains to be removed, to give a depth of 14 feet ordinary low water over this part of the harbor, as provided for by the original contract with Mr. Spence.

The amount of work to be done to fulfil this requirement is very largely in excess of the estimate furnished to me by Mr. Spence, on which I chiefly relied in stating to you in my letter of 17th ultimo, before referred to, that—"as far as I can now ascertain an expenditure of about fifteen hundred dollars will be required to effect the removal of the amount of rock still remaining, etc."

Under these circumstances I find it necessary to apply to you for instructions as to the further steps to be taken in this matter.

The rock is now in such condition that a further expenditure of about \$750 will suffice to give a depth over its whole surface of 12 ft. 6 in. ordinary low water, and this can be effected at that cost, with the machinery and plant now in use, in about six weeks from this date.

But to increase the depth to 14 feet ordinary low water will require the removal of from 6 to 18 inches in depth of rock over an extent of about 10,000 square feet, as shown by Mr. Gamble's survey.

I concur with the view expressed in Mr. Gamble's report that it will suffice for all practical purposes, for the present at all events, if a minimum depth of 12 feet 6 inches ordinary low water be attained over the rock.

But if it be decided to complete the removal of the rock down to the depth of 14 feet ordinary low water, I would advise that the accomplishment of so considerable a work be let to contract instead of being carried out by days labor.

I think it right to state further that from information given to me by the late Mr. Spence and others, there appears to have been very serious error in estimating the cubic contents of the rock to be removed under Mr. Spence's contract.

A very much larger amount of rock has already been removed than was supposed to be included in his contract; and upon this consideration and in view of the decrease of the contractor, and of the fact that I am satisfied that a much larger sum than the entire contract price has been expended by the contractor upon the work during the long period of nearly six years he has been engaged on it, I think it would be expedient to pay over to the contractor's assignees the balance of the contract price that may remain unexpended when the rock has been excavated so as to give a depth of 12 feet 6 inches over its whole area at ordinary low water; and that the removal of the further 1 foot 6 inches in depth of the rock should be undertaken as a fresh contract in connection with the removal of the other rocks in Victoria Harbor, such as "Dredger Rock" and "Tuzo Rock," which obstruct navigation, with new machinery and appliances, as the plant in use at present is almost worn out and liable to endanger the lives of those employed on the work.

I have the honor to be, Sir,
Your obedient servant,

JOSEPH W. TRUTCH.

The Honorable

Sir HECTOR L. LANGEVIN, K.C.M.G., C.B.,
Minister of Public Works, Ottawa.

PUBLIC WORKS DEPARTMENT,
VICTORIA, B.C., 23rd June, 1881.

SIR,—In compliance with your instructions I made a survey of the "Beaver Rock," in Victoria Harbor with the view of ascertaining the amount of rock to be excavated, I beg to submit the following report.

I find after having plotted the work and taken out the quantities, that there remains to be excavated 352 cubic yards of rock before water over the site of the rock is the required depth, viz: 14 feet below ordinary low water (or 3.7 on the tide gauge Hudson's Bay Company's wharf). This rock is spread over an area of about 10,000 square feet more or less, and varies in depth from 2.2 feet to zero.

The soundings and measurements were taken with the greatest care and exactness, and may be relied upon as nearly correct as it is possible to get them.

I am led to believe that it will take at least twelve months to take out this rock, for the following reasons: (1) the extreme hardness of the rock; (2) the rock being full of seams and much broken by former blasting, many shots are lost; (3) the necessarily slow progress of such shallow excavation; (4) the dilapidated and worn out condition of the plant; (5) the caisson or diving bell being only 9 feet in diameter at the bottom, only two men can work in it to advantage at one time; (6) the rock when blasted has to be lifted in a basket from the bottom piled in a scow and taken to the shore, a distance of 650 feet the nearest point, and there unloaded only at high water, as the bottom of the harbor surrounding the rock is on a level with the proposed depth called for by the original contract to which the rock is to be excavated, namely, 14 feet below ordinary low water.

I venture to suggest that, considering the expensive nature of the work and that the sum due on the original contract is hardly sufficient to complete it; and that the extreme depth of water at ordinary low water at the entrance of the harbor is only 11 feet, the required depth be reduced to 12 feet below ordinary low water. If this

is allowed I have no doubt the work could be completed in two months, perhaps, even less.

I beg to remain

Your obedient servant,

F. C. GAMBLE,

Assistant Engineer.

The Hon. J. W. TRUTCH, C.M.G.,
Dominion Government Agent, British Columbia.

No. 17557.

VICTORIA, B. C., 16th September, 1881.

SIR,—In reference to my letter to you of the 28th June and telegram of 19th August last, I have the honor to report that the removal of the "Beaver Rock" to a depth of 12 ft. 6in. below ordinary low water having been accomplished on the 24th August last, I caused the caisson, barges and piling to be removed on that day to a remote part of the harbor of Victoria where they are now secured.

The expenditure on this work since it was taken over from the contractor has amounted to \$2,732.02, a very considerable portion of which has been incurred in renewing the tackle and repairing the plant generally. Deducting this amount from the balance of the contract price remaining unpaid, viz.: \$5,228.15 (as appears from Mr. Pearse's report to you of 12th January, 1880,* the correctness of which balance I have no reason to doubt, although I am unable to verify it from any records in this office that have come to my notice) a balance of \$2,496.13 is left still due upon the contract.

This balance is applied for by Mr. Oppenheimer, the assignee of the late Mr. Spence, the contractor.

I shall be glad to receive your directions as to the payment of the balance remaining due upon this contract, as also as to the disposal to be made of the vessels, machinery and other gear used on the work, the value of which is estimated at about \$1,000.00.

I have the honor to be, Sir,

Your obedient servant,

JOSEPH W. TRUTCH.

The Hon. Sir HECTOR L. LANGEVIN, K.C.M.G., C.B.,
Minister of Public Works,
Ottawa.

ALTERATIONS POST OFFICE, VICTORIA.

No. 8884.

VICTORIA, B. C., 19th October, 1880.

SIR,—I am directed by Mr. Trutch to acknowledge the receipt of your letter, No. 3,433 of 4th September, and to forward herewith a copy of Mr. Tiedemann's Report on the Post Office Building.

I have the honor to be, Sir,

Your obedient servant.

K. S. ROEBUCK,

Secretary.

S. CHAPLEAU, Esq., Secretary,
Department of Public Works,
Ottawa.

*Published in Annual Report, 1880. Appendix 13.

VICTORIA, 7th August, 1880.

SIR,—I have the honor to report that I have examined the Post Office building, and found serious omissions and faulty construction, independent of the defects of the front wall, which should be made good in conjunction with the erection of the new front wall.

The proposed improvements would make the building fit for Public Offices and prevent future repairs.

1. The roof of the building is too flat for our rainy winters and very leaky, the parapet walls forming a box to keep the casual snow in the winter.

2. The floor in the upper story sunk in the centre about three inches through the great weight of the chimney, having a very weak support. The fireplace in said chimney is badly constructed, in fact dangerous for the safety of the building.

3. The telegraph office requires a chimney flue, and fire place

4. The plaster work throughout the building is very bad, caused by the general shrinkage of the wood-work and settlements of the walls.

5. There is no anchorage provided to bind rear and front walls together (the joists running parallel with said walls.)

6. There is no ventilation provided between upper and lower story and roof.

7. The stair is weak in its construction, consequently not very well adapted for public use.

8. The direct water supply from the main is insufficient.

9. There is a great disproportion between the two stories; the upper one is too low.

10. The two conductors are too short.

11. A new sidewalk is required.

12. The alterations of the latrines is kept in abeyance to the possible changes of the partition walls of the back rooms in the upper story, to give direct communication with such latrines.

13. My impression is, that the foundation of the front wall is good and will be entirely protected by the sidewalk; but to prevent the springing of the floor in the Post Office, additional brick piers with girders placed under the joists may be required.

Here I must remark that the present building is not erected on its proper street line, that the same stands 4 feet 6 inches back from it. The width of Government street is 70 feet, accordingly the centre stones are placed by the City Surveyor under the supervision of the City Survey Commission.

ESTIMATE OF THE NEW WALLS AND PROPOSED ALTERATIONS.

Foundation is left in abeyance.

STONEMWORK.

Plinth in granite.....	\$ 495.00	
Sandstone front.....	3,558.00	
	<u> </u>	\$4,053.00

BRICKWORK.

Bricks, cement, labor and alterations.....		1,686.10
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PLASTERWORK.

3,658 yards @ 37½ cts. per yard.....	\$1,371.75	
Cornices 420 running feet @ 50 cts. per foot, and mitre.....	262.50	
Coves 431 running feet @ 25 cts. per foot...	107.75	
20 centre pieces @ \$6.00 per piece.....	120.00	
	<u> </u>	1,862.00

CARPENTERWORK.

Flooring, 15,334 feet @ \$20 per M.....	\$ 306.88	
Joist, rafters, &c., 13,688 feet @ \$10 per M.	136.88	
Labor, hauling, &c.....	213.00	
Wainscotting.....	548.00	
	<hr/>	1,204.56

JOINERWORK.

Inside blinds.....	\$ 154.00	
Doors.....	98.00	
Windows, &c., &c.....	475.00	
	<hr/>	727.00

STAIR.

Alteration of stair.....	50.00	50.00
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PLUMBERWORK.

Roof, pipes, &c., &c.....	750.00	750.00
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SIDEWALK.

1,080 square feet @ 37½ cts. per foot.....	405.00	405.00
Contingencies..	500.00	500.00

Sum total..... \$11,237.00

SPECIFICATION OF THE DIFFERENT ALTERATIONS.

Roof.

Joists 2" x 12" placed 16 in. centres, having 3 rows of cross bridging. Rafters 2" x 12 in. placed 32 in. centres braced and supported as shown. For the sheathing use the boards of the old roof.

Skylight. 4 x 8 feet, the frame to be made of 1½ x 2 in. white pine, having in the centre a ventilator of galvanized iron. The well-hole to have moulded panels. Cover the frame with ground glass of 21 ounces weight.

Cistern. Make the same with 1½ in. lumber and 5 x 7 feet outside measurement, gained and counter-gained with white lead and well spiked together. The cistern to have double sides, bottom and top, with a space of 4 in. between. The space to be filled up with dry saw-dust. In order to get at the same provide and make a larger man-hole than the present existing one in the old roof.

Floors. The ground floor to have 2" x 4" in. tongued and grooved boards. The upper story floor to be made of 1 x 5 t. & g. flooring, to be laid perfectly level on top of the old floor. All flooring closely driven and laid in courses, joints and bywood neatly dressed off at the completion of the work. Every ten feet or thereabouts cut across the old floor a 2 in. groove or joist, as the case may be, for the circulation of air. Extend the partition walls in the upper story to a height of 14 feet.

Anchors. Every ten feet, or thereabouts, wooden anchor-plates 2 x 4 in. to be let in 6 joists dovetailed into the last and anchored into the front wall with 1½ x 2 in. iron bars, fastened to the top of the wooden anchor. The rear wall to have the same anchor, but the part passing through the wall is round having at the end screwthreads to receive plates and nuts.

Alteration of stair. Extend the platform 6 feet in width and raise the same to the level of the window-sill, and move the lower part of the stair forward and strengthen the same with 3 x 8 in rough carriages, &c., &c. Fur out the closet below stair to

the width of seven feet and make an arch across the passage way ; provide a 3 feet sash with two lights for said closet.

Wainscotting. All rooms up and down stair to have a wainscotting level with the window-sills having a 2 in. cap with moulding underneath. The panels and skirting to have raised moulding. The halls up and down stair to have a 5 feet wainscotting made of 4 in. wide rustic and 2 in. cap with moulding. All the old sound skirting to be used again. Provide 3 wooden mantelpieces each not to exceed 15 dollars.

Masonry.

Prepare the parapet walls for the reception of joists and rafters, make the same level with the top of the sheathing to receive the stone cappings.

Chimney. Take down the chimney in the Indian Department Office and rebuild the same on top of the chimney in the Savings Bank Office below, with two fire-places each having a 16 in. grate. Get it in every respect complete. In the telegraph office cut out of the stonewall a flue and fire-place 8 in. deep ; the fire-place to have a 12 in. grate, &c., in every respect complete.

Ventilation. Cut out 4 x 8 in. wide openings in the rear wall in distances of about 10 feet apart, between the first story ceiling and second story flooring and for the roof. Provide and fix neat grating into the same. Drill holes for the reception of anchors.

Plasterwork.

Remove all plaster work up and down stairs. The laths to be thoroughly cleaned and washed, any defective place repaired. For the new works use narrow laths. The Savings Bank and three front rooms upstairs to have a cornice of 36 in. girt. The halls and passage to have a quarter circle cornice with a moulding underneath. Put up 20 centre pieces (perforated) \$6.00 each. All walls and ceilings to have 3 coat work, two good coats of brown mortar throughly haired, third or finishing coat to be of plaster Paris.

Plumberwork.

Line the cistern with No. 10 zinc properly stayed and soldered. Lay on from the main of the City Water Works water to the cistern with a $\frac{3}{4}$ in. supply pipe of galvanized iron having a ball-cock, &c., with a 2 in. overflow pipe complete. The supply to be taken from the cistern throughout the building, except hosebib on front which has to be taken direct from the main. The supply pipe to be taken under the ground floor up the corner behind the plaster to the roof, the pipe is then to be covered with a 6 in. board screwed to the battens.

Cover the roof with the best Morfer IX Charcoal Leaded tin with standing double grooved seams well soldered. Provide each sheet of tin with 3 cleats well nailed to the roof sheathing. Extend the two conductors to the ground, the elbows reaching to the drain. The gutter to be made of galvanized iron, securely fastened to the roof. Put up 8 in. flashings around chimney stacks. For the new wall provide two $1\frac{1}{2}$ in conductors, the elbows reaching to the top of the sidewalk.

Sidewalk.

The foundation to consist of large angular stones bedded in sand firmly driven together. The cavities of the stones are filled up with cement concrete. The top to receive $\frac{1}{2}$ in. thick layer of cement mixed with a small quantity of clean sharp sand. Leave arched passages for the gas and water pipes.

At the request of the Post Office Inspector, Mr. R. Wallace, I increased the size of the main entrance door from 4 to 6 feet in width (4 folds) which alteration necessitates a different arrangement of the upper story window.

By making use of the parapet walls I raised the upper story two feet, which addition gives better proportion and appearance to the building.

The steps, plinth, including window sills of the new wall are to be put up in granite.

The three projections of the front wall to be faced with Newcastle sandstone of a bluish uniform color, or marble, laid in cement. The backing and the other parts of the front wall are to be erected with hard burnt bricks, of a dark cherry red color laid in cement mortar. The outer face of the two recesses to receive a half an inch thick coat of cement of a uniform tint.

All the cornices, jambs to be throughout solid.

This arrangement will secure to the building durability and lightness.

The temporary wall, if required, is to be made of 4" x 4" in scantling lined with tongued and grooved inch flooring.

All tinwork to receive two coats of oil paint.

I am, Sir,
Respectfully, your obedient servant,

H. O. TIEDEMANN, Architect.

The Hon. J. W. TRUTCH,
Dominion Government Agent &c., &c.

No. 9820.

VICTORIA, B. C., 19th November, 1880.

SIR,—I beg to submit for your information copies of letters to me from the Clerk of the Municipal Council of Victoria and from the legal adviser of the Corporation respectively, in relation to the front line of the Government lot on which the Post Office building stands, and of my response addressed to His Worship the Mayor, after due investigation of the facts, as laid before me by Mr. Tiedemann, Architect in charge of the alterations to the building in question, and consultation with the Legal Adviser of the Dominion Government here. I have not received any acknowledgment of my letter to the Mayor, nor have I heard anything more on the subject from the municipal authorities.

I have deferred reporting to you on this matter in expectation of receiving some further communication regarding it; but now think it advisable to make you acquainted with the facts above stated, without further delay.

I have the honor to be, Sir,
Your obedient servant,

JOSEPH W. TRUTCH.

Hon. HECTOR L. LANGEVIN, C.B.,
Minister of Public Works,
Ottawa.

CITY HALL, VICTORIA, B.C., 18th October, 1880.

SIR,—I am directed by His Worship the Mayor to inform you that the contractors for the work on the Post Office building are encroaching upon the line of Government street, in this city, and to request, that, you cause the work to be stopped at once, in order to prevent litigation in the matter.

Under Section 5 of the Act entitled "City of Victoria Official Map Act, 1880" the Corporation are in a position to give you the proper line of the street, and will do so on your application to that effect.

I have the honor to be, Sir,
Your obedient servant,

THOS. RUSSELL.

Hon. JOSEPH W. TRUTCH,
Dominion Government Agent.

VICTORIA, 22nd October, 1880.

SIR,—I am instructed by the Corporation of the City of Victoria to call the attention of the Government, through you, to the fact that the foundation of the Post Office building, now in course of erection, is being so constructed as to extend the edifice beyond the line of the other buildings, and several feet into Government street the principal highway of the city.

Notice of the encroachment has been given by the Corporation, but the architect and builders notwithstanding persist in the course complained of, the former asserting that the limits of the Government allotments are not being transcended, but that the street lines are wrong and trespass upon the Government lots.

Be that as it may the present lines are those by which all other buildings have been erected, and are regulated by statute; and if for the sake of uniformity only, the Corporation consider that the Post Office should be confined to the same line as the other buildings, and that a lasting impediment should not be allowed to be placed in a leading thoroughfare, simply because it is contended that through a mistake there existed a right to so obstruct the same.

But the contention of the architect is far from correct, the fact being that the building in question is being projected many feet beyond the limits of the Government property; and the Corporation is not prepared to admit, even if a survey should prove the lines to be wrong, and the Government lots extend into the street, that the Crown would thereby have any right to deprive the public of any portion of a highway prescribed and dedicated to their use.

The Corporation strongly protests against the invasion of public rights to which I have drawn your attention. Every facility for an adjustment will be afforded by the Corporation, and I have to request that you will cause work to be stopped pending such adjustment.

Your obedient servant,

THEODORE DAVIE.

Hon. J. W. TRUTCH,
Agent General, Dominion Government.

VICTORIA, B.C., 23rd October, 1880.

SIR,—Upon the question of representation conveyed in a letter addressed to me on the 18th instant by Mr. Thomas Russell, under Your Worship's direction, to the effect that the contractors for the Post Office building are encroaching upon the line of Government street, I beg to state that I have referred Mr. Russell's letter, together with a communication on the same subject subsequently received by me from Mr. Theodore Davie, to the legal adviser of the Dominion Government in this Province, and have also conferred thereupon with Mr. H. O. Tiedemann the architect in charge of the alterations of the Post Office building now under contract.

I have the honor to inform you in reply to your representations on this matter that I am advised—

1st. That the front wall of the Post Office building is now being erected identically on the same line at its springing from the level of the sidewalk as that of the front wall of the Post Office building which has lately been taken down.

2nd. That this front line of the building now being erected is four (4) feet within the front line of the lot belonging to the Dominion Government originally laid out as the Official plan of Victoria, and staked out upon the ground by the then Surveyor General Mr. Pemberton—that is to say, that it is four feet further westward from the centre line of Government street.

3rd. That the front wall of the old wooden Post Office building stood upon this front line of the lot as originally laid out on the official map of Victoria and staked out on the ground, that is to say, the front wall of the old Post Office building was

four (4) feet nearer the centre of Government street than the front wall of the Post Office building now being erected is.

4th. That the front wall of the Post Office building now being erected stands exactly on a direct straight line drawn between the corner of the British Columbia Bank building at the northwest corner of Bastion street and Government street, and the corner of the Adelphi Saloon building at the southwest corner of Yates street and Government street.

5th. But is four (4) feet inside of, - that is to say, further from the centre of Government street than, - a direct straight line drawn between the corner of Rickman's store at the northwest corner of Fort street and Government street and the corner of Jeffrey's building at northwest corner of Yates street and Government street.

6th. And further, that the Dominion have the right to occupy and use this ground, should they desire to do so (which, as I am advised, they do not) to the full extent of the lot on Government street owned by them, viz. : - to the extent of four (4) feet nearer the centre of Government street than the line of the front wall of the Post Office building now being erected thereon.

I have the honor to be, Sir,
Your obedient servant,

J. W. TRUTCH.

His Worship
J. H. TURNER,
Mayor of Victoria.

 APPENDIX No. 7.

 SLIDE, BOOMS, &c.—SAGUENAY DISTRICT.

No. 19713.

 CHIEF ENGINEER'S OFFICE,
 OTTAWA, 16th December, 1881.

SIR,—Herewith I transmit a report by Mr. Rosa on the works, &c., performed in connexion with the slide, &c., at Lake St. John, River Saguenay, during the fiscal year ended 30th June, 1881.

I have the honor to be, Sir,
 Your obedient servant,

HENRY F. PERLEY,
Chief Engineer.

F. H. ENNIS, Esq.,
 Secretary, Public Works Department.

QUEBEC, 1st December, 1881.

SIR,—I have the honor to transmit the following report on the works, etc., performed in connection with the slide, etc., at Lake St. John, River Saguenay, during the fiscal year ended 30th June, 1881.

570 feet of slide have been rebuilt.

150 feet of boom, 28 inches in width and 10 inches in thickness, with iron bolts, chains, &c.

Repairs were made to the slide for a length of 4,390 feet; and also to the bulkhead of the slide and to the adjacent dam, No. 7.

In my report for the fiscal year 1879–80, I asked \$6,500 to rebuild 1,000 feet of slide, and \$2,500 for repairs remaining to be made to the portion of the slide; moreover, \$3,500 to rebuild the bulkhead and the dam No. 7. These last two sums not having been granted, we were obliged to take from the \$6,500 authorized an amount sufficient to make the indispensable repairs to the slide, and to strengthen the bulkhead and dam No. 7, which would have been carried away.

The repairs having cost \$3,141, only \$3,359 was left to rebuild a portion of the slide.

The expenditure on the different works made during the fiscal year 1880–81, is as follows:

To rebuild 570 feet of slide (about \$6 per foot).....	\$3,331 00
For repairs on 4,390 feet of the old slide.....	2,982 00
To making 150 feet of boom, 28 inches in width and 10 inches in thickness, with iron bolts, chains, &c.....	111 69
For repairs to and strengthening of the bulkhead, and to dam No. 7.....	47 00
	<hr/>
	\$6,471 69

I have the honor to be, Sir,

Your obedient servant

JOSEPH ROSA .

HENRY F. PERLEY, Esq.,
Chief Engineer, Department Public Works,
Ottawa.

APPENDIX No. 8.

SLIDES AND BOOMS—ST. MAURICE DISTRICT.

No. 15702.

OFFICE OF THE SUPERINTENDENT,
ST. MAURICE WORKS,
THREE RIVERS, 24th July, 1881.

SIR,—I have the honor to submit, for the information of the Minister of Public Works, my report on the works placed under my superintendence, for the year ended 30th June last.

The water was so low last spring in the River St. Maurice and its tributaries, that the floating of timber was effected with great difficulty. Not more than sixty thousand (60,000) logs reached their destination in due season; all the rest lie scattered along the river, and a considerable amount of labor will be required to float them again and bring them to their destination in the course of the summer. Some 300,000 logs were made last winter.

The cost of the staff and the expenditure for carrying on the works for the past year amounted to \$14,669.14.

With a view to repairing as far as possible the injuries done to the slides, booms, piers, &c., &c., by use or accidents, a sum of \$5,481.14 was placed at my disposal for that purpose.

The repairs effected at the various stations were as follows:—

STATION No. 1. MOUTH OF THE ST. MAURICE.

Removed 4,500 yds. of earth from the channel between the islands of St. Christophe and Caron.

4,182 feet of boom, 5 feet wide, planked with 3-inch deals.

700 feet of boom, 6 feet wide, planked with 3-inch deals.

Raising pier No. 12, 12 feet.

“ “ 30, 15 “

“ mooring pier 8 feet.

STATION No. 2. CAP AUX CORNEILLES.

Raising pier No. 18.

Placing 2 posts in pier No. 12.

“ 2 “ “ No. 13.

“ 2 “ “ No. 15.

STATION No. 3. SHAWENEGAN

Grès Falls.

Repairing the Booms.

Shawenegan Bay.

4 piers 11 x 11 x 15 feet on the shoals.

162 feet of boom 12 x 13 inches.

Putting 16 yards of stone into the wharf on which the house is built.
Repairing the wharf at Grand Remous.
Placing platforms on piers Nos. 3 and 5.

Above Shawenagan Falls.

Flooring 99 feet of slide in birch of 5 x 12 inches.
Raising a pier above the falls 12 feet.
Repairing the great dam at the head of the falls.
300 feet of new boom 4 feet wide.
73 feet of new boom 12 x 13 inches.

STATION No. 4. GRAND-MÈRE.

800 feet of new boom 4 feet in width.

All this work has been effected for \$5,197.82, leaving a balance of \$283.32 remaining from the grant.

The slides and booms have suffered from no serious accident during the past spring's season.

Respectfully submitting the above,

I have the honor to be, Sir,

Your obedient servant,

CHARLES LAJOIE,

Superintendent St. Maurice Works.

F. H. ENNIS, Esq., Secretary,
Department of Public Works,
Ottawa.

 APPENDIX No. 9.

 SLIDES AND BOOMS—OTTAWA DISTRICT.

No. 17878.

OTTAWA, 30th July, 1881.

SIR,—I have the honor to submit the following Report on the state of the works under my charge, on the Ottawa River and its tributaries, for the fiscal year ended 30th June last.

During the season of 1880 the pitch of water had been at a fair average height for running timber, and the rivers kept well up until late in the Fall, so that little difficulty was experienced in getting logs to the mills and square timber to market, except in some isolated cases where it was deemed advisable to lay up arrivals from the more remote limits, instead of forcing the drives and incurring unnecessary expense in endeavoring to pass the lower stations when the water had reached its lowest stage.

After the slides and booms had been closed, a thorough examination of the works was made and certain foundations repaired, which could only be reached when the waters had subsided; and the following repairs were executed during the winter of 1880-81 and early spring months.

ON THE OTTAWA MAIN RIVER.

The slide bottoms and booms at the *Chaudiere* and *Hull* stations, were extensively repaired and strengthened, and new stop-logs provided where required, and the slide-master's house repaired and painted. The wood work and cables of the Union Suspension Bridge were scraped and received two coats of paint; the roadway approaches repaired and macadamized and the Toll house overhauled by painting glazing, &c.

At *Rocher Capitaine*, the uppermost station on the Ottawa, the piers and booms which had been considerably damaged by the high water in spring, were partially rebuilt and certain boulders removed from the foot of the slide channel.

At the *Chats slide*, certain portions of the pine and hardwood planking had to be renewed, and worn out side timbers in the piers and booms replaced by substituting new materials.

At the *Chenau Station*, the booms which at times are greatly strained by a pressure of logs during high water, had to be strengthened by placing additional anchor piers with buoys, while the floating platform was added to and improved.

At the *Calumet Station*, where the works are subjected to great wear and tear by the passage of logs and timber through intricate channels, the foundations had to be strengthened by additional stone-filling, and the booms and side piers had a lining of timber and plank inserted to make good the worn out parts.

At the *Mountain Station* where the friction of passing cribs had been the means of cutting into the side piers of the slide, a large quantity of debris had to be removed which was replaced by timber and plank properly spiked and bolted and carefully stone-filled. The head works also received attention, and the stop-logs and hoisting apparatus were put in an efficient state.

At the *Joachim slide*, the planking and its bearings had to be adjusted and the damaged materials replaced by new white pine; it was also necessary to load the side piers of the slide with extra stone filling and to face up the exposed portions of the works that had been weakened by heavy traffic for a term of years.

At *Portage du Fort slide*, the guide boom at the head had become unserviceable; it was originally of three ply timbers bolted and covered with plank on top, and its renewal was a matter of necessity.

The following repairs were executed on the

TRIBUTARIES OF THE OTTAWA.

Dumoine River.—The long slide at High Falls was partially replanked and the foundations of the side piers under-pinned, and straightened, and the dams at Ryan's Chutes, Nos. 1 and 2, carefully stanchied, repaired and made secure.

Petewawa River.—The slide at Bois dur Station was repaired, and had its side piers well braced up. The boom piers at the mouth of the stream which had been considerably wrecked by constant use for 22 years, were extensively repaired and strengthened—as were also the works on the upper reaches of the Petewawa extending from Crooked Chute to Cedar Lake, upwards of thirty miles, where dams were stanchied, booms added to and strengthened and piers topped and stone-filled.

South Nation River.—The pier above the bulkhead of the slide, which had been damaged by the shoving of ice was re-topped and straightened, and the two-ply guide boom at the head put in working order.

Gatineau River.—The pier of the bridge over the upper or new canal, where it had been undermined, was supported by the insertion of cedar timbers and stone filling; and two anchor piers and a float had to be supplied for the working of the booms.

Madawaska River.—At Ragged Chute, the easterly side of the river and the channel for the passage of timber were deepened and widened by the excavation of rock from the river bed and a portion of the necessary side dams commenced; these will be pushed on towards completion when the water falls, to be in readiness for next season's work.

The Arnprior slide piers and the booms at the mouth of the river had to be strengthened by placing white pine timber and hardwood planking in these structures, where symptoms of weakness occasioned by decay and ordinary wear, had manifested themselves. The side or wing dams at Bailey's Chute were repaired in their substructures and covering plank provided where found necessary.

Coulonge River.—The High Falls slide during the month of May, 1880, was seriously damaged by a large break in the works; temporary repairs were executed at that time, and last winter the gap was closed by rebuilding about 200 feet in length of the slide from the foundations where the superstructure was upwards of 40 feet high.

Black River.—The slide here, from its abrupt pitch at the lower end, causes the water to pass with great velocity, consequently timber and saw logs are shot through with such force as to wear into and dig out the hardwood shingling forming the bottom, in a comparatively short time. A very considerable quantity of this had to be renewed. White pine timber and planking had to be used to put in proper order the entrance guide boom, while chains to keep in position the support stays of the timbers at the gaps, had to be provided.

THE WORKS CHARGEABLE TO CONSTRUCTION consisted of:—

At the *Gatineau Station*: A fence built between the Government lands, near the Pond, and the property of the Oblats Fathers, adjoining.

Rivière du Lièvre.—Certain reefs and boulders blasted and removed from the bed of the stream at Little and Long Rapids, with the view of improving the navigation for boats and barges. This work was vigorously carried on until the Fall rains raised the river to flood height, when operations had to be suspended until next season of low water.

The breaking up of the ice on the upper streams took place at rather a later date than usual, so that the raftsmen were somewhat delayed in starting their "drives" last spring; and as the freshet was a gradual one without excessive local rains to aid in filling the creeks, it was with some difficulty that timber and logs could

be floated down the tributaries, and I am glad to say that the works under my charge received no greater damage than had been anticipated and which may be expected more or less every spring. At some of the lower stations, a good deal of inconvenience was experienced from bodies of driftwood lodging on the slide aprons and in the entrance channel and outlets. Such debris, consisting of roots and trunks of trees &c., frequently after high water, accumulates in the lumbermen's retaining booms, and, on being sent adrift by their employees in large quantities at a time, it is with difficulty that the slide men and their assistants can keep the timber channels unobstructed on such occasions.

As the upper Ottawa country which was formerly a dense forest, becomes cleared through the operations of the lumbermen and settlers and the ravages of bush fires, there is gradually an earlier breaking up of the ice and melting of the snow in spring; and one of the consequences is that the rivers and streams more rapidly attain flood height, and after draining the surplus water subside as suddenly as they had risen. The slide works on the Ottawa were designed, for the most part, about 30 or 40 years ago, when a different state of things existed—the timber then being floated in such a manner as to keep well up with the floods—but, now that the lower limits have been pretty much stripped of the bulk of the most valuable timber, supplies have largely to be drawn from the remote berths at the head waters of the Temiscamingue and Kippewa regions. Timber from these quarters arrives at the lower stations when the water is very low and often cannot reach market until the following season. I am of opinion that this difficulty might in some measure be overcome by the construction of retaining or reservoir dams below Lake Temiscamingue, with the view of keeping back and having under control portions of the north west waters, which could be discharged later in the season, at such times as would be most beneficial to the lumbermen driving and sweeping the river, which they can only accomplish under existing circumstances at great expense, if at all, when the water has reached its lowest stages.

I am glad to say that the depression affecting the lumber trade has all but passed over, and business activity characterizes the staple trade of the Ottawa Valley in all its branches. The manufacture of square timber and the out put of saw logs next winter, are likely to be conducted on an extensive scale and promise the best results to all engaged in these industrial pursuits.

I have the honor to be,

Sir,

Your obedient servant,

GEO. P. BROPHY,

Superintendent O. R. Works.

F. H. ENNIS, Esq.,

Secretary of Public Works,

Ottawa.

STATEMENT of Expenditure for Repairs and Construction of Works on the

Name of		
Work.	Province.	County.
Chaudiere slide.....	Ontario.....	Carleton (City of Ottawa)
Chats do	do	do
Joachim do	Quebec.....	Pontiac.....
High Falls slide, Dumoine River.....	do	do
Rocher Capitaine, Chenaux, Chaudiere and Calumet slides and booms and Union Susp. bridge....	Ontario and Quebec.....	Pontiac, Renfrew, S.R., Carleton and Ottawa....
Bois Dur slide, Petewawa River.....	Ontario.....	Renfrew, N.R.....
Slide near Plantagenet, South Nation River.....	do	Prescott.....
Canal bridge pier, Gatineau River.....	Quebec.....	Ottawa.....
Slide master's house, Chaudiere Station.....	Ontario.....	Carleton (City of Ottawa)
Ragged Chute, Madawaska River.....	do	Renfrew, S.R.....
South Chaudiere slide, Ottawa River.....	do	Carleton (City of Ottawa)
High Falls slide, Coulonge River.....	Quebec.....	Pontiac.....
Anchor piers and float, Gatineau River.....	do	Ottawa.....
Boom and piers at mouth of Petewawa River.....	Ontario.....	Renfrew, N.R.....
Ottawa and Petewawa River works.....	Ontario and Quebec.....	Pontiac & Renfrew, N.R.
Works from Crooked Chute to Cedar Lake, Petewawa	Ontario.....	Renfrew, N.R.....
Mountain slide, Ottawa River.....	Quebec.....	Pontiac.....
Joachim slide and Chenaux boom, Ottawa River.....	Quebec and Ontario.....	Pontiac & Renfrew, S.R.
Portage du Fort slide, Ottawa River.....	Ontario.....	Renfrew, N.R.....
Arnprior slide, Madawaska River.....	do	Renfrew, S.R.....
High Falls slide, Black River.....	Quebec.....	Pontiac.....
Upper Petewawa River works.....	Ontario.....	Renfrew, N.R.....
Baily's Chute dams, etc., Madawaska River.....	do	Renfrew, S.R.....
Boom near Plantagenet, South Nation River.....	do	Prescott.....
Slide and dams, Dumoine River.....	Quebec.....	Pontiac.....
Union Suspension Bridge approaches.....	Quebec and Ontario.....	Ottawa and Carleton.....
Fence near Pond at boom, Gatineau River.....	Quebec.....	Ottawa.....
Improvement of navigation of River du Lièvre.....	do	do
Total.....	.....	.....

OTTAWA, 30th July, 1881.

Ottawa River and tributaries for the fiscal year ended 30th June 1881.

Letter authorizing expenditure.		Expenditure authorized.	Expenditure or Liabilities incurred from 30th June 1880, to 1st July 1881.	Amount required on 1st July 1881, for completion.	Remarks.
Number.	Date.				
		\$ cts.	\$ cts.	\$ cts.	
49,999	9th June 1879....	12,500 00	31 79 37 50 28 92 114 00	.....	Repairs. do do do
			1,153 93 286 09 27 33 40 29	.....	do do do do
4,479	10th Nov. 1880...	12,500 00	49 95 1,593 51 443 37 2,427 10 285 25 678 04 177 10 1,703 95 670 40 553 33 160 72 158 93 382 85 183 14 116 06 94 86 1,013 46	.....	do do do do do do do do do do do do do do do do do do
2,632	17th July 1880...	334 00	333 77	.....	do
3,187	21st August 1880	55 00	55 84	.....	Construction.
3,791	17th Sept. 1880..	4300 00	3,559 10	.....	do
.....		.....	16,340 58	.....

D. SCOTT,
Accountant, O. R. Works.

 APPENDIX No. 10.

 REPORT ON TELEGRAPH LINES AND SIGNAL SERVICE.

No. 19267.

 TELEGRAPH AND SIGNAL SERVICE,
 OTTAWA, 30th November, 1881.

SIR,—I have the honor to submit the following report upon the above service:—

BRITISH COLUMBIA.

Since 1st January, 1881, the Government have been in possession of the 430 miles of land lines and 16 knots of submarine cable purchased from the Western Union Telegraph Company for the sum of \$24,000.

The economical result of the above purchase and of the working arrangements entered into with the Company has been an important one.

In the first place, the Government have been relieved from the payment of \$4,000 per annum subsidy to the Company, and also from an annual expenditure of \$2,500 for the maintenance of the land line through Washington Territory, between Seattle and the boundary line of British Columbia near Matsqui, *plus* the great cost of repairing and renewing the six submarine cables upon the abandoned route *via* San Juan Island; equivalent to \$6,000 per annum.

Secondly, the Western Union Telegraph Company now pay to the Government a subsidy of \$1,200 for services rendered at the New Westminster repeating station, and the Government have furthermore acquired the total revenue collected on account of Victoria Station, its present value being about \$6,000 per annum.

Thirdly, both the Government and the public have benefited by a considerable reduction in tariff rates upon messages; the total saving to the country, from such course, being not less than \$5,000 per annum in addition to the economies already enumerated.

During the fiscal year the land lines between Victoria and Nanaimo, 72 miles, and between Yale and Hamilton's 250 miles, have been thoroughly repaired, and much adjacent brush and timber cut down. New land lines have been erected between Nanaimo and Departure Bay, $3\frac{1}{2}$ miles; between Nanaimo, Valdes Island, Point Grey and New Westminster, 42 miles; and a second wire has been placed upon the poles between New Westminster and Matsqui, 36 miles. New cables have also been laid between Nanaimo and Gabriola Island, 1 knot; between Valdes Island and Point Grey, 20 knots; with two cables across the Fraser River, each being nearly $\frac{1}{2}$ a knot in length.

Furthermore, the old cables upon the San Juan Island route have been raised, repaired and stored in a new tank-house, and the cable barge, "Electron" has been built and fitted with adequate machinery for the service.

The revenue has also increased more than three fold since the service was reorganized, and the lines put in order, viz: from \$5,320 during '78-79 to probably \$18,000 to \$20,000, for '81-82, at the same time the annual cost of maintenance has been greatly reduced.

The total mileage of land lines and cables in British Columbia is now about 676 miles, *plus* 36 miles of duplicate line wire.

Gulf of St. Lawrence.

The submarine cables between Anticosti and the coast of Gaspé, and between the Magdalen Islands and Cape Breton, have worked satisfactorily and without interruption since they were submerged during October, 1880. The Bird Rock cable has been three times damaged and twice repaired close in shore at the Bird Rock; but spare 50 yard sections of very heavy cable, weighing 24 tons to the mile, have since been provided for repairing purposes, and it is anticipated that when put in order next spring, communication can be satisfactorily maintained with that very important light-house station.

During the present year the land lines upon the Island of Anticosti, 214 miles in length, have been completed and are now in successful operation. The land lines upon the Magdalen Islands, 84 miles in length, plus a new line and short cable 9 miles in length between Etang-du-Nord Village and House Harbor have also been operated.

The cost of the foregoing land lines, complete with instruments and in working order, has been :—

Upon Anticosti about \$165 per mile.

“ Magdalens “ 130 “

and the cost of the cables laid, about \$1,100 per knot.

The whole of the above work has been accomplished at $\frac{1}{3}$ less cost than the original estimate.

Nova Scotia.

The land line between Canso and Dartmouth, near Halifax, 208 miles, and between Low Point and Lingan, Cape Breton, 5 miles, has been operated, and a new line 126 miles in length between North Sydney and Meat Cove *via* Baddeck, Cape Breton, in connection with the Magdalen Island system, has been constructed and operated; the submarine cable under Big Bras D'Or entrance working uninterruptedly.

North Shore, River St. Lawrence.

Land lines have been constructed between Bay St. Paul and Chicoutimi, 92 miles, and between Murray Bay and Mille Vaches, 84 miles, the River Saguenay having been crossed by means of a novel submarine cable, 1 knot in length. This cable is armoured with 12 No. 16 wires of phosphor bronze, the first manufactured from this durable material.

Bay of Fundy.

The submarine cable between Grand Manan and Campobello was intentionally cut, probably by some vessel's crew whose anchor had fouled it, one mile from shore, and the cable between Campobello and Eastport was also damaged from rapid corrosion where the outer wires had apparently been in contact with small seams of copper in the rocky bottom of the strait. Both were repaired and the Island land lines, 24 miles in length, having been erected, the whole are now in successful operation.

Signal Service.

A pair of simple semaphores have been erected (at about one third of the cost of the less effective arm semaphores now in use upon the coasts of France,) upon the Brandy Pots Island and at Rivière du Loup, River St. Lawrence. These signals are distinctly visible at a distance of from 7 to 8 nautical miles and have thus solved the problem of communication between the light-houses upon the Islands on the East Coast of Nova Scotia and the Telegraph Stations established between Canso and Halifax, for ship signalling purposes. Meanwhile flag code signals have been supplied to twenty stations near the River and Gulf of St. Lawrence.

Telephones

Still await perfection of recent improvements and the necessary grant of money for their adoption throughout the public service.

In conclusion I have the honour herewith to submit maps and plans with a supplementary report in detail of all important matters connected with the service.

All of which is respectfully submitted by

Your most obedient servant,

F. N. GISBORNE,

Superintendent.

To the Honorable
The Minister of Public Works.

HISTORICAL.

The Gulf of St. Lawrence.

During the Parliamentary Session of 1879, a grant of \$15,000 per annum was voted for the purpose of establishing telegraphic connection with the Island of Anticosti and the Magdalen Islands and Bird Rock. Such grant was, however, found to be insufficient to induce any company to undertake to lay, construct and maintain the submarine cables and land lines necessary for the service; but during the session of 1880, the above grant was capitalized by a vote of \$200,000, for construction only. A contract was then entered into with the "India Rubber, Gutta Percha and Telegraph Works Company, Limited" of London, England, to furnish and lay the cables, between the coast of Gaspé and Anticosti, between Cape Breton, Nova Scotia, and the Magdalen Islands and between Grosse Ile and the Bird Rock, Magdalen Islands.

These cables were duly laid under the superintendence of Mr. F. N. Gisborne, during October, 1880, and the land lines were completed under a contract entered into with Messrs. Bertrand & Kennedy, Province of Quebec, during October 1881.

The total cost of the above service, including the unanticipated construction of a land line through Cape Breton, at an expense of \$14,465, and also including the cost of fitting up the SS. "Newfield" with tanks and cable-laying machinery at a cost of \$20,000, plus \$15,000 paid to the Department of Marine and Fisheries for the use of said vessel, and about \$5,000 for general expenses, is \$196,875.

Bay of Fundy.

The submarine cables between Grand Manan and Campobello and between the latter Island and Eastport, State of Maine, were also charged to the aforesaid grant of \$200,000. Their cost, including the land line connections, being \$12,925.

These cables were laid by Mr. F. N. Gisborne, during November 1880. Mr. T. M. Robinson, of St. John, N.B., being the contractor for the land lines.

Cape Breton.

The "Anglo American Cable Company" which owns exclusive privileges for landing cable on Prince Edward Island, having refused to permit the landing of the Magdalen Island Cable, on Prince Edward Island, unless the Government would acknowledge their monopoly, it necessitated the adoption of the Cape Breton route. This land line was therefore erected for the Government at cost price, by the Dominion Telegraph Company, and was completed during January, 1881, at an outlay of \$13,915.

The North Shore of the St. Lawrence.

The Government, having determined to connect Quebec with the entrance to the Straits of Belle Isle, finally entered into a contract with the Montreal Telegraph Company to extend their lines eastward from Murray Bay, (with a branch between Bay St. Paul and Chicoutimi) to Mille Vaches, during the year 1881, with a view to its gradual prolongation eastward as hereafter determined upon by Parliament. The foregoing section was completed by the submergence of a submarine cable armored with phosphor bronze wires, (the first so constructed) by Mr. F. N. Gisborne, 24th Nov., 1881, the total cost to date being \$25,130.

Atlantic coast.

By a cash payment of \$16,000, to the Dominion Telegraph Company, they constructed and agreed to maintain, a shore route telegraph line 208 miles in length between Canso and Halifax. This line was erected in connection with the signal stations to be established upon the adjacent Islands, and upon which light-houses have been erected by the Department of Marine and Fisheries.

N.B. The Montreal Telegraph Company received a similar sum for erecting the coast telegraph lines of Gaspé in connection with the signal service.

British Columbia.

According to the terms of Confederation, in 1872 the Dominion Government agreed to maintain the system of telegraphy then in existence within the Province of British Columbia. The Local Government had previously leased the lines constructed between the boundary line near Matsqui to New Westminster and also to Guesnelle, from the Western Union Telegraph Company, the terms being:—1st. That the Local Government should effectively maintain and operate the land lines and also the 16 miles of submarine cables between Vancouver Island and Washington Territory *via* St. Juan Island; 2ndly. That the Local Government should maintain and operate the land lines between the La Connor and the boundary line near Matsqui, through Washington Territory; 3rdly. That the Western Union Telegraph Company should operate and be entitled to the receipts of the Victoria Telegraph Station, and finally, that the Government should pay the company a subsidy of \$4,000 per annum.

During the latter part of 1879, Mr. Gisborne was sent to British Columbia, for the purpose of reorganizing the service and to negotiate terms with the company for a new agreement the result being, that at the close of 1880, the Government purchased the Company's telegraph system in British Columbia, for the sum of \$24,000 and otherwise effected economies equivalent to the sum of over \$25,000 per annum.

Miscellaneous.

1. A short line of telegraph has been erected, 5 miles in length, between the signal station at Low Point and Lingan, Cape Breton, at a cost of \$562.

2. Another short line (14 miles) between the lighthouse and signal station at Cape Ray and Port-au Basque, Newfoundland, is to be erected by the Anglo-American Cable Company to whom the Government are to pay \$250 per annum in compensation for construction and maintenance.

Signal Service.

Signal stations have been established at the light-houses upon the south shore of the St. Lawrence, Anticosti and the Magdalen Islands, Province of Quebec, and Cape Breton, Province of Nova Scotia, at a cost of about \$3,000; and Semaphores, the invention of Mr. Gisborne, have been erected at Rivière-du-Loup and the Brandy Pots Island at a cost of about \$1,800. These signals being clearly visible at ten miles distance renders it easy, and at small cost, to place the light-house signal stations upon outlying Islands, in communication with the telegraph offices already established upon the coast of Canada.

**TELEGRAPH AND SIGNAL SERVICE.
NEWFOUNDLAND TELEGRAPH SYSTEM.**

No.	STATIONS.	Intermediate Distances. Miles.	Operators.	Salary per annum.	Date of Appointment.	MEMO.
1	Port au Basque.....	0	.....	\$ cts. 50.00 or Com'n.....	.....	N.B.—The Commission is 25 p.c upon all business to and from the office; said commission guaranteed not to be less than at the rate of \$50 per annum.
2	Cape Ray Lighthouse	14	.....	50.00 do	.....
Totals.....		14		100.00		

Cost of land line, \$1,500; Interest thereon at 5 p.c..... \$ 75 00
 Estimated annual maintenance and repairs..... 175 00
Total..... \$250 00 { Required in Estimates,
 1882-83.

N.B.—The above short line is to be constructed in connection with the signal service and will connect at Port au Basques with the land line and cable system of the Anglo American Telegraph Company.

NOVA SCOTIA TELEGRAPH SYSTEM.
LOW POINT, CAPE BRETON, SECTION.

No.	STATIONS.	Intermediate Distances. Miles.	Operators.	Salary per annum.	Date of Appointment.	MEMO.
1	Lingan	0	.....	\$ cts. 50 00 or Com'n.....	.....	N.B.—The Commission is 25 p. c upon all business to and from the office; said commission guaranteed not to be less than at the rate of \$50 per annum.
2	Low Point Lighthouse.....	5	S. Peters.....	50 00 do	Aug. 1, 1881	
	Totals.....	5		100 00		

Cost of land line..... \$635 30

Estimated annual maintenance and repairs:—

Land lines. Salaries and repairs..... \$150 00 { Required in Estimates,
1882-83.

Less probable revenue..... 5 00

Balance deficit..... \$145 00

EAST COAST SECTION.

N.B.—In connection with the Signal Service a land line 208 miles in length has been erected between Canso and Halifax for a bonus of \$16,000, and is now maintained and operated by the Western Union Telegraph Company without further cost to the Government. *Vide* Signal Service, page 20.

TELEGRAPH AND SIGNAL SERVICE—Continued.

BAY OF FUNDY, N.B., TELEGRAPH SYSTEM.

GRAND MANAN SECTION.

STATIONS.	Intermediate Distances. Miles.	Operators.	Salaries per annum.	When Appointed.	MEMOS.
<i>Long Eddy Cable Hut, to</i>					
1 Flegg's Cove.....	3	H. C. Sealy, D. Supt.....	\$ cts. 360 00	Nov. 18, 1880	N.B.—The Commission is 25 p.c. upon all business to and from office; said Commission guaranteed not to be less than at the rate of \$60.00 per annum.
2 Woodward's Cove.....	6	W. A. Fraser.....	50 00 or Com'n.	Nov. 26, 1880	
3 Grand Harbor.....	2	Miss Josie Crouk.....	50 00 do	Jan. 18, 1881	
4 Seal Cove.....	4½	.....	50 00 do	.....
5 Southern Head Light-house...	5½	Wood McLaughlin.	50 00 do	Jan. 18, 1881	
		D. McKay, Repairer	60 00	May 1, 1881	
Total.....	21		620 00		

Cost of land lines..... \$2,000 00

CABLE.

Length of Cable, Long Eddy, Grand Manan, to Liberty Cove, Campo Bello, 7½ nau. miles... 8,000 00

Total..... \$10,000 00

No.	STATIONS.	Intermediate Distances. Miles,	Operators.	Salaries per annum.	Date of Appointment.	MEMOS.
1	<i>Liberty Cove Cable Hut, to Welchpool</i>	7½	G. M. Byron.....	\$ cts. 100 00 or Com'n.	May 1, 1881	This office was worked by G. M. Mabee, from 1st February to 30th April, 1881, at \$20 per month.
2	Eastport Maine, U.S.A.....	½	J. Cushing.....	100 00	Dec. 26, 1881	
	Total.....	8		200 00		

Cost of land lines..... \$ 825 00

CABLE.

Cable 1,188 nautical miles, Welchpool, Campobello to Eastport, Maine, U.S.A..... 2,100 00
 Total \$2,925 00

TOTAL COST BAY OF FUNDY TELEGRAPH SYSTEM.

Land lines, 29 miles cost \$2,825 00
 Cables, 9,188 nautical miles cost..... 10,100 00
 Total..... \$12,925 00

ESTIMATED COST OF ANNUAL MAINTENANCE AND REVENUE.

Land lines. Salaries and repairs \$1,000 00
 Cable. Repairs, probably..... 1,500 00
 Total..... \$2,500 00 { Required in Estimates
 Less probable revenue..... 750 00 1882-83.
 Balance deficit..... \$1,750 00

TELEGRAPH AND SIGNAL SERVICE—Continued.
MAGDALEN ISLANDS TELEGRAPH SYSTEM.
MAGDALEN ISLANDS SECTION.

No.	STATIONS.	Intermediate Distances. Miles.	Operators.	Salaries per annum.	Date of Appointment.	MEMOS.
1	Amberst.....	0	Miss Campbell.....	\$ cts. 50 00 or Com'n.	June 10, 1881	N.B.—The Commission is 25 p.c. upon all business to and from the office; said commission guaranteed not to be less than at the rate of \$50 per annum.
2	Amherst Lighthouse.....	9	Wm. Cormier.....	50 00	June 11, 1881	Plus \$30 per annum for rent. General line-repairer.
3	Etang dn Nord Village.....	15	P. Pelletier.....	360 00	Dec. 1, 1881	2 wire loop.
4	do Lighthouse.....	1	Miss O'Brien.....	50 00 or Com'n.	.....	1 mile loop.
5	House Harbor.....	8	P. Joncas.....	50 00	.....	Short cable of 750 feet in length.
6	Wolf Island.....	28½	N. Clark.....	50 00	Sept. 25, 1881	Plus \$1 per day when absent on duty.
7	Grosse Isle.....	11	A. LeBourdais, D. Supt..	500 00	Aug. 17, 1880	
8	Bird Rock.....		T. Turbide.....	50 00 or Com'n.	Aug. 20, 1881	
9	Grand Entry.....		Miss McPhail.....	50 00	.....
	Totals.....	83½		1210 00		

Cost of above land lines complete, with instruments, at \$130 per mile..... \$10,855 00

CABLES.

Distance, Grosse-Isle to Bird Rock, 18 ³ / ₁₆ nautical miles	} At a general average cost of about \$1,100 per mile laid down, 73 ¹ / ₁₆ miles.....	
" " " " " " " "		80,630 00
" " " " " " " "		
Total.....		\$91,465 00

No.	STATIONS.	Intermediate Distances. Miles.	Operators.	Salaries per annum.	Date of Appointment.	MEMOS.
1	Meat Cove.....	0	A. B. McDonald.....	\$ cts. 420 00	Nov. 7, 1880	<p>N.B.—The commission is 25 p. c. upon all business to and from the office; said commission guaranteed not to be less than at the rate of \$50 per annum.</p> <p>General Repairer. Plus \$1 per day when absent on duty.</p> <p>N.B.—This section is at present operated and maintained by the Dominion Telegraph Company, but at the cost of the Government. The agreement is for ten years (expiring 18th April, 1891) but can be cancelled on one year's notice.</p>
2	Aspie Bay.....	10½	R. G. Zwicker.....	50 00 or Com'n.		
3	O'Neil's Harbor (½ way house)	16	.....	50 00 do	
4	Ingonish North Bay.....	9	J. W. Bourke.....	50 00 do		
5	Ingonish Harbor.....	10½	.....	360 00	
6	McLennan's.....	23	.....	50 00 or Com'n.	
7	St. Anne's South Bay.....	19	.....	50 00 do	
8	Baddeck (Loop line).....	13	Miss Dunlop.....	50 00 do		
9	Englishtown.....	6	Miss McLean.....	50 00 do		
10	Kelly's Cove.....	2	C. Campbell.....	50 00 do		
11	Big Bras d'Or.....	6	H. Campbell.....	50 00 do		
12	North Sydney.....	12½	.....	.....
	Total.....	126½	.....	1230 00	

Cost of above land lines complete, with instruments, at \$110 per mile..... \$13,915 00

CABLE.

Crossing Big Bras d'Or, ½ nautical mile..... 550 00

\$14,465 00

TOTAL COST MAGDALEN ISLANDS SYSTEM.

Land lines, 210 miles cost..... \$24,770 00

Cables, 73¹⁰⁰/₁₀₀ nautical miles cost..... 81,180 00

\$105,950 00

ESTIMATED COST OF ANNUAL MAINTENANCE OF MAGDALEN ISLANDS SYSTEM.

Land lines. Salaries and repairs..... \$3,500 00

Cable. Repairs, say..... 1,000 00

Total..... \$4,500 00 { Required in Estimates, 1882-83.

Less probable revenue..... 1,000 00

Balance deficit..... \$3,500 00

TELEGRAPH AND SIGNAL SERVICE—Continued.
ANTICOSTI TELEGRAPH SYSTEM.
ANTICOSTI ISLAND SECTION.

No.	STATIONS.	Intermediate Distances. Miles.	Operators.	Salaries per annum.	Date of Appointment.	MEMOS.
1	Fox Bay.....	0	Miss Nickerson.....	\$ cts. 50 00 or Com'n.	Aug. 11, 1881	N.B.—The Commission is 25 per cent. upon all business to and from the office; said Commission guaranteed not to be less than at the rate of \$50 per annum.
2	Heath Point Light-house	23	Mr. Gagnon.....	50 00 do	July 20, 1881	General Repairer. Plus \$1 per day when absent on duty.
3	South Point Light-house.....	32½	Mr. Carter.....	50 00 do	July 27, 1881	
4	Shallop Creek	17½	Mr. Bradley.....	50 00 do	July 7, 1881	
5	Salt Lake.....	52½	F. Denault.....	360 00	.....
6	South-West Point Light-house	15	Miss Denault.....	50 00 or Com'n.	.....
7	Jupiter River.....	7	Miss E. Pope.....	50 00 do	Oct. 18, 1880	District Superintendent. Plus \$1 per day when absent on duty.
8	Otter River.....	17½	J. A. Lebourdais.....	450 00	Aug. 17, 1881	
9	Beesie River	22	Miss Ascab.....	50 00 or Com'n.	Plus \$1 per day for her father when he is absent on repairing duties.
10	Cape Eagle (Ellis Bay).....	10	Mr. Malouin.....	50 00 do	Oct. 8, 1881	
11	West Point Light-house.....	14	.....	50 00 do	Aug. 1, 1881
12	English Bay.....	3	.....	50 00 do	.....
	Totals.....	214		1,410 00		

Cost of land lines complete at (say) \$165 per mile..... \$36,300 00

CABLE.

S. W. Point Light-house to L'Anse à Fongère, Gaspé, 44,37½ nautical miles at \$1,100 laid down. 48,700 00

Total..... \$84,000 00

STATIONS.	Intermediate distances. Miles.	Operators.	Salaries per annum.	Date of Appointment.	MEMOS.
1 L'Anse à Fougère.....	0		\$ cts. 50 00 or Com'n.		N.B.—The Commission is 25 per cent. on all business to and from the office; said Commission guaranteed not to be less than at the rate of \$50 per annum. Plus his salary as operator for the Montreal Telegraph Company.
2 Gaspé Basin.....	28 <hr style="width: 50px; margin: 0 auto;"/> 28	J. J. Annett.....	100 00 <hr style="width: 50px; margin: 0 auto;"/> 150 00	Oct. 16, 1881..	

Cost of land line..... \$1,925 00

TOTAL COST OF ANTICOSTI TELEGRAPH SYSTEM.

Land lines, 242 miles..... \$37,225 00
 Cable 44¹/₁₀ nautical miles..... 48,700 00
 Total..... \$85,925 00

ESTIMATED COST OF ANNUAL MAINTENANCE AND REVENUE.

Land lines. Salaries and repairs..... \$3,500 00
 Cable. Repairs, say..... 500 00
 Total..... \$4,000 00 { Required in Estimates
 Less Revenue, probably..... 500 00 { 1882-83.
 Balance deficit..... \$3,500 00

N.B.—In connection with the Signal Service a land line 206 miles in length has been erected between Grand Metis and Gaspé Basin for a bonus of \$16,000, and is now maintained and operated by the Great North Western Telegraph Company without further expense to the Government. *Vide* Signal Service, page 20.

TELEGRAPH AND SIGNAL SERVICE—Continued.
CHICOUTIMI AND NORTH SHORE OF ST. LAWRENCE TELEGRAPH SYSTEM.

CHICOUTIMI SECTION.

STATIONS.	Intermediate Distances. Miles.	Operators.	Salaries.	Date of Appointment.	Memos.
1 Bay St. Paul.....	0	The Operators on this line are appointed and paid by the Company operating the line.	This line was completed Sept. 1st 1881. This line is operated and maintained by the Great North Western Telegraph Company, (assignees of the Montreal Telegraph Company) per agreement to that effect.
2 St. Urbain.....	9		.....	.....
3 Petit Lac Ha Ha.....	37		.....	.....
4 St. Alexis.....	3½		.....	.....
5 St. Alphonse de Bagotville.....	3		.....	.....
6 Chicoutimi.....	11½		.....	.....
Total.....	92				

CONSTRUCTION.
 Cost of land line complete, at \$135.00 per mile..... \$12,420 00

MAINTENANCE.

Included in agreement with Montreal Telegraph Company for North Shore Section.

NORTH SHORE SECTION.

STATIONS.	Intermediate Distances.	Operators.	Salaries.	Date of Appointment.	Memos.
1 Murray Bay.....	0	The Operators on this line are appointed and paid by the Company operating the line.	The line to Anse du Portage was completed 23rd July, 1881. The line to Mille Vaches was completed 7th November 1881. 1 Nautical mile of this distance is Submarine Cable which was laid November 21st, 1881.
2 St. Fidèle.....	10		.....	.....
3 St. Simeon.....	11		.....	.....
4 Anse du Portage.....	23		.....	.....
5 Tadoussac.....	2		.....	.....
6 Bergeronnes.....	10		.....	.....
7 Escoumains.....	10		.....	.....
8 Mille Vaches.....	2½		.....	.....

10 Fortneuf Village.....	2			
11 Fortneuf Lighthouse.....	7			
12 Sault au Cochon.....	254			
13 Beaudamite.....	12			
14 Pointe aux Outardes.....	16			
15 Manikougan.....	27			
16 River Godbout.....	12			
17 Pointe des Monts.....	12			
18 Sept Isles.....	68			
19 River Moisy.....	19			
20 River Chaloupe.....	45			
21 Poste de Mingan.....	50			
22 Pointe aux Esquimaux.....	18			
23 Natashquan.....	64			
24 Tohiskaska.....	18			
25 Wapitagan.....	42			
26 Mecatina.....	33			
27 Shecatica.....	50			
28 Bonne Espérance.....	49			
Blanc Sablon.....	24			
Total.....	676½			

This section of the North Shore line yet to be completed.

This line (as far as completed) is to be operated and maintained by the Great North Western Telegraph Company (assignees of the Montreal Telegraph Company) per agreement to that effect.

Loop line.

CONSTRUCTION.

Cost of land line complete to Mille Vaches, at \$135.00 per mile.....	\$11,610 00
Cost of one knot Phosphor-Bronze Covered Cable, laid across the entrance of River Saguenay, from Anse du Portage to Anse à l'Eau, near Tadoussac.....	1,100 00
Total.....	\$12,710 00

MAINTENANCE OF CHICOUTIMI AND NORTH SHORE SECTIONS.

Per agreement (terminating five years from completion of the whole of the lines which the Company contract to build) with the Montreal Telegraph Company... \$1,600 per annum. { Required in Estimates for 1882-83.

Plus revenue—as per Order in-Council, No. 14,845, June 22nd, 1881—when the North Shore Section now completed to Mille Vaches, shall have reached Pointe des Monts.

TELEGRAPH AND SIGNAL SERVICE—Continued.
BRITISH COLUMBIA TELEGRAPH SYSTEM.

No.	STATIONS.	Intermediate Distances. Miles.	Operators.	Salaries per month.	Date of Appointment.	MEMOS.
1	Victoria.....	0	Miss S. A. McClure.....	\$ cts. 80 00	.....	Repairing allowance, \$2.50 per day.
2	do Cowichan.....	31	J. H. Carmichael..... H. L. Good.....	60 00 50 00	.....	2 miles being cable. Repairing allowance, \$1 per day.
3	Chemainus.....	17	P. D. Conway.....	50 00	.....	Repairing allowance, \$1 per day.
4	Nanaimo.....	25	W. A. Lindsay.....	60 00	.....	do \$4 do
5	Departure Bay.....	3½	.....	.....	.....	\$50 per cent. Commission on all business between Nanaimo and Departure Bay.
6	Valdes.....	16	J. Wake.....	50 00	.....	1 mile being cable.
7	Granville.....	35	S. McClure.....	50 00	.....	20 miles being cable. Repairing allowance, \$2 per day.
8	New Westminster..... do	11½	J. Wilson, District Supt.. W. F. Archibald.....	108 33 100 00	.....	Repairing allowance, \$4 per day. Western Union Telegraph Company pay Government this amount
9	do Matsqui.....	36	E. LaForest..... J. McClure.....	60 00 60 00	.....	Plus 36 miles of 2nd line wire. Repairing allowance, \$1 per day.
10	Chilliwack.....	22	J. McCutcheon.....	50 00	.....	Repairing allowance, \$1 per day.
11	Hope.....	36	Miss E. M. Wirth.....	50 00	.....	.....
12	Yale.....	13	A. Lindsay.....	50 00	.....	Postmaster, &c. Repairing allowance, \$2 per day.
	do		D. M. McMillan.....	30 00	.....	.....
13	Boston Bar.....	25	J. A. Callaghan.....	50 00	.....	Repairing allowance, \$2 per day.
14	Lytton.....	32	J. J. McKay.....	60 00	.....	\$20 per month for horse-feed.
15	Spencer's Bridge.....	23	O. O'Hara.....	50 00	.....	Repairing allowance, \$2 per day.
16	Cache Creek.....	30	J. C. McClure.....	50 00	.....	do \$2.50 do
17	Savona's Ferry.....	22 }	Miss J. Wren.....	50 00	.....	do \$2 do } Branch Line.
18	Kamloops.....	26 }	L. Coates.....	50 00	.....	do \$2 do }
19	Clinton.....	26	M. O'Connor.....	50 00	.....	Postmaster, etc. Repairing allowance, \$2.50 per day.
20	Bridge Creek.....	53	Wm. Walker.....	50 00	.....	\$10 per month for horse-feed.
21	Hamiltons.....	50	G. Hamilton.....	.....	.....	50 per cent. Commission on all business to and from office.
22	Soda Creek.....	28	Henry Yates.....	60 00	.....	\$15 per month for horse-feed.

24 Stanley	49	James Stone	63 33	50 per cent. Commission on all business to and from office.
25 Barkerville	13	Plus 36 miles of duplicate wire.	1,508 66	Postmaster, &c. Repairing allowance, \$3 per day.
Totals		676 1/2		1,508 66 per month = \$18,104 per annum.

TOTAL COST OF BRITISH COLUMBIA TELEGRAPH SYSTEM FROM JUNE 30TH, 1880.

430 miles land lines and 16 knots of sub-marine cables purchased from Western Union Telegraph Company	\$24,000 00
Additional amount expended and to be expended to put land service in good order	12,000 00
Value of 210 miles additional new lines erected, say at a cost of \$100 per mile	21,000 00
New cable laid, including cost of "Electron," say 26 knots at \$1,100 per mile	28,600 00
Total present value	\$85,600 00

ESTIMATED COST OF ANNUAL MAINTENANCE AND REVENUE.

Land lines. Salaries and repairs	\$28,000 00	
Cables. Repairs, say	2,000 00	
Total	\$30,000 00	} Required in Estimates for 1882-83.
Less revenue, probably	20,000 00	
Balance deficit	\$10,000 00	

SIGNAL SERVICE.

No.	Name of Station.	Signals in use.	Location.	Marine miles below Quebec approximate.
1	L'Islet.....	Flags.....	South Shore of River St. Lawrence.....	43
2	Rivière du Loup.....	Semaphore..	do	85
3	Brandy Pots	do	do	85
4	Rimouski.....	Flags.....	do	150
5	Father Point Lighthouse.....	do	do	155
6	Little Metis Lighthouse.....	do	do	175
7	Matane Lighthouse.....	do	do	196
8	Cape Chatte Lighthouse.....	do	do	239
9	Martin River Lighthouse.....	do	do	255
10	Cape Magdalen Lighthouse.....	do	do	280
11	Fame Point Lighthouse.....	do	do	300
12	Cape Rosier Lighthouse.....	do	do	364
13	Cape Despair Lighthouse.....	do	Gaspé Coast, Gulf of St. Lawrence.....	384
14	Pointe Maquereau Lighthouse	do	do	400
15	West Point Lighthouse.....	do	Island of Anticosti.....	360
16	South West Point Lighthouse.....	do	do	356
17	South Point Lighthouse.....	do	do	413
18	Heath Point Lighthouse, East end of.....	do	do	436
19	Amherst Island Lighthouse.....	do	Magdalen Islands.....	455
20	Grosse Isle.....	do	do	475
21	Bird Rocks Lighthouse.....	do	do	480
22	Meat Cove, near Cape St. Lawrence, the Landing place of Magd'n Islands cable.	do	Cape Breton	530
23	Low Point Lighthouse	do	do	575
24	Cape Ray Lighthouse	do	Newfoundland	551
25	Pointe Lepreaux	do	New Brunswick	

The International Code of Signals is in use at the above stations.

Cost of construction	\$4,000 00	
Cost of maintenance, including fishery bulletins and telegrams.....	5,000 00	{ Required in Estimates 1882-83.

RECAPITULATION.

Total length of land lines in operation	1,769½ statute miles.	} Including 414 miles of land lines erected for a bonus of \$32,000 account signal service.
do do 13 submarine cables.....	154½ nautical "	
do cost value of the 8 systems.....	\$352,650 00	
do do of annual maintenance, about.....	48,000 00	
do amount of revenue, about.....	22,255 00	

N.B.—The total deficit for the whole service, viz., \$25,745 for 1881-82, will be about *one-half* of the nett deficit for British Columbia alone during 1878-79; the names of passing vessels, fishery bulletins and meteorological reports being transmitted free of charge over Government lines.

30th November, 1881.

F. N. GISBORNE,
Superintendent.

P.S.—For my report upon the Telegraph and Signal Service of Manitoba and the North West Territory, *vide* Department of Railways and Canals.

F. N. G.

 APPENDIX No. 11.

 LETTER FROM THE MONTREAL BOARD OF TRADE ON THE GULF
 TELEGRAPHIC SYSTEM.

No. 19372.

OFFICE BOARD OF TRADE,

MONTREAL, 2nd December, 1881.

SIR,—Since the close of the shipping season, the Council of this Board has had its attention drawn to a number of particulars which afford further proof of the value of the extension of the Telegraphic system to the Gulf of St. Lawrence and Islands, inasmuch as the scheme being carried out by the Government has already led to the saving of life and property by making it possible to *render immediate assistance* to stranded or wrecked vessels. The importance of the project has, moreover, been made doubly valuable, inasmuch as by its instrumentality, efficient aid and succour was rendered very recently to distressed and famishing people on the Island of Anticosti. There can hardly be a doubt but that the weather and fishery bulletins which have been issued during a considerable part of the past season, have been of great service to the Gulf fishing interests of Canada.

The Council has watched with a great deal of interest, the progress that has been made from year to year since the project was initiated; and I am very respectfully to communicate to you its earnest hope that the work of extension will continue to be vigorously prosecuted, and especially that the North Shore Line may be continued to the eastward and along the straits of Belle Isle to Point Amour in Forteau Bay, for the substantial reason that such an extension would prepare the way for establishing a calling station during the season of navigation for steamships coming to, or going from, the St. Lawrence River.

I am therefore desirous to solicit your consideration of what is herein submitted, and your decision in favor of the great maritime interest that would be promoted thereby.

I have the honor to be,

Sir,

Your obedient servant,

WM. J. PATTERSON,

Secretary.

Hon. SIR HECTOR L. LANGEVIN, K.C.M.G., C.B.,
 Minister of Public Works,
 Ottawa.

APPENDIX No. 12

LETTERS FROM HON. P. FORTIN, M.P., ON THE TELEGRAPH AND SIGNAL SERVICE SYSTEM IN THE GULF OF St. LAWRENCE; ON THE UNITED STATES SIGNAL SERVICE; AND ON THE NORWEGIAN TELEGRAPH SYSTEM.

THE GULF SYSTEM.

(Translation.)

OTTAWA, 28th November, 1881.

No. 19591.

SIR,—In the early part of the month of May, 1875, six large steamers carrying over one thousand persons and valuable cargoes in addition, were considerably delayed, some of them for several weeks, in their course through the gulf of St. Lawrence. They were of course the vanguard of the fleet of steamers which enter our ports of Quebec and Montreal every year.

Great anxiety resulted in Canada, in the United States and in Europe, as may well be fancied. There were no means of communication whatsoever with the coasts or islands near which these vessels might be. Had they foundered on the high seas? Had they been driven ashore by the ice? Or were they simply detained by an impassable ice barrier, at the entrance of the gulf? No one knew, no one could know.

The idea of a telegraphic system for our coasts and the islands of the gulf, was mooted in consequence of the commotion caused in maritime circles by fears for the safety of those vessels. I must add that it then became evident that a powerful auxiliary was needed for the navigation of the St. Lawrence. The press received the suggestion with favor, and the ship-owners and seamen gave it their best support, for they saw that it was a new means of developing the navigation of that magnificent river.

In 1876, a committee of the House of Commons, after an examination of the proposed system of telegraphs, its advantages and probable cost, reported strongly in favor of the establishment of the system.

The Government soon took the matter in hand, for public opinion evidently demanded it; and in 1879, a sum of \$35,000 was voted by Parliament, of which \$20,000 was for a coast line between Halifax and Canso. The remaining \$15,000 was to be an annual permanent grant offered in order to induce capitalists to construct and work the telegraphic system of the Magdalen Islands and Anticosti.

But the attempt did not succeed, for the undertaking seemed to be a hazardous one, though it was not so in reality.

In the following year, 1880, \$10,000 of the grant of \$15,000 was capitalized at 5 per cent, which gave (\$200,000) two hundred thousand dollars; and so soon as that amount had been voted by Parliament, the Department of Public Works began the work in earnest. A special service was organized in that Department, called "The Telegraph and Signal Service," and it was placed under the superintendence of Mr. F. N. Gisborne, whose acquirements and skill in all matters relating to land or marine telegraphy are well known.

I have recurred to these facts in this letter for the purpose of shewing that it was only after five years of work and enquiry that the idea of coast telegraphs as an adjunct to the navigation of the gulf and river St. Lawrence was put in execution.

Since then the work of constructing the land lines and laying the electric cables has been carried on with reasonable rapidity. The work has been well and economically done, and the materials used are of the best quality. The Magdalen Islands and Anticosti systems estimated at (\$200,000) two hundred thousand dollars, have cost in fact only (\$180,000) one hundred and eighty thousand dollars, and with the balance most useful coast lines have been constructed in Nova Scotia and New Brunswick, besides among others the system of Grand Manan Island.

I give below a statement for which I am indebted to the kindness of Mr. Gisborne, showing the lines in operation and the number of miles of land telegraph in operation and the number of miles of submarine cable laid.

I.

MAGDALEN ISLANDS AND CAPE BRETON SYSTEM.

The system consists of:—

83½ miles of line on Magdalen Islands.

54½ miles of electric cable between Magdalen Islands and Cape Breton, and the line from Meat Cove to Sydney 113½ miles, to which must be added 13 for the Baddeck line, making a total of 126½ miles,

There are (9) nine stations in operation on the Magdalen Islands and in Cape Breton.

II.

THE ISLAND OF ANTICOSTI.

This system consists of the following:—

Line from Gaspé Basin to Anse à Fougère, 28 miles.

Electric cable between Anse à Fougère and the Island of Anticosti, 44 miles;

Line on the Island of Anticosti, 213½.

There are (7) seven telegraph stations, of which four are also signal stations, in full operation on the Island of Anticosti.

III.

NORTH SHORE OF THE RIVER AND GULF OF ST. LAWRENCE.

This system includes the following:

A line between Bay St. Paul and Chicoutimi; this is a branch line for the Saguenay navigation.

The principal line starts from Malbaie (Murray Bay). It was commenced last year and, this fall, reached the village of Mille Vaches.

A cable one mile in length was laid across the Saguenay.

Line from Murray Bay to Mille Vaches, 86 miles.

There are (8) eight stations in operation.

IV.

COAST LINE FROM HALIFAX TO CANSO, N.S.

This system consists of a line erected along the coast, which will hereafter be placed in communication with the lighthouses erected on the Islands bordering the coast, by means of semaphores.

Length, 210 miles.

There are (17) seventeen stations in operation.

V.

GRAND MANAN ISLAND SYSTEM.

This system consists of a line crossing the island at its greatest width, a length of $28\frac{1}{2}$ miles, with a cable $9\frac{1}{10}$ miles connecting the island with the main-land opposite.

There are (6) six stations in operation.

This gives for the Province of Quebec :

502 $\frac{1}{2}$ miles of land line,
7 $\frac{1}{2}$ " electric cable.

For the Province of Nova Scotia :

361 $\frac{1}{2}$ miles of land line,
36 " electric cable.

For the Province of New Brunswick :

28 $\frac{1}{2}$ miles of land line,
 $9\frac{1}{10}$ " electric cable.

Total.

Telegraph lines on land, 895 $\frac{1}{2}$ miles.

Submarine electric cables, 119 "

Total number of Stations, 47.

GULF OF ST. LAWRENCE.

PROPOSED LINES.

The Magdalen Islands and Anticosti systems being completed and in full operation, we must deal with the line on the north shore.

At first it was considered impossible to reach the Strait of Belle-Isle, in view of the apparent difficulty of such an undertaking, at certain points on the coast. But, in 1878, after further examination, the idea of extending the line to Forteau Bay, in the Strait of Belle-Isle, was mooted and received with favor by the press and the public. The more the matter is looked into the more it becomes evident that, inasmuch as the whole of the steam fleet and many sailing vessels have adopted the Strait of Belle-Isle as the most direct and shortest route from the Atlantic to Quebec and Montreal, they should be afforded facilities in the form of telegraphic communication with the coasts, harbors and bays of that Strait.

Now at the present moment, these coasts which are almost uninhabited, and which are sterile and afford no resource except the fisheries, are still entirely without communication either by postal service or by telegraph, with the rest of the country. And if an accident happens to a vessel on these coasts there are no means whatever of promptly making known her dangerous position and of summoning help in time.

The interests of commerce then, urgently call for the extension of the telegraph line on the north shore as far as Forteau Bay, or rather to Point Amour (which is east of that bay and where there is a lighthouse and fog-whistle) to meet the requirements of navigation.

But we shall gain something more by the opening of this line, for when we have a telegraph station at Point Amour lighthouse, which will then be in constant connection with Canada, the United States, and in fact the whole world, it will be possible to land at Forteau Bay, which is easy of access at all times during the season of navigation, despatches, lists of passengers, private messages, &c., &c., after a run of five days only from Moville, Ireland. This would then be the most rapid route for the transmission of news from Europe to America by steamer, and in that respect it would confer an undoubted superiority on Canada. It would be in a sense a realization of the greatly desired five-day journey between Europe and America.

As a matter of fact the sea voyage can only be said to last so long as you are on the wide seas and as it were cut off from the world and utterly unable to communicate with the land, that is to say, during the ocean voyage between Merville and Forteau. Once that port made, vessels would once more be in communication with the whole world by means of the telegraph. What is still more, between Forteau and Quebec other means of communication would be available, viz:—

1st The telegraph stations and signal stations of the Island of Anticosti, nine in number;

2nd The stations on the south shore of the St. Lawrence from Gaspé to Québec, numbering ten, being a total of nineteen.

It seems to me that this is a national work, that it forms part of the system of coast telegraphs, which should be put in operation as soon as possible if we desire to keep pace with our neighbours or compete with them successfully in the important matter of the carrying trade between Europe and America.

But I have been looking at the project under one of its aspects only. See what useful and profitable service this telegraph line would render to the vast and well known fisheries of Labrador and to vessels in distress on those remote and isolated coasts.

NORTH SHORE TELEGRAPH LINE CONSIDERED AS AN AUXILIARY TO THE FISHERIES.

The Government has been (and I think still is) negotiating with the Montreal Telegraph Company for the extension of this line next spring from Mille Vaches to Point des Monts.

Moreover, as there are no maritime fisheries or very few in this locality, the remarks I am about to make on the Labrador fisheries will apply only to the coast line extending from Point des Monts to Anse aux Blancs Sablons, the eastern limit of Canada, and Forteau is only twelve miles further east than Blancs Sablons.

I shall divide the coast into two parts:—The first extends from Point des Monts to Esquimaux Point, the latter point being an incorporated village with over fifteen hundred inhabitants, all fishermen.

Extent of coast, 190 geographical miles.

Number of harbors and fishing stations.....	25
“ fishing schooners.....	41
“ fishing boats.....	445
“ men employed in the fisheries.....	2,113

The second part extends from Esquimaux Point to Anse aux Blancs Sablons, the eastern limit of Canada, and thence to Forteau Bay, which is only 12 miles further.

Extent of coast in geographical miles.....	290
Number of harbors and fishing stations.....	25
“ fishing schooners.....	22
“ “ boats.....	298
“ men employed in the fisheries.....	820

Value of products of the various fisheries of this coast in 1880, \$1,401,283.95.—One million four hundred and one thousand two hundred and eighty-eight dollars, ninety-five cents.

I take the following from the report, 1880, of the officer in charge of the expedition for the protection of the fisheries in the Gulf of St. Lawrence, Dr. Wakeham.

In the chapter headed “Cod,” page 76 of his report, the Doctor says, speaking of the north shore:—

“This fishery has been one of unusual abundance. The season was far advanced before the fishing began, but there seemed to be no limit to the quantity of fish. The various fishing establishments were taxed to the utmost to handle the fish, and in some cases there was a scarcity of salt for curing purposes. Had we had telegraphic communication with the north shore, as I trust we will have before

“ very long, many of our south shore fishermen would have abandoned the fishing on the south shore and taken themselves and appliances across to the north shore where the fishing was so good.

* * * * *

“ There must have been at least 500 schooners cod-fishing off St. Augustine and Bonne Espérance Divisions.”

Dr. Wakeham estimates at 175,000 cwts., the quantity of cod taken by these schooners, most of which belong to the Maritine Provinces.

Thus Dr. Wakeham does not hesitate to assert that with a telegraph line on the north shore, the south shore fishermen who for whole months took hardly anything, might have been notified by means of the electric telegraph to go to the north shore, a distance of only one day's sail, there to gather an abundant harvest, in the vast field cultivated by the hands of Providence itself, without the help of man, and take their share of the rich and varied yield of cod, herring and every species of smaller fish upon which the former prey, which furnish an article of food so wholesome and so easily shipped to foreign countries.

But this is not all. On the eastern part of this coast, that is to say, from Esquimaux Point to Anse aux Blancs Sablons, the fishing schooners go from harbor to harbor, from fishing post to fishing post, seeking for cod and herring, but they are as it were groping in the dark, and when they are in one harbor they do not know what is taking place on the rest of the coast. They are simply “ trying their luck.”

Some times they succeed. But have I not, myself, during the sixteen years that I commanded the service for the protection of the fisheries in the Gulf of St. Lawrence, many a time seen from twenty-five to fifty schooners anchored for weeks in some harbor waiting for cod or herring? But the shoals of fish had struck the coast elsewhere, and while in neighboring harbors, great takes were being made, these vessels were waiting their chance, not knowing, and quite unable to know, what was taking place at other points of the coast on either side of them. The unfortunate fishermen were meantime a prey to depression and weariness during those days of enforced idleness, which destroyed their brightest hopes.

But the telegraph would completely alter the face of things in these waters, since the fishermen whether residents of the coasts or belonging to schooners frequenting them yearly for the purpose of fishing, would know on what part of the coasts, near what harbour, the shoals of fish abound and where the bait run in. In short they would follow the trail of the fish as the hunter follows game on land.

I may say, moreover, that all who are well acquainted with the north shore and the coast of Labrador are firmly convinced of the utility or rather the necessity, of a telegraphic line on this coast.

Now with regard to the erection of this line, I leave it to those who are skilled in such matters to say whether we can or cannot reach Forteau all the way by means of lines erected on land along the coast. I may say, however, that between Esquimaux Point and Forteau there are many serious difficulties in the way of erecting a line of the kind, on account of the islands and rocks bordering the coast; at some points the islands extend as far out as twelve miles from the shore. Now, telegraph or signal stations can only be of use when located on the islands in the offing, where the harbors used by the fishermen are located.

Within the last few years great improvements have been made in sub-marine cables, and the cost has been much reduced, so that submarine lines might be used for a great portion of this telegraphic system. From Point des Monts to Esquimaux Point there can be no serious difficulty whatever in the way of erecting a land telegraph the whole way along the coast, so that telegraph and signal stations can be placed at all the chief harbors and fishing stations.

Between Esquimaux Point and Forteau, if submarine electric cables have to be used, as will probably be the case, the cables may be submerged along the coast, in many places inside the outer islands and rocks and be made to connect one important harbor or fishing place with another.

As the result of my own study of the matter, of the information I have gathered and of my experience derived from sixteen years of cruising on this coast, I would point out the following as the harbors or fishing stations where the submarine cables should touch and where there should be telegraph or signal stations :

	Miles.
1. Esquimaux Point.....	0
2. Nataskuan (the Harbor).....	65
3. Coacoachou	65
4. Little Mecatina.....	48
5. Great Mecatina.....	18
6. La Tabatière.....	5
7. St. Augustin.....	25
8. Bonne Espérance.....	36
9. Bradore Bay....	15
10. Anse aux Blancs Sablons.....	8
11. Bay of Forteau.....	12
	297

12. A station at Nataskuan Point connected with the Harbour of Nataskuan.

SHORT DESCRIPTION OF THE SEVERAL HARBORS ABOVE MENTIONED.

1. Esquimaux Point is an excellent harbor, capable of sheltering two hundred or more vessels of any tonnage. The village has over 1500 inhabitants, all fishermen, owning twenty-three (23) schooners and a large number of fishing boats, all employed in catching seal, cod and herring in the Gulf of St. Lawrence.

2. The Harbor of Nataskuan is capable of affording perfect shelter to 200 fishing schooners. There is also an anchorage for vessels of the largest tonnage.

Along the Nataskuan Coast, in the vicinity, and on the banks in the offing, cod is always to be found in abundance. Nataskuan has always been considered one of the best fishing grounds of the whole north shore. It is in consequence resorted to each year by a large number of fishing schooners, chiefly from the Maritime Provinces.

There are several fishing establishments in the harbor, and the population consists of some fifteen families. At a distance of three miles towards the south, is the well known Nataskuan river, one of the most productive salmon rivers of the north shore.

3. Coacoachou, at the entrance of the river of that name, is one of the best harbors on this coast. It is capable of sheltering a whole fleet of large vessels. It is situated a few miles west of Cape Whittle, which is at the entrance of the Strait of Belle Isle. Though there are no important fisheries in the vicinity of this harbor, still it would be an advantage to connect it with the telegraphic system, for it might serve as a port of refuge for the large steamers navigating these waters in case of their being disabled.

4. Little Mecatina Island has two good harbors for fishing-schooners, and there are good cod-fishing grounds in the vicinity. Moreover, it stands high out of the sea and is visible from a long distance, and vessels navigating the strait may require to run in there for shelter.

5. Great Mecatina is also a lofty island easily identified from a distance off, and in its vicinity is the harbor of Bay des Moutons, one of the best and most frequented of the whole coast.

A large number of schooners from the Province of Quebec and the Maritime Provinces resort to it every year, and the fishing banks of the vicinity are excellent and easy of access. Bait is also, generally speaking, abundant.

6. La Tabatière (Fish Harbor) is one of the best seal fishing grounds of the whole coast. It is also inhabited by several families.

7. St. Augustin consists of a group of islands lying off the mouth of the river of

that name, and not less than twelve miles from the main land. It has always been an important centre for the seal, salmon, cod and herring fisheries. There are several good and well known harbors in this group of islands.

8. Bonne Esperance is one of the best known and most frequented harbors of the coast, like Bay des Saumons, whose waters flow into it. It lies off the mouth of the river St. Paul or Quitzaqui, a river of considerable magnitude and renowned as a salmon river ever since the discovery of Canada.

In former days large numbers of Esquimaux and Indians lived on this part of the Labrador coast, and when Jacques Cartier visited it for the first time, the French had already a stone fort erected and mounted with cannon to meet their assaults. This fort had been built at the head of a large bay, which was then called the "Port de Brest." It is now "Old Fort Bay," and is situated a few miles to the west of the St. Paul River.

The cod fisheries of Bonne Espérance and Baie des Saumons are about the most productive on the north shore.

9. Bradore Bay has long been celebrated for its seal, herring and cod fisheries. The Spaniards had large fishing establishments here, before the French entered these waters.

Bradore has always been an important centre. There are here two harbors for vessels of every class. A large number of fishing vessels resort to this locality every year for the cod and herring fisheries, the latter being the well-known Labrador herring. In the vicinity of Bradore, at Anse des Dunes, I have seen as many as six hundred (600) barrels of herring taken in one haul with a seine.

10. Anse aux Blancs Sablons is a celebrated and well known locality.

There are several large fishing establishments there, and it is the yearly resort of some two or three hundred fishing schooners attracted by its cod and herring fisheries, which are generally speaking most productive.

Blancs Sablons Bay is sheltered by two islands, Ile à Bois and Ile Verte. At this place, I have often seen boats manned by two men only, take as many as two thousand cod and even more in a single day. A large number of fishing schooners gather in this harbor every year.

The eastern boundary line of Canada, is at the head of this bay near the mouth of a small river. Beyond is Labrador, under the jurisdiction of Newfoundland.

11. Forteau Bay is one of the finest on the whole coast, it offers great facilities for the cod and herring fisheries. There are a number of residents engaged in fishing and hunting. The largest vessels can run in here at all times, day or night, while the navigation is open in the Strait of Belle-Isle. There is a good anchorage and good shelter from all winds. On the east side is Point Amour, on which stands one of the finest lighthouses in America. It is a lofty tower built of stone, brick and cement, furnished with a Fresnel dioptric light, which is visible from the other side of the strait, a distance of over 15 miles. It is also furnished with a steam whistle for the guidance of vessels in foggy weather.

This is the point I recommend as the terminus of the North Shore telegraphic line.

Before concluding I would point out that the whole network of sub-marine cables starting from Esquimaux Point and extending towards Forteau, and in its course connecting all the harbors and fishing stations I have enumerated, can nearly everywhere, be submerged inside the outer islands, and will therefore be sheltered from the ice which sometimes grounds on the coast.

It may not be out of place to mention here that on the 30th June, 1862, when on board the "Napoléon III," I found an iceberg aground at the entrance of Forteau Bay, where it lay for over a month, in twenty-five fathoms of water. It stood at least seventy (70) feet above the water. His total height was therefore two hundred and twenty feet. I climbed the iceberg with four of my crew.

The telegraphic systems above mentioned on the island of Anticosti, the Magdalen Island and Grand Manan Island, were commenced, completed and put in operation under your administration. To you, sir, also should fall the honor of completing, by

the extension of the north shore line to Forteau, the coast telegraphic system of the gulf of St. Lawrence, which will be of such vast service to shipping, to trade and to the fisheries of Canada. You will doubtless have no difficulty in obtaining from Parliament the means for prosecuting energetically the work of construction already begun on this north shore line, so that it may reach Forteau within a few years.

I cannot conclude without calling your attention to a number of short telegraphic lines which should be erected in order to connect several important points on the sea coasts of the Provinces with the telegraphic system of Canada.

I would mention specially :

1. A line about 16 miles in length to connect the east point of Prince Edward Island with the telegraphic system of that island.
2. A line one tenth of a mile in length to connect Cape North Lighthouse on that island with the same system.
3. A line of 20 miles in length to connect the lighthouse at Point Escuminac, the southern point of Miramichi Bay, with the telegraphic system of New-Brunswick.
4. Another line of about 16 miles in length to connect the extreme eastern point of Cape Sable Island with the port of Barrington, Nova Scotia.

COAST LINE TELEGRAPHS IN THE UPPER LAKES.

I have not spoken as yet of the great lakes, that unbroken chain of inland seas which enables us to penetrate to the heart of the continent of North America, as a field to which the system of coast telegraphs might be applied with advantage.

It is not that I am unwilling to admit their usefulness for our inland navigation, but it is hardly two years since the Government began the erection of coast telegraph lines, and it seemed to me to be proper that the coasts of the Gulf of St. Lawrence, our great commercial highway, should receive before all others, the benefit of this powerful agent which annihilates time and distance. But now that the telegraphic systems of the Gulf of St. Lawrence have been in good part constructed, and we are in hopes of seeing the whole completed within a few years, it is natural that public attention should be directed towards the great lakes, the inland and not least important portion of the great highway of the St. Lawrence.

Canada holds the north shore of the following great lakes: Erie, Ontario, Huron, and Superior. Now the following is the approximate length of the Canadian coast of each of these lakes, in English miles:

Lake Ontario	250 miles.
“ Erie	290 “
“ Huron, including Georgian Bay.....	620 “
“ Superior.....	400 “

Total..... 1,560 miles.

I must say that I have not as yet fully informed myself as to the real requirements of navigation on these lakes, as to coast telegraphs, but I can at least recommend what is most urgent and necessary, namely, telegraphic lines starting from the lighthouses erected on the most prominent points and their connection with the nearest telegraph line, thus placing these lighthouses, which would all serve as points of observation, in permanent connection with the telegraphic system of Canada.

I would mention specially Long Point, Rondeau Point, and Point Peléo in Lake Erie; Salmon Point on Lake Ontario, &c., &c.

Once the system of coast telegraphs is put in operation on the shores of the lakes, the signal system will follow of itself and in a short time the whole lake fleet will at last adopt the international code of signals. Thus vessel owners on the one hand will be enabled to follow their vessels from point to point, and the vessels themselves will be enabled to call promptly for all needed assistance in case of accident, grounding, &c., &c.

I append to this letter a testimonial in favor of the coast telegraph system and

its further extension along the north coast of the Gulf of St. Lawrence, signed by all the agents of Maritime Insurance Companies at Montreal, and two others, one from J. B. F. Painchaud, Collector of Customs of the Magdalen Islands, and the other from Messrs. Ritchie & Co., relating to services rendered to shipping by the telegraph system of the Magdalen Islands.

I have the honor to be, Sir,
Your obedient servant,

P. FORTIN.

To the Honorable
Sir HECTOR L. LANGEVIN, K.C.M.G., C.B.,
Minister of Public Works.

MONTREAL, 16th November 1881.

DEAR SIR,—In reply to your enquiry as to my opinion as an underwriter of ships and cargoes, of the value of the Government Gulf Telegraph System, and especially of the news of the SS "Lartington" lately wrecked on Anticosti which reached here promptly :

I beg to say on my own behalf as well as others interested in our navigation that this Gulf System of telegraphy is of inestimable value to the commerce of the country, it is impossible that any other opinion could be formed of it, the wisdom of the Government is conspicuously shown in the construction of these lines, and no time should be lost in extending them along the North Shore to Belle-Isle either on land or by short submarine stretches.

I beg to say that I have seen several of my fellow underwriters and others and their names signed below endorse my views of the value of these lines.

M. H. GAULT, Agt. Brit. America, Assu. Co.	HERRIMAN & ROSS, Managers, B.M. Underwriters.
THEODORE HART & SONS., for Commercial Mutual Ins. Co., of N.Y. and Union Ins. Co., of Philadelphia.	HENRY STEWART, Marine Underwriter for Royal Canadian Insurance Co.
JACKSON RAE, Agt. International Marine Ins. Co., Cinn.	J. H. ROUTH & Co., Agts., Western Assurance Co.
PERCEVAL TIBBS, Agt. Reliance Marine Ins. Co., Limited, of Liverpool.	J. F. NOTT & Co., Agts., The Marine Insurance Co., Ltd.
F. W. HENSHAW, Esq., President, Montreal Board of Trade.	HENRY CHAPMAN, Agts. Lloyd's Underwriting & Agency As- sociation, London.

(Translation.)

MAGDALEN ISLANDS, AMHERST HARBOR,
Via PICTOU, 7th December, 1881.

SIR,—In the interest of the telegraphic lines established on these islands, I have the honor to send you the enclosed letter just received from the important mercantile house of D. & J. Ritchie & Co., of Newcastle, N.B., showing the service rendered to them by the line, when their vessel, the "Jardine Bros.," went ashore in September, on these islands. The same was the case with the ship "Governor;" and if I was enabled to transmit the message to the master and give him the instruction received it was thanks to the telegraph line. With the help of good counsel, these vessels whose safety was imperilled, were enabled to escape from difficulties which might have been fatal, and as shewn by the letter, the "Jardine Bros.," and "The Governor" were floated without serious damage.

You are at liberty, Sir, to make use of this letter and even to publish it, if you consider it useful to do so, in the interests of the telegraph, which it is now evident we could not do without.

I have the honor to be, Sir,
Your most obedient servant.

J. B. F. PAINCHAUD,
Collector of Customs.

Hon. P. FORTIN, M.P.

NEWCASTLE, N.B., 28th November, 1881.

DEAR SIR,—We write you at present to state that we desire to bear you our testimony to the very great value we attach to the cable and telegraph lines established and connected with your islands, and which in our opinion is likely to prove a great boon to shipping interests generally and especially of the Dominion. We have to acknowledge the very material benefit we have received from the said communication on the occasion of the stranding of our vessel the "Jardine Brothers" on the Magdalens in September last. Owing to the established line we were enabled to get immediate advice from our captain and could at once communicate with him and send such instructions which, together with the *assistance rendered*, probably saved said ship from becoming a wreck, but which in this case was floated without any serious damage or expense attending. The writer had the opportunity of being on the spot at the time and had the satisfaction of seeing the ship proceed on her voyage from England to Newcastle, N.B. There is no doubt that the established telegraph lines connecting with your islands is of the highest importance to all ship owners and others who may be similarly circumstanced as ourselves, and you are at liberty to publish the above if you wish.

We remain, dear sir,
Yours truly,

D. & J. RITCHIE & CO.

F. B. F. PAINCHAUD, Esq.
Collector of Customs,
Magdalen Islands.

UNITED STATES SIGNAL SERVICE.

OTTAWA, 29th November, 1881.

SIR,—I think it my duty to lay before you the following letter which General Hazen, Chief of the United States Signal Service, did me the honor of sending to me in the month of August last.

After merely glancing at the chart which accompanies it one can form an idea of the magnificent signal system which exists in the United States.

In Canada we are progressing in the same direction. Let us endeavor to be their rivals and even their superiors if such is possible in increasing the extent and efficiency of such works, which have as their object the succoring of our fellow men, and the lessening the losses to those engaged in navigation; occurring through shipwrecks.

I have the honor to be, Sir,
Your obedient servant,

P. FORTIN.

The Hon. Sir HECTOR L. LANGEVIN, K.C., M.G., C.B.
Minister of Public Works.

LETTER FROM GENERAL HASEN, OF THE U. S. ARMY, CHIEF DIRECTOR OF THE SIGNAL SERVICE OF THAT COUNTRY.

On March 3, 1873, Congress authorized the establishment of signal service stations at lighthouses and life-saving stations on the lakes and sea coast, and made provision for connecting the same with telegraph lines or cables.

Since that date lines have been built from Sandy Hook, New Jersey, south along the coast to Cape May, New Jersey; from Delaware Breakwater, Delaware to Chincoteague, Va.; from Norfolk, Va. *via* Cape Henry, Va., Kitty Hawk, Cape Hatteras, Cape Lookout and Wilmington to Smithville, N.C., the total distance is about 500 miles.

In order to connect these with the office of the Chief Signal Officer, wires are leased from the Western Union Telegraph Co., viz:—from Cape May, N.J., and Philadelphia, Pa., Baltimore, Md., and Washington, D.C., to Norfolk, Va., and from Delaware Breakwater, Del., to Philadelphia, Pa.

The following have been built and are operated by the signal service, but are merely connected with the Western Union Telegraph Company, viz:—from Narragansett Pier *via* Point Judith to Block Island, R.I., and from Rockport to Thatcher's Island, Mass. All are operated on the Morse system.

The following are the stations where meteorological observations are taken and cautionary signals displayed on the above, viz:—Thatcher's Island, Mass; Point Judith, New Shoreham and South East Light, Block Island, R.I.; Sandy Hook, Barnegat, Atlantic City and Cape May, N.J.; Delaware Breakwater, Del.; Chincoteague, Norfolk and Cape Henry, Va.; Kitty Hawk, Hatteras, Portsmouth, Fort Macon, Wilmington and Smithville, N.C. Repair stations are located at Manasquan and Little Egg Harbor (Life Saving Station No. 23), N.J.; Ocean City, Md.; Life Saving Station No. 6, (near False Cape), Cape Lookout, New River and Sloop Point, N.C. From Cape Henry to Kitty Hawk, there is a second line which connects the eleven intermediate Life Saving Stations with them by telephone, thus bringing the two branches of the Government service (Treasury and War) into united relations to each other.

The stations on the coast line are fully equipped with meteorological instruments for observation and signal apparatus for communicating with vessels passing or in distress. The practical result of the system is, *first*, to warn passing vessels of approaching storms, so they may seek shelter; *second*, in case of vessels being in distress to quickly summon the aid of the Life Saving Crews and the Wrecking Co. and to notify interested parties; *third*, Hatteras is a valuable station for first feeling the effect of a hurricane approaching the coast from the south and south east.

During the building of the Cape Henry-Kitty Hawk section a vessel having a cargo of tea was stranded. The aid of the Norfolk Wrecking Co. was at once summoned. Both the vessel and cargo were saved, in advance of a severe storm which swept the coast. The value of the cargo was more than three times the cost of that section.

In case of vessels in distress temporary stations are opened abreast the same on the beach for the purpose of giving such personal assistance as may be possible, and for transmitting all information without any delay by wire to this office, to Wrecking Companies, Boards of Trade, Chambers of Commerce, &c.

It was found necessary to introduce into the lines drawn on accompanying map, twenty-seven lengths of submarine cable, to cross inlets which are navigable to small craft, and where on account of the low banks and the necessities of navigation, a suspended wire could not be used. The total length of these cables is eighteen miles, the shortest single length is thirteen yards, the longest forty-five hundred and eighty-one yards.

Thatcher's and Block Islands on the New England coast are connected with the shore by cables which are respectively twenty-six hundred and forty yards, and ten miles in length.

The average cost of building the line, the labor having been done by troops is

about seventy dollars per mile. The average cost of establishing the stations is one hundred (100) dollars per station; the yearly average cost of maintaining station is three hundred (300) dollars; yearly average cost of maintaining line is thirty-six hundred and four (3,604) dollars for a total of about five hundred and forty (540) miles. This is exclusive of pay of troops and operators.

No rent is paid at Life-Saving Stations.

All signal service men are instructed in telegraphy, and the sea-coast lines are operated on the Morse System, excepting the telephone line from Cape Henry to Kitty Hawk.

The accompanying Chart shows all U. S. lines operated by the signal service. All other signal service stations of observations, &c., than those on the sea coast telegraph lines, are in telegraphic communication with this office through the lines of the Western Union (principally) and other telegraph companies.

THE NORWEGIAN TELEGRAPHIC SYSTEM.

(Translation.)

OTTAWA, 28th November, 1881.

Sir,—The task which I have imposed upon myself, and which I have the honor to bring before your notice, would be incomplete if I did not send you the following short notice upon the telegraphic system of Norway. A country which in respect to its climate, the industrial occupations engaged in there, the fisheries, the timber trade, the extent of water communication, the coasting trade, the configuration of its sea coasts, much resembles our Maritime Provinces and the Province of Quebec.

Norway has a sea coast of over 1500 nautical miles in extent, measured in a direct line, but by following the indentation of its bays and fiords, some of which are 40 miles in depth, the figure of 2,000 miles, at least, is reached.

This coast line fairly bristles with points, capes, &c., girt about with rocks and islands, some of which are forty miles in the offing. All these taken together go to make the coast navigation of Norway very dangerous.

All the prominent points on these coasts whether parts of the mainland, of an island, or of a rock, are united by telegraph wires or cables forming part of the Telegraphic System of Norway.

What study, what work of genius I may say, was required to conceive and carry out such a system, and to keep it constantly in thorough working order, it is almost impossible to express.

As the work of seamen it is one worthy of the descendants of the Norsemen.

I cannot state in what year this telegraphic system was perfected, but the following extract from a report of the English Vice-Consul at Christiania would make it appear that in 1866, the greater part of the system was already in operation.

Extract from the report of the Vice-Consul General of Her Majesty at Christiania upon the cod and herring fishery in Norway, for the year 1866 :

“That part of the population directly or indirectly interested in the fisheries numbers about 150,000, and the number of fishermen regularly employed at the present time is 60,000.

“These latter in their boats come and go along the coasts, according to the reports which reach them as to the signs or prognostics, for example the appearance of the straw-herring, sea birds, whales, &c., &c., and formerly, before they had the telegraph wire to procure speedy information for them, the impossibility in their position of verifying the correctness of the reports, and the great distances they had to traverse to reach the neighborhood of the fishing banks, were the causes of numberless disappointments and deceptions, and often the catch was not as great as it might have been owing to the lack of hands to take the fish. All this has greatly changed since, especially as concerns the herring fishery.

"There are telegraph stations already constructed, and others are in course of erection at the principal points along the coast, and the inspectors require that directions should be every day posted up at each of the stations upon the appearance and position of the banks, and they keep up a constant communication with all the stations in operation.

"Field telegraphs are always ready to connect with the main line, and in this way the slightest movements of the banks of fish are attentively watched and promptly signalled, and it is a curious sight to see the sudden exodus of thousands of fishermen, with their accompanying train of buyers, salters, &c., with their equipage of boats, barrels and apparatus pushing forward towards a distant spot at the summons of the telegraph wire. The men seem to extol highly this important assistant, and in the cases where the success of the fishing is owing to its intervention they call their fish telegraphic herrings. The inspectors post up every morning in the various stations a statement of the quantity of fish taken the day before, and at the same time they quote the price per barrel and they carry on this duty until after the spawning season, which is easily ascertained by the water assuming the colour of the milt.

"This fishery lasts for three months, but the profitable fishing only lasts six weeks or about that, during which they take from ten thousand up to twenty thousand tons each week.

"The advantages which the telegraph will probably secure are incalculable, for it will not be confined to rendering greater the produce of the cod and herring fishermen, but will permit the inhabitants scattered here and there along the coast and the banks of the great Fiord, to gather at places determined upon, during other seasons of the year, and to give close attention to other fisheries less important but very numerous in this country, and especially the summer herring fishery, a very fat fish and highly esteemed, which, for its delicacy of flavor and its size, rivals successfully the Dutch and Northern herring."

The short description which follows displays, on one hand, the numberless difficulties which require to be overcome to carry out a similar work, and on the other hand the extent and perfection of the works which ensures a perfect action throughout the whole system, even to the most retired parts of Norway, as far as the 70th degree and 35 minutes of north latitude, that is to say, fourteen hundred (1,400) geographical miles further north than Quebec.

DESCRIPTION.

This system may be divided into three classes :

The first includes the telegraphic lines of the interior, of which the most important are found between the capital Christiania and Trondhjen, about 300 miles in length. In the second place there are the railway lines about 500 miles. In the third place the sea or coast lines, nearly 2,000 miles in length.

Commencing at the boundary line of Sweden, the coast line telegraphic system, composed at times of several lines, and again of a single line, makes the circuit of the fiord at the bottom of which Christiania is built ; then it reaches the coast, by proceeding in a westerly direction, at the Bay called Skager Rack, which separates Norway from Denmark, as far as Stravanger, on the Atlantic—the North Sea—having a length of 370 miles.

A submarine cable of 15 miles in length crosses the entrance of a great fiord and the line proceeds from Skudesnæs to Bergen, one of the great sea ports of Norway, a distance of 100 miles.

Within this circuit two large islands are connected with the mainland by submarine cables, 15 miles and 12 miles long respectively. These islands are Utsire and Røvær.

Brandesund, an island situate thirty miles further to the north, is also connected by a submarine cable with the mainland line.

From Bergen, the telegraphic line runs along the coast, sometimes crossing the

mouthing of fiords by means of submarine cables, at other times going round them, and it reaches Christiansund after a course of about 300 miles.

On the route it crosses over some fifteen fiords by means of cables of from 1 to 3 miles in length.

Several islands and rocks which occupy important positions on this part of the coast are joined to the principal line by cables varying from two to ten miles in length.

Eighty miles further on the line passes into Trondhjen, a sea port situate on one of the largest fiords in all Norway.

About 330 miles further to the north, the line reaches Lodingen, an important sea port on a large fiord which lies on the 68th parallel of north latitude.

In this circuit there are several branch lines, each from 20 to 40 miles in length, which connect islands, rocks, ports or places with the main line.

At Lodingen, we find ourselves opposite to the famous group of the Lofoden islands, about 180 miles in length, especially notable for its cod and herring fisheries.

A system of land lines and sub-marine cables, about 200 miles in length, connects all the islands of this group with one another as well as all the ports, harbors and fishing localities where the fishing boats betake themselves, and the whole are joined to Lodingen.

We have already reached a point which is about twelve hundred (1,200) nautical miles more northerly than Quebec. But the coast line telegraph system of Norway does not end here, it continues to girdle the coast as far as Hammerfest, which we know to be the most northerly sea-port in the world. Then it proceeds across Lapland up to within a few miles of the famous North Cape, the most northerly portion of the mainland of Europe. It is in north latitude 70 degrees, 30 minutes,—fourteen hundred and ten (1410) miles further north than Quebec, and eleven hundred and forty (1140) miles than Forteau Bay in the Straits of Belle-Isle.

In all there are about 2,500 miles of telegraphic lines of all kinds. Some sixty sub-marine cables of from 1 to 20 miles in length, form connecting links in this system.

There are on the coast lines more than 130 telegraph and signal stations, of which 15 are upon the Lofoden islands.

CONCLUDING STATEMENT.

The telegraph offices may be placed in several categories:—

There are offices, of the permanent service.

“ “ of the full day.

“ “ of limited service.

“ “ open during the winter, that is during the fishing season only.

“ “ attached to railways.

Such, in a few words, is what a nation, of an especially maritime character, having a population of 1,760,000 and a territory 121,000 square miles in extent, (two-thirds the size of the Province of Ontario), has done in aid of its shipping, and its fisheries.

It seems to me to have set an example, well worth following by such a country as Canada, which possesses such an extent of sea coast and fisheries so varied and so important.

I have the honor to be, Sir,
Your obedient servant,

P. FORTIN.

The Honorable

SIR HECTOR L. LANGEVIN, K.C.M.G., C.B.

Minister of Public Works.

(Translation.)

OTTAWA, 8th December, 1881.

SIR, - The coast-line telegraphic system of the Gulf of St. Lawrence, and the shores of the Maritime Provinces, has already been made use of for purposes of great consequence to the mercantile navy, the commerce and the fisheries of Canada. But there is still another not previously mentioned which is of no less importance.

Many foreign and home vessels set out every year, in ballast, from foreign ports and often very distant ones in order to enter our waters seeking for cargoes of timber, especially at Montreal, Quebec, Miramichi, St. John, and other ports of less importance.

The larger proportion of them arrive in the Gulf without knowing where they can procure freight.

Some of the vessels stop at Sydney, C.B., others go to Gaspé, while others again proceed to other ports; from these places they announce their arrival to their agent seeking cargoes for them.

And often, of course, they are obliged to go to other ports where freight is more easily obtained and more profitable. But in this case they are obliged to enter two harbors, and consequently pay double pilotage fees and other charges; they also run more or less danger of losing their sailors by desertion, and they lose their time.

The coast line telegraph can remedy this, in many cases, in a very simple way, which, besides, is already in use in other countries.

This will be done with the aid of the coast line telegraph stations, of which the Government owns nearly forty on the shores and islands of the Gulf of St. Lawrence.

The manner of accomplishing it will be as follows:—The government will give notice in advance, at the custom houses of the principal maritime countries of the world, that the new service is in operation at such and such telegraph and signal stations, the names of which would be given in the notice.

The ship owners who send the vessels to Canada, in ballast, to obtain cargoes of timber there, would give instructions to their Captains to stop opposite one of these signal stations, when they have entered the Gulf of St. Lawrence, to lie to at a reasonable distance, to signal the names of their vessels by means of the International code of flags, and to enquire for any despatches there may be for them at the station. So soon as the vessels are despatched, the shipowners write by the quickest route to agents, who transact this kind of business, in the Ports of Quebec, Miramichi, St. John or elsewhere, to look for freight for such and such vessels. The letter reaches its destination long before the vessels, which are sailing vessels of ordinary speed.

The Agent soon finds profitable freights, and hastens to make this fact known to the Superintendent of Government signals, who sends a telegraphic despatch containing everything connected with the freighting vessel, to all the Government signal and telegraph stations, in operation in the Gulf of St. Lawrence.

Soon after this these vessels enter the Gulf of St. Lawrence, and they direct their courses to the stations most convenient for them according to the winds they have had and the time made, then each vessel will go and lie to opposite one of these stations, and spell out its name by means of signal-flags, as I have mentioned before.

The signal-man examines his journal and discovers that he has received a short time previous a message with instructions to convey it by means of signals to the vessel, whose number they have given him, as found in the official list of vessels, appended to the book containing the national code, and he immediately communicates this message by means of the code signals, and by this message he has told the vessel to proceed to a certain port where a cargo of timber awaits it.

The vessel has only to bear off, fill its sails, and gain as quickly as possible the port indicated.

And this is done without the vessel being obliged to put into any intermediate port, without casting the anchor, without incurring any expense. And in order to bring this new service into perfect operation at once, the Government need incur no expense. It has only to have it published throughout all maritime countries.

The Superintendents and the operators of our telegraph and signal stations will be able, without any difficulty, to put this new service into practical effect, after merely a few days study and trial.

I beg that you will kindly take this matter into consideration at your convenience.

If you decide upon putting it into operation, allow me to remark that it will be necessary to organise it in the month of January at latest, in order that it may be advertised in time and may be of use to the fleet which will visit the waters of the Gulf of St. Lawrence next spring.

This service will be useful to the timber trade, inasmuch as it will assist in some degree in facilitating the means of transport of our timber to Europe and more especially to England.

F. A. Schwartz, Esquire, the distinguished Consul-General of Sweden and Norway at Quebec, who has had a great experience in maritime affairs and shipping concerns, has kindly appreciated the projective system in a letter dated the 10th December, 1881, which I enclose.

I have the honor to be, Sir,
Your obedient servant,

P. FORTIN.

The Honorable

SIR HECTOR L. LANGEVIN, K.C.M.G., C.B.
Minister of Public Works,
Ottawa.

ROYAL SWEDISH AND NORWEGIAN CONSULATE,

QUEBEC, 10th December, 1881.

DEAR SIR,—In reply to your letter of yesterday, I have no hesitation in saying, that such a system for signalling as you propose, would not only give the facilities you mention to vessels coming out seeking, in the manner you mention, but would also enable an owner residing in England, or on the other side, to keep the disposal of the vessel for a much longer time in his own hands, giving him the choice of either market.

Yours truly,

F. A. SCHWARTZ.

Hon. P. FORTIN, M. P.
House of Commons,
Ottawa, Ont.

APPENDIX No. 13.

QUEBEC HARBOR IMPROVEMENTS—RIVER ST. CHARLES AND
GRAVING DOCK AT LEVIS.

No. 17989.

HARBOR COMMISSIONERS OFFICE,
QUEBEC, 17TH October, 1881.

SIR,—In conformity with the request contained in your letter of the 23rd ult^o the receipt of which has already been acknowledged, I have the honor to transmit you herewith, our Resident Engineer's Report on the Harbor Improvements at River St. Charles, and also a report from same on the Graving Dock, at Levis, for the fiscal year ended the 30th June last.

Each Report is accompanied with a statement containing the usual information that I have been in the habit of conveying yearly to your Department since the works above mentioned have been under contract.

I have the honor to be,
Sir,

Your most obedient servant,

A. H. VERRET,
Secretary Treasurer.

F. H. ENNIS, Esq.,
Secretary, Public Works Department,
Ottawa.

REPORT ON THE HARBOR EXTENSION AND DOCK WORKS IN THE
RIVER ST. CHARLES, QUEBEC, NOW NAMED "THE PRINCESS
LOUISE EMBANKMENT AND DOCKS"—:

RESIDENT ENGINEER'S OFFICE,
QUEBEC HARBOR WORKS,
11th October, 1881.

SIR,—In compliance with the instructions of the Hon. the Minister of Public Works dated Ottawa, 24th September, 1881, I have the honor to report.

The contract awarded for the above works in the River St. Charles to the contractors, Messrs. Peters, Moore & Wright, was for a bulk sum of \$529,296.31, for works therein specified, forming the first section of the original scheme for a Tidal Basin and Wet Dock.

This contract was accompanied by bills of quantities and schedules of rates in order that all needful changes might be made in the form of the works, and such omissions and deductions or additions as these might involve determined *pro rata*.

Under these conditions certain materials had further to be supplied by the contractors, viz : for clay, and broken stone for concrete, amounting to \$41,755.31, and an alternative extra for a masonry or stone face to the embankment on the south side, in lieu of timber, amounting to \$21,974.90, neither of which was included in the bulk sum.

Lastly, to enable large vessels "to reeve" into the channel and afford further accommodation in the tidal basin, 250,000 cubic yards of supplementary dredging were provided for under the contract, forming another additional item of \$62,500.

The works, with all the changes that have been made, including all alterations, omissions and additions now or nearly complete, and forming what may be termed the present contract so far as can be positively determined, will cost \$682,791.99, viz: \$673,459.16, *vide* synopsis annexed to the report of last year plus a sum of \$9,332.83, for contingencies and extras.

But this statement supposes the entire works included in the contract complete. It is the intention of the Commissioners to omit the roadway as provided for in the present contract from the works to be done, and also the pitched slope forming the junction with the made ground and foreshore at the Gas Wharf end of the works and to complete them under an altered specification with the second section of the works, including the cross wall and caisson entrance to the Wet Dock.

This will reduce the total expenditure here given of \$682,791.99, as required to complete the contract by the following amounts :

1. Stone for roadway and pitching slope.....	\$20,000 00
2. Labor in forming roadway.....	8,829 80
3. do " pitching slope... ..	340 50
	\$29,170 30

The total amount of expenditure under this contract as thus shewn will then be—

1. Contract sum of estimated expenditure.....	\$682,791 99
2. Reduction as per statement above	29,170 30
	Total..... \$653,621 69

The work executed during the last fiscal year included the completion of the piling and crib work of the substructure and concreting of the Wet Dock wall, the construction of the masonry of the superstructure to coping level, concreting, backing and filling for 1200 feet, together with 200,000 cubic yards of dredging in the channel ways and tidal basin.

The working season opened this year on May the 7th. The fiscal year ended the 30th of June, so that the summary given above was chiefly accomplished during the former half of the fiscal year, that is to say, between July the 1st and November the 15th, 1880, when the working season closed.

At the date of this report the quay wall may be considered to be completed, its entire length being 3,550 feet. Allowing for reduction in time for the close season of winter, this wall may be said to have been built in the short space of 17 working months, in a tide way with no protection by cofferdam and only depending on the period between fall and rise of the tide for the completion of the greater portion of the work.

The dredges have removed nearly 100,000 cubic yards of excavation, which have all been deposited in the embankment in terms of the contract.

The mooring posts for the northern face of the embankment are all permanently placed in position as well as those for the quay wall for 2,480 feet from the ballast wharf, west.

The remaining bollards and filling behind the wall will be completed by the end

of the season, leaving nothing but such deductions as may be needful from the contract for work unexecuted to finish the first section of this most important and valuable public work.

I have the honor to be,

Sir,

Your most obedient servant,

WOODFORD PILKINGTON,

Resident Engineer.

A. H. VERRET, Esq.,
Secretary Treasurer.

REPORT ON THE GRAVING DOCK WORKS AT ST. JOSEPH DE LEVIS.

RESIDENT ENGINEER'S OFFICE,
QUEBEC HARBOR WORKS,

12th October, 1881.

SIR,—Following the instructions of the Hon. the Minister of Public Works, dated Ottawa, 24th September, 1881, I have to report on the graving dock now in course of construction at Point Levis for the fiscal year ending 30th June, 1881.

The total contract sum under contracts so far accepted for the graving dock at St. Joseph de Levis fully equipped, including the builder's contract, machinery, caisson, &c., complete amounts to \$398,820.18.

To this has to be added engineering expenses \$21,243.68, and sundries \$17,432.12, making a total of \$437,606.92, after allowing for a deduction of \$6,158.22, being the difference in cost according to the schedule of rates between the circular head as now adopted and the second entrance at head.

But to this sum of \$437,606.92, has still to be added the cost of 3 boilers, fitting up and placing the caisson in position, further engineering charges and the extras to entrance works as recently ordered and approved by Government.

The amount voted by Parliament for the construction of this dock was \$500,000, of which there remains a balance of \$62,393.08, available for these purposes.

The distribution of this balance would be proximately made as follows :

1. Extra works at entrance.....	\$30,000 00
2. Boilers.....	4,500 00
3. Fixing up and fitting caisson.....	5,000 00
4. Balance of engineering and supervision.....	15,000 00
5. Contingencies and sundries	7,893 08

Total..... \$62,393 08

The total expenditure to the 30th of June amounts to \$237,941.60, leaving an unappropriated balance of \$262,058.40 at that date.

The works executed during the last fiscal year include the cofferdam, bringing the east and west wing walls to coping level, the completion of the upper end or head of the dock excavation down to grade, trenching for the arterial drains and concreting to the under surface of the dock floor for a length of 210 feet.

During the previous year the cofferdam was commenced, the wing walls nearly completed, 30,000 cubic yards of excavation in the dock pit were removed and the greater part of the ashlar work for the dock proper cut, and 45,000 cubic yards delivered by the North Shore Railway.

The travelling caisson was completed in England by Messrs. Wigham, Richardson & Co., of Newcastle, and shipped to Quebec, where it was received in good order and placed under shedding for protection during winter, ready for completion when the works are sufficiently advanced.

The pumping machinery under contract with Messrs. Carrier, Lainé & Co., is making satisfactory progress.

The work yet remaining to be done includes the further complete excavation of the dock pit and entrance works, the construction of the main pumps and drainage well with discharging culverts, the completion of the masonry of the dock and engine house, caisson chamber and entrance culverts, and the fixing in place of the boilers, machinery, caisson, pumps, engines and gearing.

The masonry completed at the head of the dock and for 180 feet in length of the side walls, altars, stairs and timber slides give every indication that the graving dock when finished will be a success, fulfilling all the needful conditions for the repair of large ocean going steamers, so long felt to be necessary in the port of Quebec.

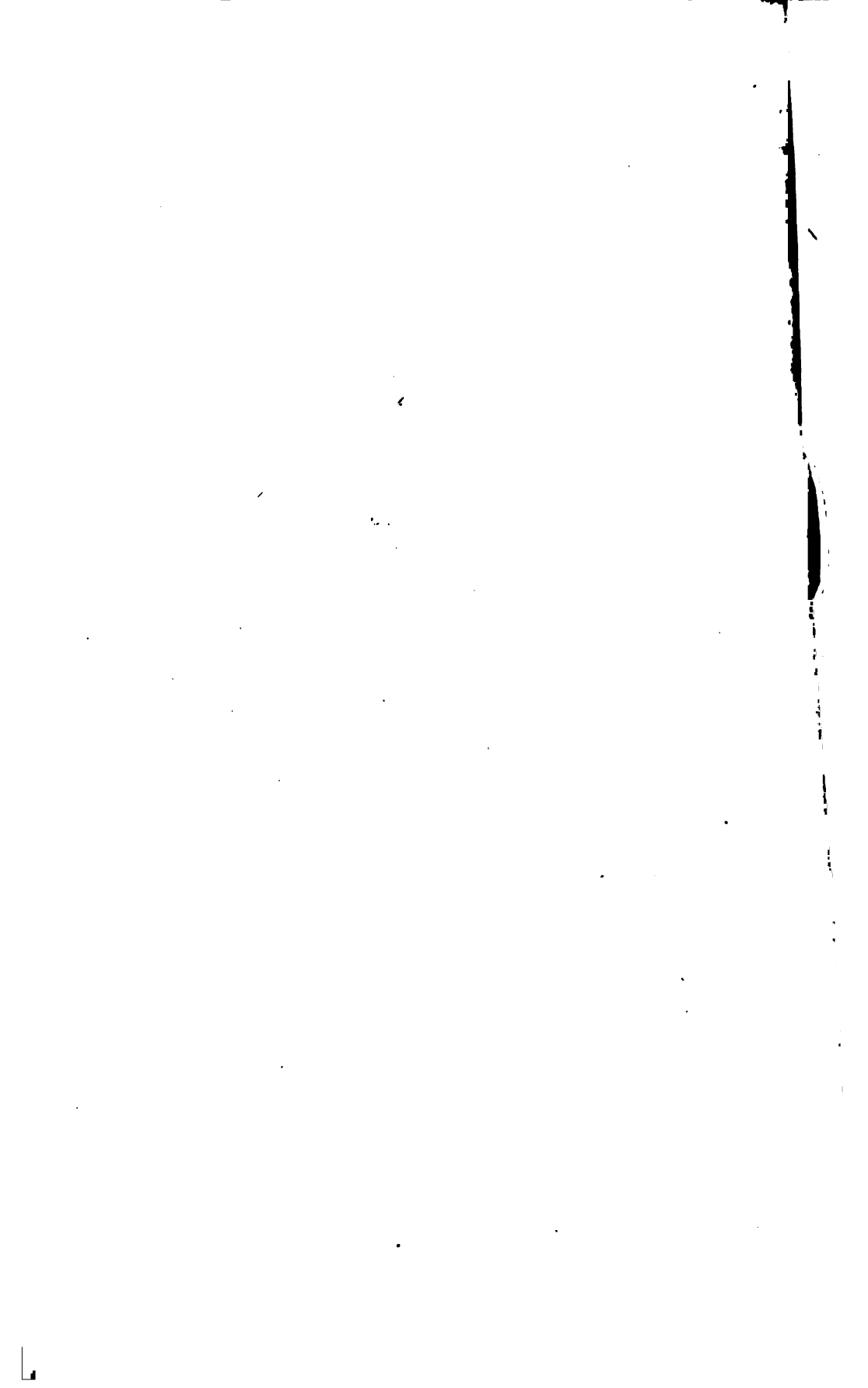
I have the honor to be,

Sir,

Your most obedient servant,

WOODFORD PILKINGTON,
Resident Engineer.

L. H. VERRENT, Esq.,
Secretary Treasurer.



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APPENDIX No. 14.

REPORT RESPECTING OPERATIONS OF LIFTING BARGE.

18531.

HARBOUR COMMISSIONER'S OFFICE,
QUEBEC, 10th December, 1881.

Sir,—I have the honor to transmit you herewith my report on the operations of the Lifting Barge for the present year.

I have the honor to be, Sir,
Your obedient servant,

A. H. VERRET,
Sec.-Treas.

H. ENNIS, Esq., Secretary,
Public Works Department,
Ottawa.

HARBOUR COMMISSIONERS' OFFICE,
QUEBEC, 10th December, 1881.

Sir,—I have the honor to report as follows on the operations of the Lifting Barge for the working season of the present year.

The Barge left her winter quarters on the 30th April and was brought to the Commissioners' Wharf for the purpose of being rigged and repaired.

The Barge was on that day placed under the command of her former master, Captain Claude Gignère. The other officers, comprising two mates, a chief engineer and assistant, were re-engaged. The remainder of the crew, composed of fourteen men, were placed on board as necessitated during the progress of the fitting up. Another man having been required, was added to the crew during the month of July.

On the morning of the 24th of May, the Barge left the wharf with instructions to proceed to the Fly Bank, in order to continue the work of clearing the obstructions caused by boulders.

Four days after, an application was made by Mr. E. H. Duval, on behalf of Captain Lochead, to send the barge to the help of the bark "Eveline" whose anchor was fouled.

According to the custom hitherto followed, the Barge was dispatched to the assistance of the bark, and after two days and a-half work, succeeded in raising the obstruction in which the anchor of the "Eveline" was caught. The obstruction formed a nest containing three large anchors and about one hundred fathoms chain, and also one small anchor with about thirty fathoms chain attached to same, exclusive of the anchor and chain belonging to the bark which were surrendered to Captain Lochead.

On the 31st of the same month, the barge returned to the Fly Bank in order to resume the work of clearing the obstructions caused by the boulders. She steadily

worked there during the whole of the following month, that is to say, the month June, and succeeded in raising ninety-six (96) boulders averaging in size as follows:

	2	weighing about	8	tons.
12	"	5	"	
20	"	3	"	
42	"	2	"	and
20	"	1	"	

By adding to the above the 514 boulders previously secured at the same spot, gives a total of 610 boulders, representing an aggregate weight of 1,957 tons distributed in the following manner:

	2	weighing about	50	tons=	100	tons.
1	"	30	"	=	30	"
1	"	25	"	=	25	"
1	"	20	"	=	20	"
1	"	15	"	=	15	"
2	"	12	"	=	24	"
2	"	10	"	=	20	"
2	"	8	"	=	16	"
18	"	6	"	=	108	"
17	"	5	"	=	85	"
94	"	4	"	=	376	"
220	"	3	"	=	660	"
229	"	2	"	=	458	" and
20	"	1	"	=	20	"

Scattered around the boulders, were found a few small pieces of copper which contribute to establish, as in the previous years, that vessels had touched many of them and consequently suffered damage.

Captain Hansen, master of the Bark "Askur" having reported one of the anchors of his vessel fouled at a spot situated about one quarter mile east of the breakwater, orders were forwarded to the Captain of the Lifting Barge, to go to her assistance, and on the 1st July, the barge was brought alongside the bark.

After a few days work it was discovered that the barge had to deal with a very heavy nest of anchors and chains lying in a depth of thirty fathoms of water, and in a tide way running at the rate of four knots to the hour.

During the progress of the work many of the strongest chains used to secure the nest were broken in consequence of its heavy weight, and, it having been clearly established that the lifting apparatus was showing signs of weakness, it was decided to increase its power by adding four of the largest blocks that could be obtained which were rigged with the most powerful ropes and chains.

With the aid of these new appliances it became evident that the work of lifting could now be effected without any risk. After eight weeks of constant work, half of which was night work, the barge was brought to shore in front of the Champlain Market Wharf, where she remained a few days to prepare for the final landing, and on the evening of the 23rd August, she was safely towed by six powerful tugs in front of the Custom House where the nest of anchors and chains was successfully landed.

The work of disentangling the nest was thereupon proceeded with and continued till the whole, comprising 42 anchors and 1,500 fathoms chain, was properly placed on the wharf used for that purpose. A piece of oak was found entangled in the nest.

Although the nest secured this year contained a smaller quantity of anchors and chains, it is admitted that its weight was not inferior to the weight of the nest raised in 1877, the average size of its anchors and chains being far larger. The weight being equal and the depth of water ten fathoms deeper, the work of lifting this year's nest was surrounded with difficulties that were not experienced in 1877.

During the summer a boatman made an offer to the Commissioners to hook

the Lifting Barge on a nest of anchors and chains if a suitable remuneration was given him. His proposal having been considered, it was agreed to make him an offer of two dollars for each anchor and each length of chain respectively contained in the nest, when raised, with the understanding that he would not be paid more than the aggregate sum of fifty dollars for his information. This offer having been accepted the barge started, the 20th October, for the spot where the supposed nest was to be found, near the west end of the Island of Orleans, and was on the same day hooked at the place designated by the boatman. Only one large anchor with thirty fathoms chain was found and subsequently secured.

The season being too much advanced to make searches, the barge was ordered to return. The work of dismantling her was immediately commenced and, at the end of November, she was placed in her winter quarters, in the Louise Dock.

I stated in my report on the operations of 1878 that the Commissioners were under the impression "that no more nests of anchors and chains were in existence, and that if such really exist, they were covered with sand and were, as obstructions, considered of no more consequence."

The nest discovered this year was located on the spot where searches were made by the Barge in 1878, and it must have been at that time covered with sand. All the other searches made that year where nests were supposed to exist proved fruitless. The discovery made this year must be accepted as a warning for the future.

The work of clearing the obstructions caused by the boulders inside the Fly bank having been suspended this year by the discovery of the nest of anchors and chains that has been removed, it will be necessary to resume that work next year which, if not interrupted, cannot be executed in less than three months. It is unnecessary to mention the importance of that improvement, it having already been urged in my previous reports.

The Commissioners do therefore most respectfully request that the Government will further extend their help towards the clearing of the obstructions in existence in the Harbour of Quebec, and they do believe that the sum of twelve thousand dollars, (\$12,000,) will be required to meet the expenses for the next working season on account of the renewal of the deck of the Barge which is necessitated by its dilapidated condition, having leaked during the whole summer.

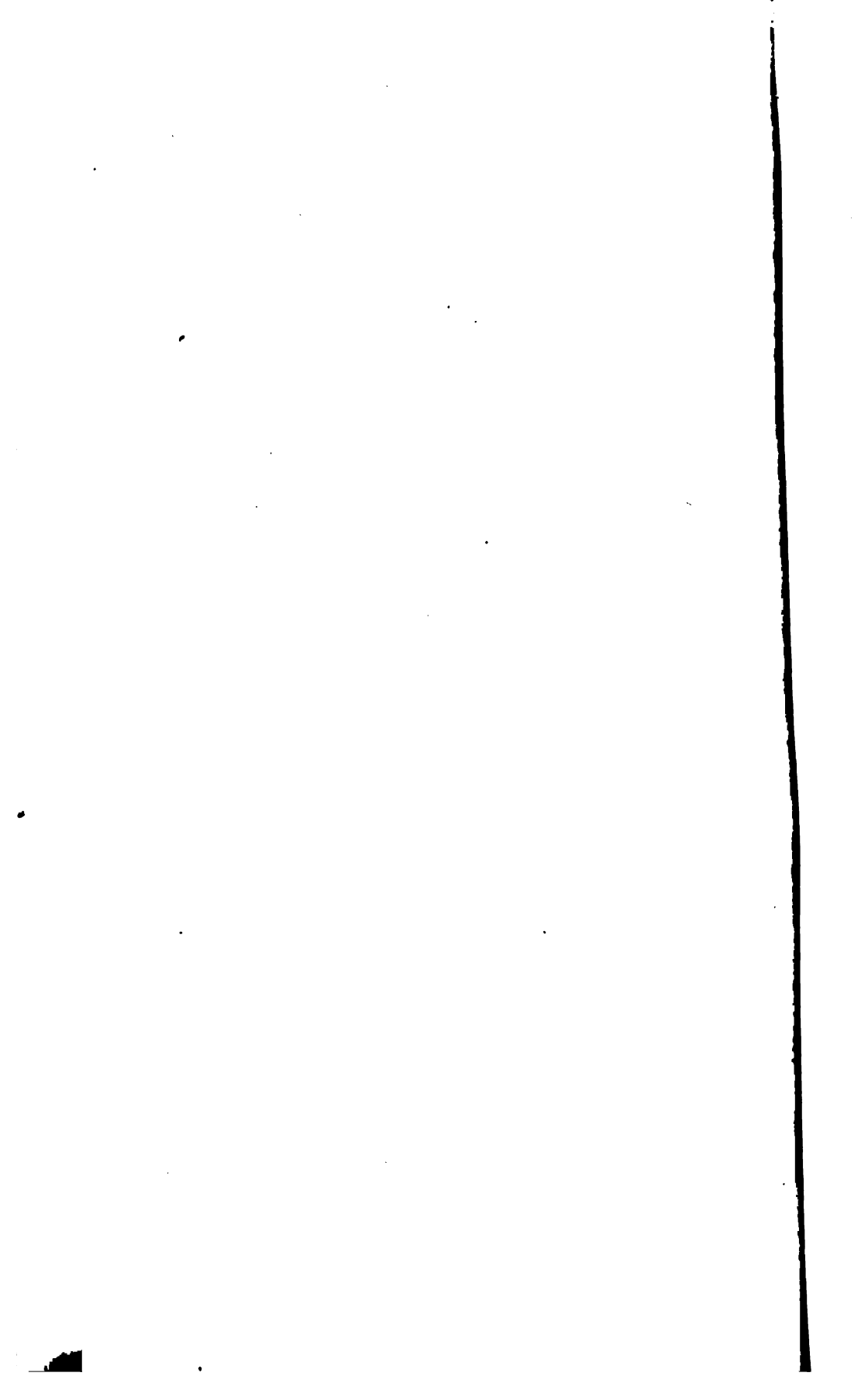
The annexed statement shows the particulars that I am in the habit of furnishing to your Department as to the cost of the Lifting Barge and her yearly working expenses from the commencement of her operations in 1875, as also the yearly quantity of anchors, chains, boulders etc., secured by her during the same period.

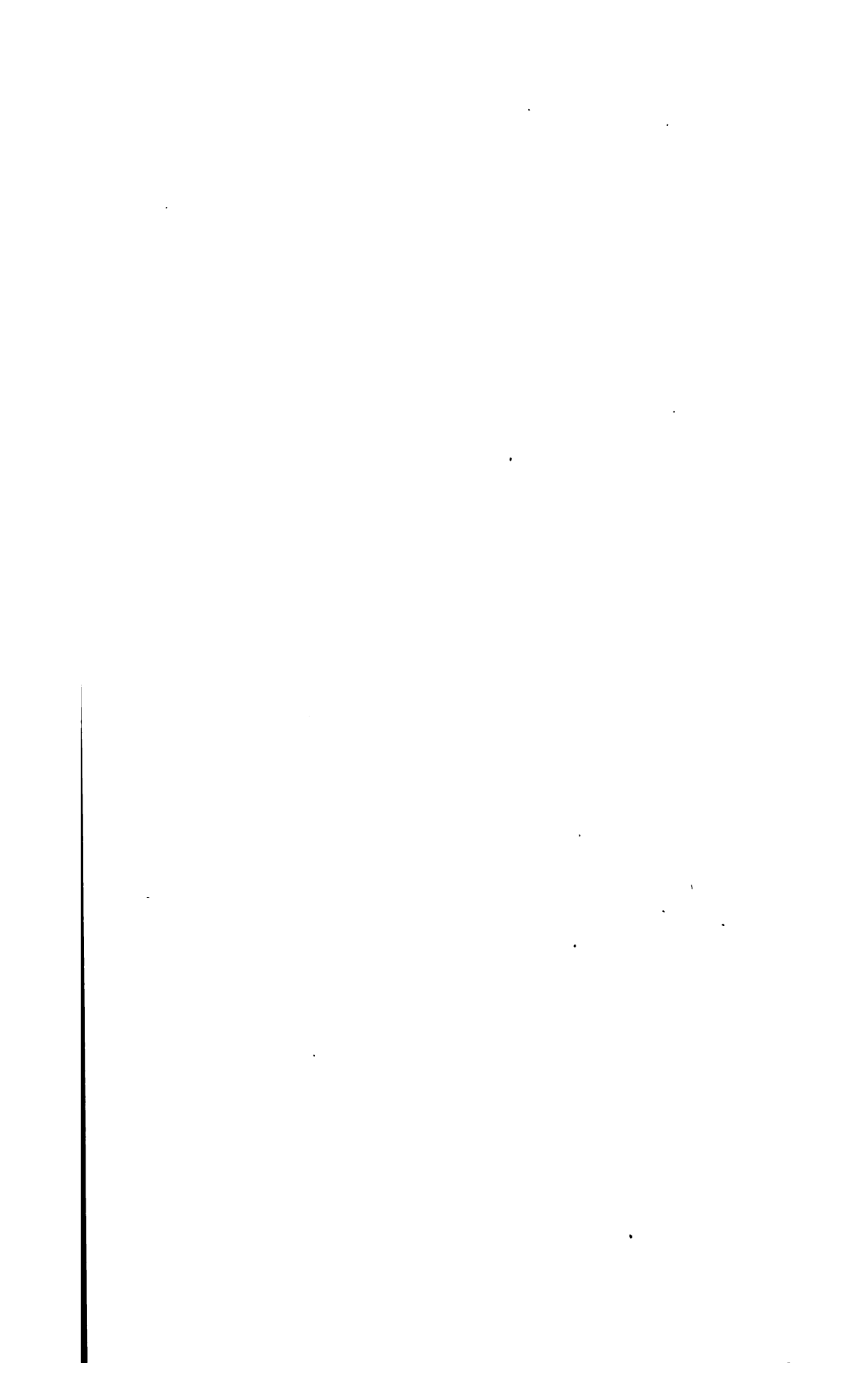
In conclusion it affords me much pleasure to state that, in the execution of his duties as master of the barge, Captain Giguère has given the same satisfaction as heretofore.

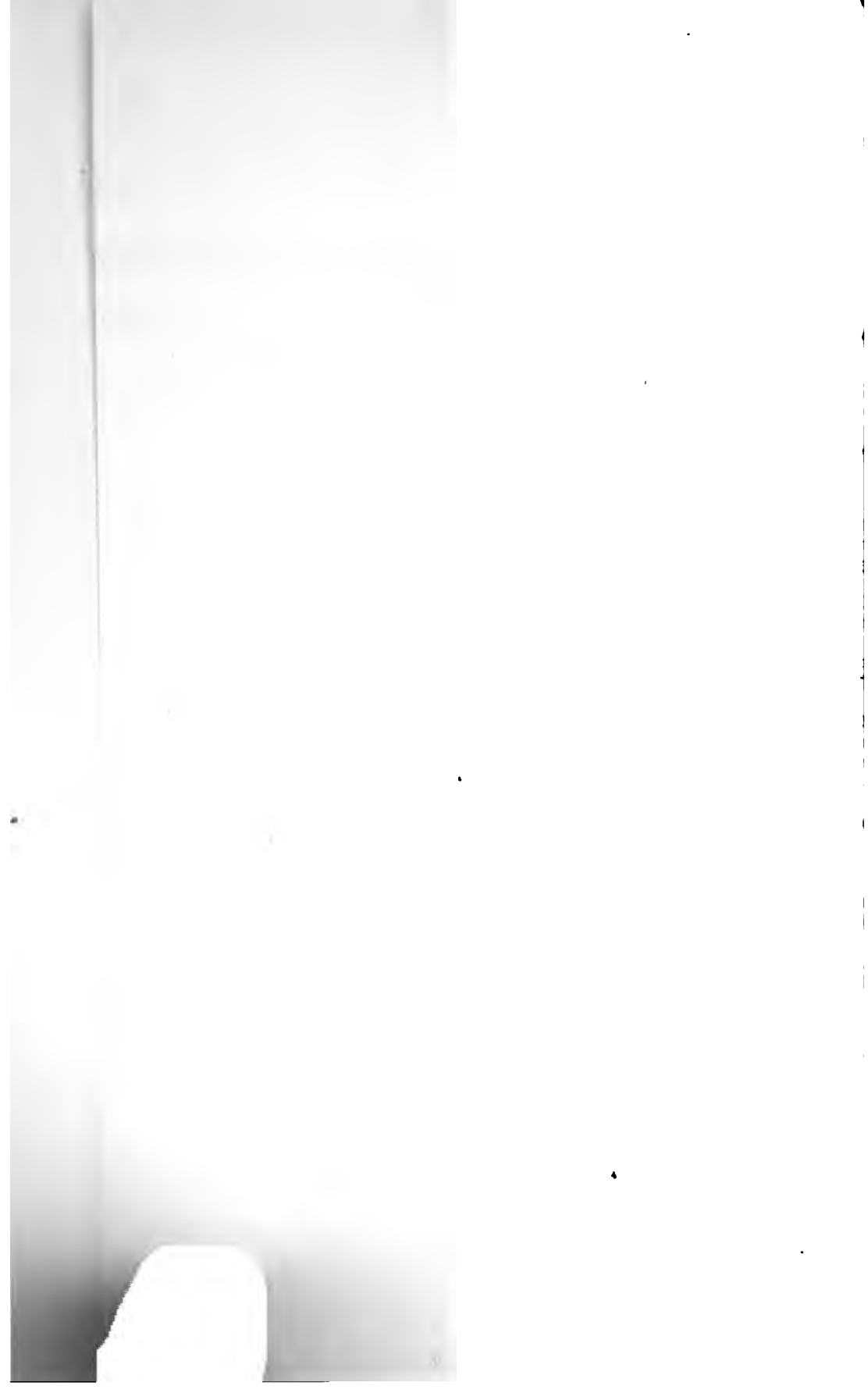
I have the honor to be, Sir,
Your most obedient servant,

A. H. VERRET,
Secretary Treasurer.

The Honorable
Sir HECTOR L. LANGEVIN, K. C. M. G., C. B.,
Minister of Public Works,
Ottawa.







APPENDIX No. 15.

ANNUAL REPORT OF THE MONTREAL HARBOR COMMISSIONERS, ON THE DEEPENING OF CHANNEL BETWEEN QUEBEC AND MONTREAL.

HARBOR COMMISSIONERS OF MONTREAL,
SECRETARY'S OFFICE,
MONTREAL, 18th October, 1881.

No. 18040.

SIR,—Referring to your letter of the 26th ult., I beg to hand you herewith copy of the Chief Engineer's Report on the dredging operations for deepening the ship channel of the River St. Lawrence, between Montreal and Quebec, for the fiscal year ended the 30th June last.

As you have already been informed in my letters of the 16th November and 17th December of last year, it is impossible to answer exactly the questions contained in your letter.

I would state, however, in reply to questions 1 and 2, that the works are carried on under the terms of the Act 36 Vic., cap. 60, and as amended by the 44 Vic., cap. 7, and that a depth of 25 feet at low water will be obtained.

Questions 3 and 4.—No special expenditure is authorized for any one year, the Commissioners advancing the money, and being repaid by the Government on application; and there are no liabilities, all accounts for supplies and payment of wages, &c., being settled monthly.

Question 5.—Amount available for completion 1st July, 1881.

Nil.—Expenditure to that date being \$1,513,461 or \$13,461 in excess of original amount of the loan.

Question 6.—Probable amount required for completion 1st July, 1881. \$250,000.

Question 7.—Revenue each year. No direct revenue.

The capital cost of the dredging plant included in above expenditure is \$533,189, exclusive of the value of certain harbour plant previously on hand and now employed in the work.

I have the honor to be,

Sir,

Your obedient servant,

H. D. WHITNEY,
Secretary.

F. H. ENNIS, Esq., Secretary,
Department of Public Works, Ottawa.

HARBOUR COMMISSIONERS OF MONTREAL.

CHIEF ENGINEER'S OFFICE,
MONTREAL, 12th October, 1881.

SIR,—In compliance with the request of the Secretary of Public Works, I beg to submit the following report upon the work of deepening the ship channel of the

St. Lawrence between Montreal and Quebec during the Government fiscal year ended 30th June, 1881.

The work carried on during the year is the continuation of the deepening of the ship channel from 22 feet to a depth of 25 feet at low water, the breadth being 300 to 325 feet in the straight portions, with enlargements at bends and other necessary points.

The places at which the greatest quantities of work have been done are Cap Charles and Cap la Roche, where the dredging is in rock; near Cap Levrard; at Champlain and Champlain Point in Lake St. Peter; at Contrecoeur, and at Montreal, in all of which places the dredging is of earth.

The following are the chief details of the year's work. The cost of the dredging at each place is generally taken as that of the previous summer, for the reason that the expenditure cannot well be subdivided to the end of the Government fiscal year which occurs in the middle of the working season.

Cap Charles.—Dredging the shale and lifting boulders were continued through the working season. By the close of the fiscal year over three fourths of the area of the channel had been deepened to 23 ft. 3 ins. at low water, and 19,278 cubic yards of rock and boulders had been taken out at an average cost of about sixty cents per cubic yard.

Cap La Roche.—Dredging shale and lifting boulders were continued through the working season with two dredges, and one stone lifting barge. At the beginning of the fiscal year the new channel was in use to a depth of 19 ft. 6 in. at lowest ebb tides with a breadth of 150 feet; by the 25th of September, it was opened to 200 feet, and on the 10th of November, the whole contemplated width of 300 feet was made available for navigation. Further deepening is now in progress. During the year ended 30th June, there were raised 46,522 cubic yards of rock and boulders at an average cost of about sixty cents per cubic yard.

Cap Levrard and vicinity.—In the early part of the fiscal year, a part of the channel which remained to be cleared of a number of small clay shoals and boulders was traversed by a dredge and completed throughout to 25 feet at lowest water. Quantity dredged 8,800 cubic yards of clay and boulders at an average cost of 54½ cents per cubic yard.

Champlain Point and Champlain.—During midsummer of 1880, the dredging necessary to complete the channel to 25 feet at low water was done. Quantity raised during the fiscal year 24,675 cubic yards sand, clay, and boulders, at an average cost of 28½ cents per cubic yard.

Port St. Francis. During spring of 1881, two dredges were employed for a short time in cutting away the south points of the Iron and Force shoals. Quantity dredged, 7,095 cubic yards, hard pan and boulders.

Lake St. Peter.—The work accomplished during the fiscal year was the deepening of the three bends at the channel at Nos. 1 and 2 Light Vessels and the White Buoy to 25 feet deep, with a breadth of 325 feet to 450 feet, and also the deepening of about two miles of straight channel. Total quantity dredged, 774,488 cubic yards of soft clay at an average of 3 $\frac{2}{3}$ cents per cubic yard.

Contrecoeur.—Dredging was continued the greater part of the working season and a total quantity of 191,550 cubic yards of clay was raised at an average cost of 11½ cents per cubic yard.

Pointe Marie.—In the early part of July 1880 a few small points were cleared away, which completed the dredging required in the vicinity to 25 feet at low water. Quantity dredged, 2,160 cubic yards, costing 31 $\frac{7}{10}$ cents per cubic yard.

Cap St. Michel.—In the fall of 1880 and spring of 1881 the channel above and below the Cape was widened and deepened. Quantity dredged, 104,805 cubic yards at a cost of about 23½ cents per cubic yard.

Varennes.—A small shoal containing 3,090 cubic yards was removed.

Montreal.—The improvement of the main ship channel through the harbour was continued in 1880. Total quantity dredged, 47,471 cubic yards, costing 22 $\frac{1}{10}$ cents per cubic yard.

The aggregate quantity of dredging done at all points during the Government fiscal year ended 30th June, was 1,229,937 cubic yards as against 1,063,434 cubic yards in the preceding year.

The expenditure on working account which is made up only at the end of each Harbour Commissioner's year at 31st December, was for the year ended 31st December 1880, \$147,038, with an aggregate of 1,219,231 cubic yards dredged, as against \$143,354 for 1879 with 843,210 cubic yards dredged.

The floating plant in the work was substantially the same as before, and consisted of two large and three ordinary elevator dredges for working in earth; three elevator dredges for working in rock; three spoon dredges part of the time; two steam stone-lifters; seven screw tugs; one paddle wheel tug; five barges used as coal tenders, and smiths' shops; nineteen hopper bottom scows and three flat scows.

Yours respectfully,

JOHN KENNEDY,
Chief Engineer.

H. D. WHITNEY, Esq.,
Secretary.

APPENDIX No. 16.

REPORT OF MONTREAL HARBOR COMMISSIONERS ON LAKE AND RIVER WORKS BETWEEN MONTREAL AND QUEBEC.

HARBOR COMMISSIONERS OF MONTREAL,
 SECRETARY'S OFFICE,
 MONTREAL, 12th September, 1881.

No. 16997.

SIR,—Referring to your letter of the 6th ultimo, asking for certain information concerning the lake and river works between Montreal and Quebec, I have the honor to transmit herewith copy of a report from the Chief Engineer on the subject, which the Commissioners hope will be found to contain all the details required.

I have the honor to be,

Sir,

Your obedient servant,

H. D. WHITNEY,

Secretary.

F. H. ENNIS, Esq.,
 Secretary, Department of Public Works,
 Ottawa.

HARBOR COMMISSIONERS OF MONTREAL.

CHIEF ENGINEER'S OFFICE,
 MONTREAL, 31st August, 1881.

DEAR SIR,—I have to acknowledge the receipt of a letter addressed to you by the Secretary of the Department of Public Works, and dated 6th inst., with your request that I should furnish the information required by that part of the letter which asks the Harbor Commissioners to report to the Department the present state of the work of deepening the ship channel between Montreal and Quebec; what remains to be done to complete it; the probable cost of the works yet to be executed; the condition of the plant employed or on hand, its present value, and what its probable value will be on the termination of the work; the report also to be accompanied by a list of the plant.

This information I beg to furnish as follows:—

1. The present state of the work, and what remains to complete it:—

Cap. Charles.—The work consists of lifting boulders and dredging a shale rock shoal, about $\frac{1}{3}$ rd of a mile in length; all but a small fraction of this is now cut through to 300 feet wide, and 22 ft. 10 ins. deep at extreme low water, giving a depth ranging from that up to about 35 feet according to the time of year and condition of tide.

Cap la Roche.—Shale rock shoal $\frac{1}{4}$ th of a mile, overlaid with boulders. The north half, or 150 ft. in width is deepened to 22 ft. at lowest water, and 1,220 feet of this is further deepened to 23 ft. 3 in. Of the south half, about 1,500 feet is down to 22 ft., and the remaining 3,000 ft. to 20 ft. The depth of water at each place will vary from the depths given to 12 ft. additional according to the state of tide and time of year.

St. Ann's Shoal and Cap Levrard.—A series of small detached shoals of clay and boulders, through which the channel has been finished to 25 ft. at low water.

Becancour.—The small shoals of hard pan and boulders have been cut away to 22½ ft. at low water, and are yet to be deepened to 25 ft. A few places in the traverse immediately above, require to have boulders removed.

Port St. Francis.—The south points of the Iron and Force shoals, of hard clay and boulders have been almost cut through at a depth of 25 ft. The small remaining pieces are yet to be cut through, and the cutting is also to be enlarged to the north.

Nicolet Traverse.—Some small clay shoals to be cut through to 25 ft. at low water.

Lake St. Peter.—The soft clay flats from No. 3 Light vessel to No. 2, 11½ miles in length, are cut through to 25 ft. The remaining portions, about 6½ miles in all, are yet to be deepened from their present depth of 22½ feet to 25 ft.

Ile de Grace.—The channel to be straightened and deepened in several places throughout a distance of nearly ½ a mile in sand cutting.

Ile St. Ours.—A shoal of stiff clay and sand nearly ¾ of a mile in breadth, has been cut through and finished to a depth of 25 ft. at low water.

Contrecoeur Channel.—From the lower end to the Bend a distance of 1, ⅞th miles is finished to 25 ft. From the Bend to the Contrecoeur Traverse there are yet about 1½ miles in soft clay to be deepened from 22½ feet to 25 feet.

Pointe Marie.—Several small clay shoals have been cut down to a depth of 25 feet.

Cap St. Michel and Ile Delorier.—About one mile of clay shoals have been dredged over and finished to a depth of 25 feet.

Varenes.—The Pouillier Varenes, and the larger clay shoal below, about 1½ miles in all, have been cut through to 25 feet deep at low water.

Pointe-aux-Trembles.—About ½ of a mile has been dredged to 22½ feet through clay and boulders. The remaining portion about 2 miles in length, consisting of clay boulders and some shale rock has been dredged to 25 feet deep.

Montreal.—The ship channel with exception of a few small places is all deepened to 25 feet.

2. The probable cost of the work yet to be executed will be about \$180,000.

3. The condition of the plant employed or on hand. The plant which all belongs to the Harbour Commissioners, is all in good working condition, and is in actual use on the works. One elevator dredge, one tug, one stone lifter, two barges and some scows are old, and the timber of the hulls somewhat decayed, but all the rest of the fleet is in excellent order.

4. The present value of the plant, and its probable value on the termination of the work. The value of the plant, made upon the basis of its first cost and subsequent depreciations is at present about \$470,000, and its value at the termination of the work may be taken at about seven and a half per cent. less, or say \$400,000.

5. *List of plant employed:—*

Eight elevator dredges.

One side wheel tug.

Eight screw tugs.

Two stone lifters.

Five barges (coal tenders and smiths' shops.)

Nineteen hopper bottom scows.

Three flat scows.

Equipment of shipyard, and machine shop at Sorel, and of floating shops. The principal items are launching ways, shears, steam engine and boiler, four lathes, iron planer, shaping machine, drills, steam hammer, 6 forges, two furnaces, and plate bending machine.

Yours respectfully,

JOHN KENNEDY,
Chief Engineer.

H. D. WHITNEY, Esq.,
Secretary, etc.

APPENDIX No. 17.

REPORT ON RIVER SAGUENAY IMPROVEMENT BELOW CHICOUTIMI.

No. 19736.

CHIEF ENGINEER'S OFFICE,
OTTAWA, 16th December, 1881

SIR,—Herewith I transmit a report by Mr. Rosa on the works executed by him during the fiscal year 1880-81, in the improvement of the River Saguenay below Chicoutimi.

I have the honor to be, Sir,
Your obedient servant,

HENRY F. PERLEY,
Chief Engineer.

F. H. ENNIS, Esq., Secretary,
Public Works Department.

QUEBEC, 1st December, 1881.

SIR,—The removal of boulders and small stones in the channel of the river Saguenay during the fiscal year 1880-81, was commenced on the 5th of July, 1880, after the freshets, and continued to the 5th October; and from the 20th to 30th June, 1881.

The boulders and small stones were removed for a length of about one mile, and a width of from two hundred to two hundred and fifty feet.

Six hundred and twenty-six boulders, making four hundred and seventy cubic yards, or one thousand and fifty-seven tons, were removed and deposited on the shore, or in the deep water in holes where there is more than twenty feet at low tide.

There are still three shoals to be removed in the distance where soundings were taken in 1877, and two others above. Some dredging should also be done near Chicoutimi wharf, so as to have a depth of 10 feet at low tide.

The amount expended in the removal of boulders during the fiscal year 1880-81, is \$3,330.18.

I have the honor to be, Sir,
Your obedient servant,

JOSEPH ROSA,
Superintending Engineer.

HENRY F. PERLEY, Esq., Chief Engineer,
Department Public Works, Ottawa.

APPENDIX No. 18.

REPORT ON THE TEMISCOUATA ROAD.

No. 19715.

CHIEF ENGINEER'S OFFICE,
OTTAWA, 16th Dec., 1881.

SIR,—Herewith I transmit for the information of the Hon. the Minister a report by Mr. E. Marquis, on the repairs to the Temiscouata Road, during the last fiscal year, and his estimate for works considered as urgent to be executed during 1882-83.

1. To repair the flooring and hand-railing of the bridge across the Green River at the eighth mile.....	\$ 100 00
2. To reconstruct the bridge over the St. Francis River, at the 16th mile.....	1,000 00
3. To reconstruct the bridge at the 38th mile known as Little River bridge.....	400 00
4. Repairing the bridge at the 49th mile.....	100 00
5. Repairing culverts between the 9th and 41st miles...	200 00
6. Clearing underbrush from sides of road.....	200 00
Making a total of.....	\$2,000 00

I have the honor to be, Sir,
Your obedient servant,

HENRY F. PERLEY.
Chief Engineer.

F. H. ENNIS, Esq.,
Secretary, Public Works Department.

FRASERVILLE, 12th December, 1881.

SIR,—According to your telegram, dated 6th inst., I have the honor of transmitting the following report concerning the works executed and now being executed under my direction on the Temiscouata Road during the present year.

1. I have reconstructed at the 64th and 66th miles, in pine and cedar of first quality, two bridges known as "Griffin's Bridges" with the following dimensions;—
No. 1, length 175 feet, width 18 feet.

" 2 " 145 " " 18 "
These two bridges have cost \$800.

2. Reconstruction (actually being executed) of the bridge known as "Cabano Bridge"—probable cost \$1,800, according to the estimate given in my preceding report.

As regards the works of 1880, please look at page 113 of the annual report of the Honorable the Minister of Public Works, and after having consulted my *datas*, of the 14th December of that year, at which date the works were brought to a close, you will see that the appropriated sum has been expended for the items mentioned in the paragraphs numbered 1 and 2, (construction 1880).

In accordance with your request I furnish a statement of the repairs considered as urgent for the year 1882.

1. Repairs to the railings and flooring of a bridge at the 8th mile, on the Green River; probable cost.....	\$ 100 00
2. Reconstruction at the 16th mile, of the bridge on the St. Francis River, width of the water 50 feet; probable cost.....	1,000 00
3. Reconstruction at the 38th mile, of the bridge known as "Little River Bridge," width of the water 30 feet; probable cost.....	400 00
4. Repairs at the 49th mile, to a bridge, increasing the height of a pier; cost.....	100 00
5. Repairs to a certain number of culverts on an extent of 32 miles of road from the 9th to the 41st miles, to cost.....	200 00
Total estimates.....	\$1,800 00

To this please add an additional sum of \$200, being of absolute necessity for clearing the sides of the road from underbrush, on an extent of 20 miles of the said Temiscouata Road, opposite the non-conceded Government lands.

So, the appropriation to be asked for the year 1882, is \$2,000.

The whole respectfully submitted.

I remain,

Your most humble servant,

ELZEAR MARQUIS.

HENRY F. PEBLEY, Esq.,
Chief Engineer, Ottawa.

APPENDIX No. 19.

SLIDES AND BOOMS—NEWCASTLE DISTRICT.

TRENT CANAL WORKS,
SLIDES AND BOOMS DIVISION,

ENGINEER'S OFFICE,
PETERBORO', 23rd December, 1881.

No. 20076.

SIR,—I have the honor to submit the following report on the works under my charge, connected with the Department of Public Works, for the fiscal year ended June 30th, 1881.

The works on the River Trent and the waters of what was formerly known as the "Newcastle District" are divided into two classes; those erected exclusively for the improvement of the navigation of the waters of Midland Ontario comprising one class, and those erected to facilitate the descent of timber, saw logs, &c., the other.

The works erected by the Government which come under the head of the former class consist of several locks and canals connecting long stretches of navigation upon which there are at present engaged 18 steamers of various tonnage, the largest being about 362 tons, with a draught of 4 ft. 10 in.; these are principally employed in towing the products of the forest and the mine, others are engaged in the passenger trade and the carriage of grain, &c.

These works are under the direct control of the Department of Railways and Canals, to which I have already submitted my annual report.

The works embraced in the latter class consist of slides, dams, booms, and all such works as are necessary to facilitate the descent of timber, &c., down the various rapids that occur at the outlets of the several lakes composing the inland navigation of Midland Ontario, and in the River Trent which flows into the Bay of Quinte, an arm of Lake Ontario, near the head of the River St. Lawrence.

To the works comprised in the latter class this report has chiefly reference, and in submitting to you, for the information of the Honorable the Minister, a detailed description of the various works at the several stations, together with the repairs executed during the past year and those required, I shall be as brief as possible.

FENELON FALLS.

The works at this station consist of a dam 304 ft. in length and 7 ft. high, a slide 290 ft. in length and 33 ft. wide, and a boom 3090 ft. in length, dividing the river into two channels, one being for the passage of timber and the other for steamboats.

The repairs executed during the past year consisted in partially renewing the flooring of the slide, which was damaged to such an extent as to impede the passage of timber.

The improvements required consist in renewing the side walls of the slide three courses high, and extending the line of piers above the entrance a sufficient distance to ensure safety in directing the running of timber into the slide; as at present it sometimes occurs—when a strong gale is blowing—the "drive" breaks loose and a portion is carried over the dam.

The following is the quantity of timber that passed through the slide at the station, and on which tolls were collected, during the past year :—

Saw logs.....	259,120
Boom timber (pieces)	4,140
Square “ “	2,566

SCUGOG RIVER.

This is a branch of the main line of navigable waters in a south-westerly direction, and upon which there is a traffic of considerable importance carried on in the towing of timber, sawn lumber, grain, &c., to the Town of Lindsay, in the Township of Ops, the principal town in the County of Victoria; and also to Port Perry, at the head of Lake Scugog, where there are several mills and manufactories of importance.

This river being altogether under the control of the Government of Canada, an appropriation was granted at the last Session of Parliament for the removal of “snags” and other obstructions to navigation therefrom; accordingly the work being carried out, and, although not yet completed, steamers which before its commencement could not pass up the river, could, at the close of navigation, do so without any difficulty whatever.

A beacon was constructed at the mouth of the river in Lake Sturgeon to direct steamboats, but as yet no light has been fixed thereon; it is necessary that one should be supplied as soon as possible. Any of the residents on the lake shore would undertake to attend to it for a reasonable remuneration.

LINDSAY.

Situate on the River Scugog, nine miles from its outlet into Lake Sturgeon. The works here consist of a wooden lock 134 ft. by 34 ft. by 5 ft. water on the lower mill sill when Sturgeon Lake is level with the apex of the dam at Bobcaygeon; and a dam 280 ft. in length, 9 ft. high, 30 ft. base. These works are exclusively for the benefit of steamboat navigation, and the dam is under the control of the Department of Railways and Canals.

A fish pass was constructed in accordance with the request of the Department of Marine and Fisheries.

BOBCAYGEON.

The works here, consisting of a canal 973 ft. in length; a lock of masonry 134 ft. by 34 ft. by 5 ft. water on lower sill; a dam of truss-work 1,262 ft. in length, 6 ft. high; wharves, &c., are under the control of the Department of Railways and Canals.

In the river approaching the canal, both from Sturgeon Lake and Pigeon Lake there exist serious obstructions to the passage of steamers, which were exemplified in a very marked manner this autumn, as steamers and loaded barges which were unable to get through the lock in safety were unable to pass up the river. The water was unusually low, which, to a great extent, accounted for the obstacles these “bars” presented, and will continue to present under similar circumstances, unless removed. I would, therefore, respectfully suggest that as there are 10 or 12 steamers navigating this stretch of water from Bobcaygeon to Lindsay, an amount be placed in the Estimates for the coming year for this purpose.

BUCKHORN.

The works here consist of a dam 387 ft. in length, 5 ft. high; a slide 93 ft. in length and 33 ft. wide, with guide-booms, piers, &c.

The dam which maintains the waters of Pigeon, Buckhorn and Chemong Lakes at the standard level is under the control of the Department of Railways and Canals. The slide requires a new set of stop logs and the bulk-head should be renewed. The boom is being rebuilt.

The quantity of timber, &c., passed through the slide at this station during the last year consisted of:—

Saw logs.....	234,331
Square timber (pieces).....	2,366
Boom " "	2,316

BURLEIGH.

The works at this station, consisting of a dam, slide and waste weir, were erected exclusively to facilitate the descent of timber. This was one of the stations over which the "Trent Slides Committee" exercised control; but since that body became disorganized the works have been neglected, and the lumber trade is complaining at the required repairs not being carried out.

I have no doubt but that the trade would be agreeable to pay a small toll for timber &c. passing through, such as would give a fair rate of interest on the expenditure.

The quantity of timber, saw logs, &c., that passed this station during the past year was as follows:—

Saw logs.....	314,331
Boom timber (pieces)	3,116
Square " "	2,500

LAKEFIELD.

On the stretch between this station and Burleigh the channel is in several places obstructed by boulders which, in accordance with instructions, are being removed; when the water is level with the apex of the dam there is only 3 ft. 6 in. of water over these boulders, consequently it was necessary to place slash boards on the dam to the required depth, 4 ft. 6 in. This proceeding was objected to by the settlers on the Lake Shore, who complained that the slash boards penned back the water on their lands; the removal of these boulders will, to a great extent, do away with the difficulty, inasmuch as there will be no necessity to place such a deep slash board or racket on the dam.

The dam, I should state, is private property, and such being the case the management is anything but satisfactory to the public interest and is the subject of constant dispute and contention.

A "stone lifter" has been at work up to the close of navigation removing the boulders, and an extra depth of 12 in. was obtained, giving a total depth of 4 ft. 8 in. Provided the dam is retained at its present height, which is quite sufficient, the draught of the largest steamer plying on the reach being 4 ft. 6 in. at the stern when laden.

PETERBOROUGH.

Situate at the head of the navigable stretch from Heely's Falls, a distance of about 2 miles, upon which there are constantly engaged six steamers, and above which there is a continuous rapid extending to Lakefield and a number of saw-mills, the refuse from which is rapidly filling up the channel leading to the wharves, so as to seriously impede navigation. This has been a subject for complaint for the past number of years, and several communications have been addressed to the Department thereon, and, in accordance with instructions received from the Chief Engineer, Mr. Perley, I am preparing a detailed report for submission.

LITTLE LAKE.

Situate one mile below the town of Peterboro'. The works here consist of a three-stick retaining boom and four piers.

The repairs executed consisted in building three top-courses to two of the piers and refilling them partially with stone; constructing one pier, and supplying the boom with new timber and chains. This lake is also being rapidly filled up with mill refuse and at low water saw-dust banks appear. The steamers of late years find it almost impossible to make the wharf at the village of Ashburnham, and on several occasions have run aground; it is therefore necessary, in the interest of the steamboat navigation, that a dredge should be set to work to make a channel to this wharf and those at Peterboro'.

WHITLAW'S RAPIDS.

The works here consist of a lock 134 ft. by 34 ft., of good masonry with solid gates; a wing dam 223 ft. long; a cross dam 160 ft., average height about 9ft., with waste weirs and piers and guide booms. An additional waste weir with other improvements was called for by petition No. 84,294, and in accordance with instructions received from your Department, in No. 3,623, September 10th, 1880, the sluice or waste weir was constructed and the other improvements carried out.

The quantity of timber, &c., that passed this station during the past year was as follows:—

Saw logs.....	329,600
Boom timber (pieces).....	2,850
Square " "	141

The works at this station are under the control of the Department of Railways and Canals, excepting the guide booms and those works connected with the passage of timber, &c.

OTONABEE RIVER.

The obstructions that existed in this river, known as "Yankee Bonnet," "Dangerfield," and "Robinson's Island" have been removed and a flat dam constructed at Yankee Bonnet shoal. The result of these improvements is that there is four inches more water on these shoals than on the lower mitre sill of the lock at Whitlaw's Rapids.

HASTINGS.

The works here consist of a canal lock and dam; and a slide for the passage of timber, with guide booms, piers, &c. The canal lock and dam are under the control of the Department of Railways and Canals.

The repairs executed under the Department of Public Works consisted in—

Constructing a coffer-dam across the river above the dam, on what is known as the "Flat Rock," so as to dry the works below.

Excavating 600 cubic yards of rock from the bed of the river, so as to deepen the steamboat channel six inches.

Removing boulders and cleaning the channel below the locks.

Repairing and gravelling the dam and renewing the flooring, and performing general repairs to the slide.

The benefit of these improvements were felt in a very marked manner this autumn, as notwithstanding the extreme low water which prevailed all along the line, the level of Rice Lake (which is maintained by the dam here) was never known to be higher at the season of low water.

The quantity of timber that passed through the slide at this station during the past year was as follows:—

Saw logs.....	89,600
Boom timber (pieces).....	950
Square " "	250

HEELY'S FALLS.

The works here consist of a dam 488 ft. long, 8 ft. high; a slide 713 ft. long, 33 ft. wide, with piers and guide booms.

The dam maintains the water at a navigable height up to Hasting's Locks, and under the control of the Department of Railways and Canals.

The dam was gravelled and received temporary repairs

The slide is badly in need of extensive repairs, the side walls being in a decayed condition. There has been no outlay on this work for a number of years.

The quantity of timber, &c., passed through the slide during the past year was :

Saw logs.....	114,524
Boom timber (pieces).....	630
Square " "	200
Cedar " "	7,000
Shingle butts.....	780

MIDDLE FALLS.

The works at this station are exclusively for the benefit of the lumber trade. They consist of two dams, each 96 ft. long; two slides, one 455 ft. long by 33 ft. wide, the other 60 ft. long by 33 ft. wide; a wing dam of crib-work 638 ft. long and 8 ft. high, and guide booms and piers.

The repairs required at this station consist of the re-building of the portion of the retaining wall of the basin that was cut away some years ago by order of the "Trent Slides Committee," as the lumberers are determined now to run the lower slide as in former years.

The quantity of timber, &c., that passed through the slide at this station was:—

Saw logs.....	119,414
Boom timber (pieces).....	1,430
Square " "	200
Cedar " "	53,500

CHISHOLM'S RAPIDS.

The works at this station, consisting of a canal nearly 3,000 feet in length; a lock of first-class masonry, 133 ft. by 33 ft., with 5 ft water on mitre sills; a dam 715 ft. long and 6 ft. high, are under the control of the Department of Railways and Canals.

There is also a slide 100 ft. long and 50 ft. wide, with guide booms, &c.

The dam, which leaked badly, is undergoing general repairs and being gravelled.

The works at this station connected with the descent of timber, and also those at Middle Falls and Heely's Falls were, in the year 1855, transferred to a committee of lumbermen, who were empowered to collect tolls on timber passing down the river, and to render yearly statements to Government of their receipts and expenditure; but since that period, several changes having taken place, the committee has become disorganized, and in fact there is no committee now.

I would, therefore, respectfully urge upon the Department the immediate necessity of taking action in the matter and performing those duties which were entrusted to the old "Trent Slides Committee." This so called committee has not expended any money of any consequence on the works for the past number of years, and has not even made an effort to keep the works in a proper state of repair.

The toll that should be collected on the saw logs that pass through the slides at Middle Falls and Heely's Falls should more than pay for the annual expenditure required at these stations.

I have the honor to be, Sir,

Your obedient servant,

THOMAS D. BELCHER,

Superintending Engineer.

F. H. ENNIS, Esq.,
Secretary, Department of Public Works.

APPENDIX No. 20

STATEMENT showing Property purchased or sold by the Department of Public Works during the Fiscal Year ended 30th June, 1881.

Date of Sale.	Vendors.	Purchasers.	Property Purchased or Sold, &c.	For what purpose used.	Price of Sale.	Area of Land.
1880.					\$ cts.	
September 27....	Western Union Tel. Co....	Her Majesty.....	Telegraph lines and instruments owned by the Company in British Columbia, and electric cables between Vancouver Island and Swinomish, U.S.	.....	24,000 00	
do 27....	Thos. Wills.....	do	Lots 2, 3, 4, 5, 6 on West side of Pinnacle street, Belleville, Ont.	Post Office, &c.....	5,500 00	
October 7.....	Her Majesty.....	J. K. Suter.....	Letters Patent of part of lot No. 5, Block XIV., in New Westminster, B.C.	Old Registry Office.....	800 00	
November 9.....	H. A. King	Her Majesty.....	Part of lot No. 8, corner of King and Queen Streets, St. Catharines, Ont.	Post Office, &c.....	3,250 00	15 perches.
do 9.....	W. L. Copeland.....	do	Part of lot corner of King Street and Helliwell's Lane at St. Catharines, Ont.	do	2,750 00	11 do
September 6.....	F. A. Almon and others (Heirs Egan)	do	Strip of land in rear of Post Office building, Ottawa.	In connection with Post Office.	11,276 44	4,656 superficial feet.
October 12.....	Hon. J. Hearn	do	12 Lots in Champlain Street, City of Quebec.	To build thereon a retaining wall to the Citadel cliff.	21,700 00	Lots Nos. 2304, 2305, 2306, 2308, 2312, 2313, 2314, 2315, 2316, 2320, 2321, 2322.
December 7.....	Dame Sarah J. Rankin ...	do	Lot No. 686, north ward of the City of Sherbrooke.	Post Office, &c.....	3,500 00	
do 7.....	Eastern Townships Bank.	do	Lot No. 685, north ward of the City of Sherbrooke.	do	5,000 00	
1881.						
February 11.....	Thos. McGoey	do	Part of lot No. 3, in 6th Range of Township of Hall, Que., and south of ^{west of} way to near Boom Station.	In connection with Gath-	250 00	10,500 sq. feet.

March 26.	W. Turner.....	do	.....	the public road over lots 2 and 4, a length of 1,874 feet.	350 00
do 26.	E. Waldon.....	do	.....	Right of way over his land in Parish of Dorchester, County of Westmoreland, N.B., to lay, repair and renew water pipes for Dorchester Penitentiary aqueduct.	200 00
do 26.	J. S. Chapman.....	do	.....	do do do ...	800 00 1 acre.
do 26.	W. Milner.....	do	.....	Sale of a piece of land on Chapman's property, in the Parish of Dorchester, Co. of Westmoreland, N.B., containing one acre and the right to lay water pipes from the piece of land sold; also right of way to renew or repair water pipes.	200 00
June 22	W. Reay and others.....	do	.....	Right of way over his land in the Parish of Dorchester, N.B., to lay, repair and renew water pipes for aqueduct, Dorchester Penitentiary.	1 00
				Right of way from public road to Cedars Wharf, Que.	Way to Cedars Wharf....

A. GOBELL.

DEPARTMENT OF PUBLIC WORKS,
OTTAWA, November 18, 1881.

STATEMENT showing Public Property leased to various parties by the Department of Public Works, during the Fiscal Year ended 30th June, 1881.

Date of Signature.	Term of Lease.	Lessees.	Property leased.	Date from which Lease is reckoned.	Annual rental.	Amount of each in-stalment.	When payable each year.
Dec. 13, 1880.	During pleasure, terminable at 3 months notice.	C. B. Wright.....	Permission to him to cut an opening in the railing of the slide bridge at Hull, P. Q. Part of Government reserve at the head of Chaudière Island, Ottawa River. Government pier and freight shed at St. Dominique, P. Q.	Dec. 13, 1880.	\$ cts. 1 00	\$ cts. 1 00	13th Dec.
Mar. 28, 1881.	do	Perley & Pattee.....		Jan. 1, 1881.	96 00	96 00	1st Jan.
May 3, 1881.	do	Lake St. Francis Tow Boat Co		Nov. 1, 1880.	50 00	50 00	1st July.

A. GOBELL.

DEPARTMENT OF PUBLIC WORKS, 18th November, 1881.

APPENDIX No. 21.

REPORT OF THE SECRETARY OF THE OFFICIAL ARBITRATORS.

OTTAWA, 30th September, 1881.

SIR,—I beg to transmit herewith a statement of the claims referred to and arbitrated or reported upon by the Official Arbitrators in connection with the Department of Public Works, during the fiscal year ended 30th June, 1881.

I have the honor to be,
Sir,
Your obedient servant,

CHS. THIBAUT,
Sec. to the Official Arbitrators.

F. H. ENNIS, Esq.,
Secretary, Department of Public Works,
Ottawa.

STATEMENT of Claims referred to and arbitrated or reported upon by the Official Arbitrators, in connection with the Department of Public Works, during the fiscal year ended 30th June, 1881.

Claimant.	Nature of Claim.	When referred.	To whom referred.	Whether referred for award or report.	Amount claimed.	Amount awarded or recommended.	Date of award or report.
Andrew Northwood.....	Land required for public building at Chatham, Ont.....	May 20, 1881.....	J. Cowan.	For report.....	\$ cts. 8,000 00	\$ cts. 8,000 00	May 30.
The Managers of Presbyterian Church at St. Thomas, Ont.....	Land required for public building at St. Thomas, Ont.....	do	do	do	7,000 00	7,000 00	May 28.

CMS. THIBAUT, Secretary to the Official Arbitrators.

APPENDIX No. 22.

BREAKWATERS ON THE COAST OF GASPÉ.

(Translation.)

No. 20080.

MONTREAL, 28th December, 1881.

SIR,—In the month of January last, I had the honor of addressing you a letter respecting certain breakwaters of which I recommended the construction at several points on the coast of Gaspé, in order to facilitate the working of the sea-fisheries, and consequently to increase the produce of the same.

In that letter, I mention several important facts which seem to me to establish in an incontrovertible manner the good effects which would result from these breakwaters. But, unfortunately, my letter came to hand too late to be inserted in your excellent report for 1880.

As this question of breakwaters will probably be brought forward, during the coming session of Parliament, it would perhaps be a convenient thing that the Members of the House of Commons and of the Senate, and the general public should have before them a document (however short it may be) which treats of the matter, and which furnishes certain information which possesses a degree of importance. For these reasons, I beg that you will do me the honor to insert my letter of last year in your report for this year.

The communication in question will interest, I think, that portion of our population which resides in the interior of our country, and which is almost completely ignorant of the difficult conditions under which our sea-fisheries are carried on.

I have the honor to be, Sir,
Your obedient servant,

P. FORTIN.

The Honorable
Sir HECTOR L. LANGEVIN, K.C.M.G., C.B.,
Minister of Public Works.

OTTAWA, JANUARY 31, 1881.

SIR,

I have already had the honor of drawing your attention frequently to the necessity of constructing breakwaters in several of the roadsteads on the coast of Gaspesia, for the purpose of affording our fishermen necessary facilities for the prosecution of their calling—so difficult, so dangerous, and, in general, so unremunerative—with better chances of success and to enable them to draw from the sea a larger amount, than now, of production for their labor.

Now, it should not be forgotten that our fishermen are not the only class who will benefit by this increase of wealth, because, just in proportion as the products of our fisheries are augmented, the fishermen being the largest consumers, as a class, of manufactured goods, as well as of foreign produce, from their increased ability to purchase, manufacturers will receive increased orders, and commerce in

general will be largely benefited by this state of things, while the Treasury will profit also by the increased amount of custom duties derived from importation.

But these are not the only reasons which, at this time, prompt me more than ever, to insist on the necessity of aiding one of our most important industries which furnishes articles for exportation to an amount of more than *six million* (6,000,000) dollars, and which brings also to our domestic trade and consumption, produce of great value, of which unfortunately, in this country, there is not generally a correct appreciation.

Now, this industry is threatened, although not entirely in its very existence, yet to such an extent that if the present state of matters is not changed, instead of being prosperous as in bygone years, until lately, it will become languishing, and eventually fail in furnishing subsistence to those engaged in its prosecution—a class, as shown by vital statistics, which increases with a most remarkable rapidity—and the inevitable consequence will be, that our fishermen will have largely to abandon their native shores, and emigrate to foreign countries.

And whence this threat? From the competition of Norwegian fish—especially codfish—in the foreign markets in which Gaspé fish, until within a few years past, held first place, and had sold with facility and profit.

The abundance of Norwegian fish for the last few years in these markets, in which, besides, it arrives at an earlier date than Canadian fish,—has caused there an important lowering of prices, so that our codfishery, carried on under the like conditions as heretofore, is not sufficiently productive to yield profits to our fishermen and merchants, at the reduced prices.

I take the liberty of submitting to you the following extracts from a letter which I received from Mr. Henry N. De Veulle, agent of the fishing establishment of the firm of Charles Robin & Co., on the coast of Gaspesia—the following being what he wrote me under date of 6th January, 1881 :—

“Next summer we are going to retrench and to try to economise still more than the past season.

“Appertaining to the Percé establishment, we are going to close North Beach and Anse-au-Beaufils.

“When I went to Percé, in 1878, we had 124 boats fishing. Next summer I do not intend having more than 60 or 65; besides this, we will close Anse-au-Basque at Caraquet. At Caraquet we will keep only 2 or 3 boats, but we will increase slightly at Shippegan and North Shore. As for advances to draftmen, we are doing as usual, but we are reducing dealers a little; as you may well suppose, we will leave off those that remain in debt and keep those that pay.

“Should this coming season’s transactions not be an improvement on the past, there is not much doubt that a further reduction will become imperative.

“Did I not tell you in Percé in 1878, that the Canadian fish merchants were experiencing a competition that would become serious?”

It seems to me that the facts above stated by Mr. De Veulle do not require comment.

For, on one hand, the codfishery in Norway, aided and encouraged as it has been by all possible means—telegraphs, breakwaters, towboats, etc., etc.—yields products of an extraordinary abundance. And, on the other hand, the fish merchants of that country, enlightened as they have been by those of their consuls who reside in fishing countries, have had for the last few years, their codfish intended for exportation to warm countries cured after the Gaspé method, instead of making it into “stock-fish” as formerly, and it is that kind of codfish taken in such large quantities, and consequently sold at low prices, which competes so disastrously with the codfish of Canada and Newfoundland in the markets of Brazil, Spain, Portugal and Italy.

I cannot speak extensively in this letter of the codfisheries of Norway and their immense production, but permit me to say a word of those which are best known—I mean the fisheries of the Lofoten Islands.

The fishery of the Lofoten Islands—a group on the coast of Norway, 150 miles

in extent, lying between 67° and 69° 30' N. latitude—viz.: 1272 (twelve hundred and seventy-two) geographical miles further north than Quebec, and 1,200 (twelve hundred) miles further north than the central part of the Gulf of St. Lawrence, yielded 26,500,000 (twenty-six and a half million) codfish, during the fishing season of 1879, employing 26,556 men. Vessels and fishing-boats employed, 5,222.

In 1878, for the requirements of that fishery and the fish trade, 41,709 telegraphic dispatches were sent and received at these Lofoten Islands. In 1879, these figures must have been still greater.

Now, we must acknowledge with regret, that the productions of our fisheries have not augmented for some years past, and in certain parts they have decreased. But it would be necessary for our fishermen, in order to compete successfully with the fisheries of other countries, that they should augment the production. But can they do so?

Yes!

And how?

By obtaining more facilities, more encouragement for the different operations, all of them difficult and laborious, which constitute the art of sea fishing.

And what do they principally require?

Shelter for their boats.

Every one knows that on the coast of Gaspesia there is not a single port, with the exception of Gaspé Basin, which, however, is too far inland to be useful as a fishing harbor.

Without harbors, without shelter, these fishermen lose *one-third* of their time.

At each high wind or tempest, blowing on shore, they are obliged, after having discharged ballast, to haul their boats on shore.

And when fine weather has returned, they are obliged to launch them.

And how many boats are either injured or destroyed under these operations, which have often to be performed during one night, when the surf, rolled in by the fury of the gale, threatens destruction alike to the fishermen and their boats? At times, the wind springs up suddenly, and the sea, in consequence, rises with so much rapidity that before the fishermen can come to the rescue, their boats are smashed with the sails and outfits lost.

In the roadstead of Percé alone, I believe, that within the last *ten years one hundred* boats have been lost. Value—ten thousand dollars (\$10,000).

And when the boats are thus hauled ashore, how many fishing days are lost? For the fishermen have to wait until the return of fine weather, and further until the surf has gone down sufficiently to permit the launching of their boats.

Often, when they are on the fishing grounds and the catch most abundant, they are seen suddenly to raise anchor and scud for the shore, and by so doing, probably, lose their best day's fishing.

The reason of this movement is because the weather has become threatening and they fear the approach of a gale from seaward.

In this case it is imperative that they reach land and have beached their boats before the sea has risen and breakers have formed on the shore; for, if too late in making the land, the attempt to beach is certain death to the men and future misery to their widows and orphans.

According to the avowal of all competent men, fishermen who prosecute their business on a coast unprovided with shelter from on-shore winds, lose, at least, one-third of their time.

And so, by providing the necessary shelter, on those parts of the coasts of Gaspesia which are opposite to good fishing grounds, the codfishery, with the same outfit, with the same expense of equipment, and with the same number of men as now employed, will produce fully one-third more than at present.

This will enable our fishermen and merchants to compete with the Norwegians under favorable circumstances.

The roadsteads in which the first works are projected are those of Percé, Cape Cove, and Grand Pabos.

Preliminary surveys have already been made at these places.

But I would not advise you to have any of these works begun until Mr. Perley Chief Engineer of Harbors, has personally visited the places.

And I offer to accompany him on this tour of inspection (which might take place when I make my visit to the county of Gaspé), so as to give him myself, and to get the most competent persons residing at these places, to furnish him with precise information.

Once the sites chosen, and the kind of breakwater adopted, the contracts can be given, the wood for the structures can be drawn from the forest in winter and at the same time the necessary stone for ballasting the piers can be provided.

I do not know at what sum the carrying out of these works may be estimated but I believe I cannot ask, for this year, less than ten thousand dollars (\$10,000) for each of the breakwaters named, in all—thirty thousand dollars (\$30,000).

I hope that you will be pleased to put that amount in your Estimates, and to have it submitted for the approbation of the Hon. the Privy Council and the House of Parliament.

In having these works executed, which of course I desire to see extended to all our sea coasts not possessed of natural harbors, you will confer important benefits on our fishing industry and on our Maritime population, which is no unimportant factor in the Confederation.

I have the honor to be, Sir,
Your obedient Servant,

P. FORTIN.

THE HON. H. L. LANGEVIN, C.B.,
Minister of Public Works.

 APPENDIX No. 23.

 COPIES OF RESOLUTIONS PASSED BY LÉVIS, MONTREAL AND QUEBEC
 BOARDS OF TRADE IN FAVOR OF AN EXTENSION OF THE
 TELEGRAPHIC SYSTEM TO POINTE DES MONTS.

MONTREAL, 5th January, 1882.

MY DEAR SIR,—The Board of Trade of Lévis has passed resolutions approving the extension of the telegraph line to Forteau, and has sent a petition to the Hon. the Minister of Public Works based on the said resolutions.

If the petition has been received, I would suggest that it be published in the Annual Report of 1881, together with the petitions of the Boards of Trade of Montreal and Quebec.

Yours truly,
 P. FORTIN.

F. H. ENNIS, Esq.,
 Secretary, Department of Public Works.

COPY OF RESOLUTIONS PASSED BY THE LÉVIS BOARD OF TRADE.

(Translation.)

No. 14140.

 OFFICE OF THE LÉVIS BOARD OF TRADE,
 LÉVIS, 18th May, 1881.

SIR,—I have the honor to transmit the following, a copy of a resolution adopted by the Council of the Lévis Board of Trade, at a meeting held on the 17th May, instant.

“ Moved by Mr. C. W. Carrier, seconded by Mr. M. Etienne Samson, and

“ Resolved,—That this Council has learned with pleasure that the Government has taken steps towards the construction of a telegraphic line on the north shore of the River St. Lawrence, from Murray Bay to Bersimis, with a branch to Chicoutimi ;—

“ That this Council deems it its duty to point out, that it would be more advantageous to the interests of ocean navigation to extend the line at once as far as Pointe des Monts, the most important point on the whole north shore,—inasmuch as one-half of the vessels, and especially sailing vessels, navigating the river both inwards and outwards, pass in sight of the lighthouse erected on that point ;—

“ That moreover, shipwrecks often occur in the bay lying to the east of that point, and that in consequence of the difficulty and at times the impossibility of communicating with the south coast or with Quebec, the crews and passengers have undergone great suffering, and the vessels themselves have been lost, whereas with more speedy assistance they would have been saved ;—

“ That the system of tow-boats established by the citizens of Lévis and Quebec has rendered great services to navigation, and that the tow-boats are stationed on the north shore between Pointe des Monts and the Brandy Pots ;—

“That for the above reasons this Council recommends that the line be extended as far as Pointe des Monts.”

Believe me to be, Sir,
Your obedient servant,

JULIEN CHABOT,
Chairman of the Lévis Board of Trade.

Hon. Sir H. L. LANGEVIN, K.C.M.G., C.B.,
Minister of Public Works, Ottawa.

MEMORIAL OF THE QUEBEC BOARD OF TRADE.

No. 14195.

QUEBEC, 20th May, 1881.

The memorial of the Quebec Board of Trade—Respectfully sheweth:—

That your memorialists, in representing the interests of trade in general, have pleasure in noting the recent action of the Government in appropriations for the completion of telegraphic communication to Chicoutimi and Betsiamis;

That any effort in the direction of perfecting the comprehensive scheme of telegraphic relations along the lower River St. Lawrence and Gulf will doubtless receive favorable consideration at the hands of the Government;

That the bay north-eastward from Pointe des Monts towards Seven Islands has been the scene of many marine disasters, aggravated from the fact that no ready assistance can be had under such circumstances before (as has occurred in many cases) total loss and destruction of shipping has taken place, it being often impossible to communicate with the south shore for aid, especially late in the fall and during heavy weather;

That the continuation of electric connection to Pointe des Monts would aid materially as a means in procuring such help as would result in lessening destruction to shipping and probably loss of life; and the construction of this work would prove a great boon to the marine community, as well as an auxiliary towards perfecting the safe navigation of the river;

Wherefore, your memorialists will ever humbly pray that the Government may in its wisdom, see fit to take such measures as may end in the construction of the works indicated;

And your memorialists will ever pray, &c.

On behalf of the Council of the Quebec Board of Trade.

O. MURPHY,
President.

F. H. ANDREWS,
Secretary.

Hon. H. L. LANGEVIN, K.C.M.G., C.B.,
Minister of Public Works, Ottawa.

 COPY OF RESOLUTIONS PASSED BY THE MONTREAL BOARD OF TRADE.

No. 14673.

 OFFICES BOARD OF TRADE,
 MONTREAL, 8th June, 1881.

SIR,—In accordance with the action of the Council of this Board, at a meeting held yesterday, I have pleasure in transmitting herewith a copy of resolutions adopted unanimously, having relation to the telegraphic system which the Government is so advantageously establishing in the River and Gulf of St. Lawrence.

In doing so I am specially to solicit your early consideration of the views expressed by the Council in the second resolution, and to express the hope that you may be pleased to give effect to it, believing, as the Council does, that the extension along the north shore, as indicated, will be an invaluable section of the great enterprise.

I have the honor to be, Sir,
 Your obedient servant,

W. J. PATTERSON,
Secretary.

Hon. Sir H. L. LANGEVIN, K.C.M.G., C.B.,
 Minister of Public Works, Ottawa.

 COPY OF RESOLUTIONS ADOPTED AT MEETING OF COUNCIL OF THE MONTREAL BOARD OF TRADE, HELD 7TH MAY, 1881.

“That this Council has constantly watched the progress of the work of introducing and constructing the telegraphic system in the River and Gulf of St. Lawrence, including its extension to Anticosti, the Magdalen Islands and Bird Rock, and very respectfully begs thus to convey to the Dominion Government its appreciation of the very great services rendered to the commerce of Canada in lessening the dangers of navigation and reducing the risk of loss of valuable merchandize and ships, as well as providing facilities for saving lives and property, besides the advantages that will be derived by those who are engaged in the fisheries, &c;”

“That the Council also views with satisfaction the progress now making with work on the north shore extension, for that portion of the scheme must inevitably be of great service in promoting the safety of navigation and the value of fisheries in the Gulf, and would earnestly urge upon the Government the obvious advantages that must further accrue from continuing the wires without delay as far in the meantime as Pointe des Monts; and

“That the Secretary of this Board be instructed to transmit a copy of these resolutions to the Hon. Sir Hector L. Langevin, K.C.M.G., C.B., Minister of Public Works, with the request of the Council that he may be pleased to give the suggested extension to Pointe des Monts his early consideration.

STATEMENT of the Opening and Closing of Navigation.

PROVINCE OF NOVA SCOTIA.

Name of Port.	County.	Date of Closing, 1880.	Date of Open- ing, 1881.	Depth of Water available at low water.	Remarks.
				Feet.	
Annapolis	Annapolis	Always open		15 to 20	In very severe winters thin ice forms but screw steamers could always enter.
Barrington	Shelburne	do		12 to 20	At anchorage, wharves dry at low water.
Bridgewater	Lunenburg	Dec. 18...|	March 20..	8 to 10	
Digby	Digby	Always open		18	About 10 feet at end of steamboat pier.
Halifax	Halifax	do		20 to 30	At wharves, 70 to 180 feet in harbor.
Liverpool	Queen's	do		7	On bar; at Brooklyn Breakwater 24 feet.
Lockeport	Shelburne	do		8	
Lunenburg	Lunenburg	do		12	At wharves, 20 to 22 feet in harbor.
Parrsboro'	Cumberland	do			Dry in harbor.
Pictou	Pictou	Dec. 24...|	April 15...	19	At wharves, 40 feet in harbor.
Shelburne	Shelburne	Always open		40 to 60	
Sydney	Cape Breton	Dec. 30...|	April 27...	48	
Windsor	Hants	do 27...|	March 18...		Dry.
Yarmouth	Yarmouth	Always open		13	

PROVINCE OF NEW BRUNSWICK.

Buctouche	Kent	Nov. 20...	April 18...	12	8 feet on bar.
Obatham	Northumberland	do 20...	do 20...	35 to 40	In harbor, 18 feet on bar.
Dalhousie	Restigouche	do 30...	May 2...	30	In south channel, 70 feet in north channel.
Dorchester	Westmoreland	Dec. 16...	March 22...	10	
Moncton	do	do 17...	do 30...		Dry.
Newcastle	Northumberland	Nov. 22...	April 19...	30	In harbor, 18 feet on bar.
Richibucto	Kent	do 20...	do 20...	12	
Sackville	Westmoreland	Dec. 17...	March 25...	4	
Shediac	do	Nov. 22...	April 19...	12	
St. Andrews	Charlotte	Always open		14	In inner harbor.
St. John	St. John	do		24	At entrance to harbor, 40 feet to 120 feet in harbor.
St. Stephen	Charlotte	do		6	30 feet at landing place "The Lodge," 4 miles below the town.

PROVINCE OF PRINCE EDWARD ISLAND.

Charlottetown ..	Queen's	Dec. 1...	April 20...	20	At wharves, 40 to 60 feet in stream.
Cascompec	Prince	do 24...	do 4...	9	On outer bay, 11 feet on inner bar; 15 feet to 30 feet in harbor.
Georgetown	King's	Jan. 3, '81	do 24...	18	At railway wharf, 30 feet in stream.
Souris	do	Dec. 31...	do 29...	18	do 20 do
Summerside	Prince	Nov. 20...	do 14...	16	do 20 to 30 do

APPENDIX No. 24—Continued.

PROVINCE OF QUEBEC.

Name of Port.	County.	Date of Closing, 1880.	Date of Open- ing, 1881.	Depth of Water available at low water.	Remarks.
				Feet.	
Chicoutimi	Chicoutimi	Dec. 6...	May 6...	10	
Malbaie	Charlevoix	do 15...	March 30...	8 to 14	
Boulements	do	Nov. 24...	Early Apl.	over 36	
Quebec	do	Nov. 27...	April 1...	6 to 168	
Three Rivers	do	do 21...	do 26...	17	At Richelieu and Ontario Navigation Co.'s Wharf.
Berthier (<i>en haut</i>)	Berthier	do 20...	do 25...	7 to 8	
Montreal	do	Dec. 3...	do 19...	20·5	22 feet at ordinary low water.
New Carlisle	Bonaventure	Jan. 15,'81	do 1...	10·6	At end of proposed pier.
Carleton	do	Dec. 7...	do 11...	18 to 24	
Matane	Rimouski	Late Dec...	Early Apl.	17	Upper end of new pier, 12 feet old pier, 5 feet on bar.
Islet	L'Islet	Nov. 21...	April 15...	7	

PROVINCE OF ONTARIO.

Bellefleur	Hastings	Nov. 22...	April 9...	5 to 9	At docks, 9 feet in channel.
Cobourg	Northumberland	do 25...	do 19...	8	
Port Hope	Durham	Dec. 15...	do 9...	12	
Toronto	Toronto	do 8...	do 16...	11·6 to 15·6	
Oakville	Halton	Nov. 25...	do 20...	10	
Port Stanley	Elgin	Dec. 15...	March 25...	10	At entrance.
Port Dover	Norfolk	do 3...	April 23...	7 to 8·6	12 feet to 15 feet in the creek.
Port Burwell	Elgin	Nov. 14...	do 25...	7·6 to 8	
Warpeth	Kent	do 15...	do 18...	9	11 feet at outer end of dock.
Kingsville	Essex	Dec. 7...	do 10...	7 to 9	
Barnia	Lambton	do 20...	March 10...	4 to 40	
Goderich	Huron	Nov. 26...	April 25...	10	At entrance.
St. Albert	do	do 16...	do 20...	6	
Inverburton	Bruce	do 6...	do 20...	20	At end of pier, 500 feet from shore.
Kincardine	do	do 14...	do 27...	9	
Owen Sound	Grey	Dec. 2...	do 24...	9	
Meaford	do	Nov. 25...	May 2...	10	
Presqu'île	do	Dec. 5...	April 23...	12	

CANADA.

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ANNUAL REPORT

OF THE

MINISTER OF PUBLIC WORKS

FOR THE

FISCAL YEAR 1881-82

ON THE WORKS UNDER HIS CONTROL.

PRINTED IN ACCORDANCE WITH THE PROVISIONS OF THE 40^T THIRTY-FIRST
VICTORIA, CHAPTER TWELVE, SECTION NINETEEN, AS AMENDED BY
THE ACT FORTY SECOND VICTORIA, CHAPTER SEVEN.

PRINTED BY ORDER OF PARLIAMENT.



OTTAWA:

PRINTED BY MACLEAN, BOGGS & CO., WELLINGTON STREET
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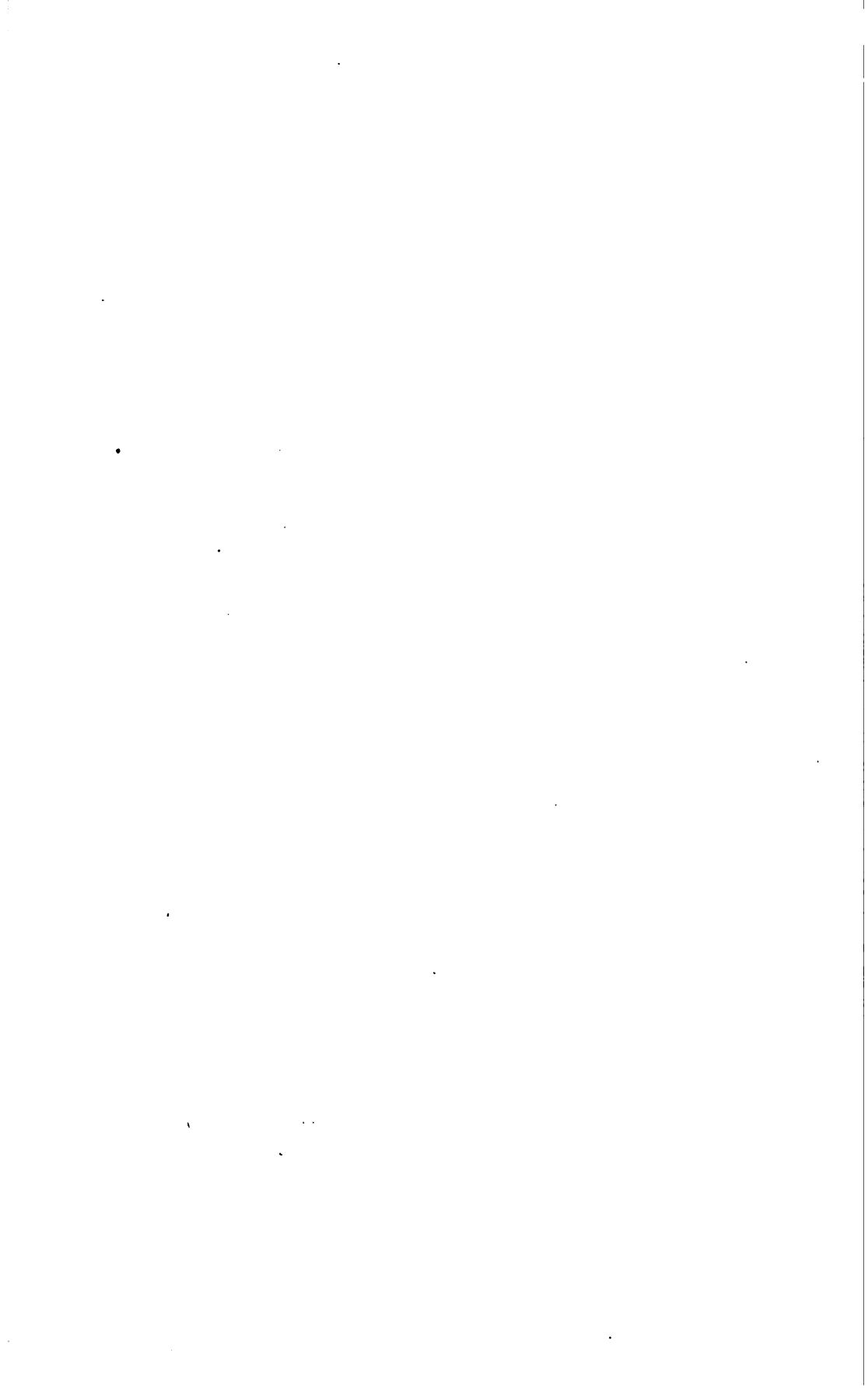
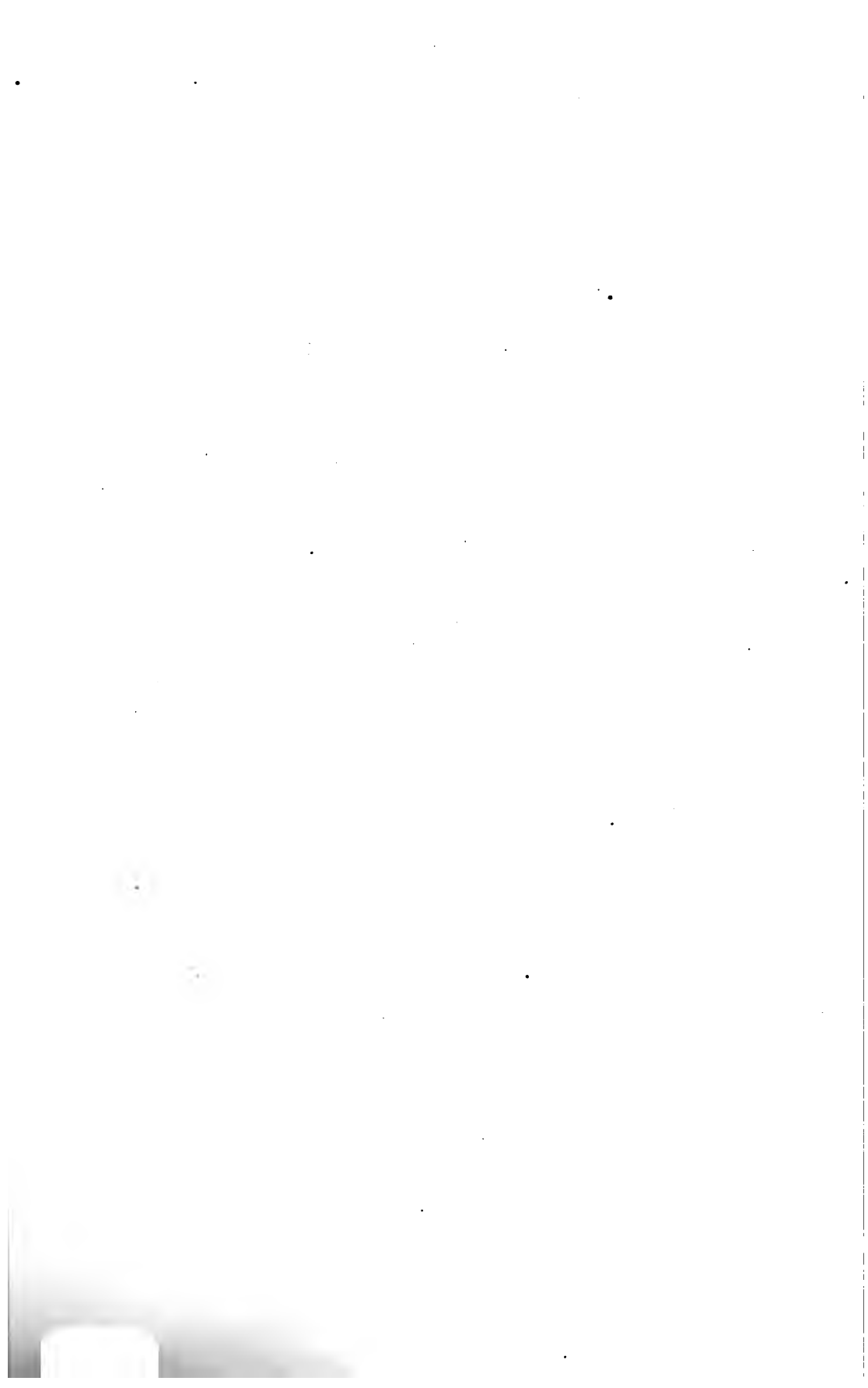


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CANADA.

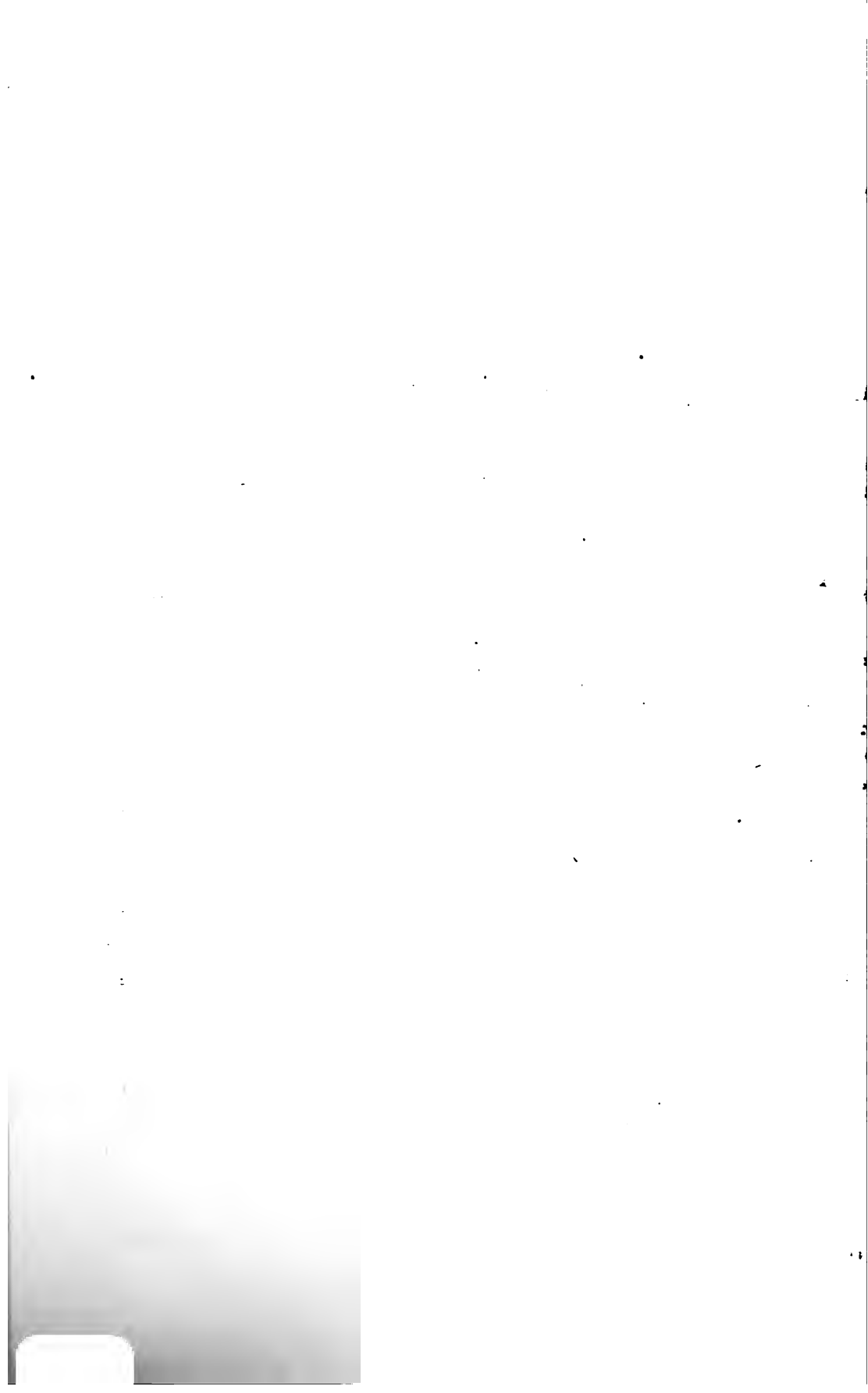
REPORT

OF THE

MINISTER OF PUBLIC WORKS.

FOR THE

FISCAL YEAR ENDED 30TH JUNE, 1882.



To His Excellency the Right Honorable Sir John Douglas Sutherland Campbell, Marquis of Lorne, one of Her Majesty's Most Honorable Privy Council, Knight of the Most Ancient and Most Noble Order of the Thistle, and Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor General of Canada and Vice Admiral of the same.

MAY IT PLEASE YOUR EXCELLENCY :

In accordance with the 19th section of the Act 31 Victoria, Chapter 12, I have the honor to submit the Annual Report of the Department of Public Works, for the fiscal year ending 30th June, 1882.

It contains an abstract of the operations and a statement of the general expenditure and cost of maintenance, during the last fiscal year, connected with the various public works placed under the control of the Department.

To it is attached a supplement, containing an historical sketch and general summaries of the operation and expenditure of the Department from 1867 to 1882.

In Appendix No. 1, to the Annual Report, on page 5, will be found, in detail, the expenditure of the last fiscal year. It is followed by the Annual Reports of the Chief Architect, the Chief Engineer and several Agents attached to the Department of Public Works.

The Buildings and Works under the control of the Department are :—

PUBLIC BUILDINGS.

HARBORS AND RIVERS.

DREDGING.

SLIDES AND BOOMS.

TELEGRAPHS.

PROVINCE OF NOVA SCOTIA.

HALIFAX.

DOMINION BUILDING.

The works mentioned in the Report of last year have been executed.
(Appendix 3, page 19.)

PICTOU.

MARINE HOSPITAL.

The plans of this building are ready and tenders will shortly be called for (Appendix 3, page 19.)

PRINCE EDWARD ISLAND.

CHARLOTTETOWN.

DOMINION BUILDING.

The repairs mentioned in the Report of last year have been made. (Appendix 3, page 19.)

PROVINCE OF NEW BRUNSWICK.

DORCHESTER.

GENERAL PENITENTIARY FOR THE MARITIME PROVINCES.

Mr. A. E. Killam has executed the contract mentioned in the Report of last year.

The work undertaken by Messrs. T. McManus & Son, is less advanced than it ought to be.

Work is being done for the purpose of completing the water service, and the drainage. (Appendix 3, p. 20.)

ST. JOHN.

CUSTOM HOUSE.

The works mentioned in the Report of last year have been completed. (Appendix 3, p. 20.)

NEW MARINE HOSPITAL.

The contract in course of execution includes the offices and a ward. According to the plan adopted, two other hospital wards may be constructed when they are required.

The new hospital is situated on land adjacent to the present Marine Hospital, which it will replace. (Appendix 3, p. 20.)

SUSSEX.

POST OFFICE, CUSTOM HOUSE, &c.

A contract has been entered into for the erection of this building, the plans for which have been prepared by the Department. (Appendix 3, p. 20.)

WOODSTOCK.

POST OFFICE, CUSTOM HOUSE, &c.

The Architect of the Department has been instructed to prepare plans for this building, for the construction of which an appropriation was voted during the last session of Parliament. (Appendix 3, p. 20.)

PROVINCE OF QUEBEC.

QUEBEC.

CITADEL.

General repairs have been made during the course of the year.

A reception hall has been constructed at the eastern end of the portion reserved for His Excellency the Governor General. (Appendix 3, p. 21.)

QUEBEC FORTIFICATIONS.

Three sections of the fortification walls have been repaired with the materials which had fallen from them. (Appendix 3, p. 21.)

WALL UNDER DUFFERIN TERRACE.

The works mentioned in connection with this subject in the Report of last year have been continued. (Appendix 3, p. 21.)

KENT AND ST. LOUIS GATES.

The pointing mentioned in the Report of last year has been done. (Appendix 3, p. 21.)

CARTRIDGE FACTORY.

The old " Artillery Barracks " are completely converted into a cartridge factory, and are occupied as such. (Appendix 3, p. 21.)

LABORATORY, &c.

The works mentioned in the Report of 1880-81, have been completed, and a heating apparatus is now being constructed in accordance with plans and designs furnished by the Department of Militia and Defence. (Appendix 3, p. 21.)

CHAMPLAIN STREET ROCK.

The retaining wall, of which mention is made in the Report of last year, has been completed and it is proposed to prolong it in the direction of Mountain Hill (Appendix 3, p. 22.)

CUSTOM HOUSE.

The attic rooms, of which mention is made in last year's Report, have been completed. (Appendix 3, p. 22.)

POST OFFICE.

The work of grading and the building of the retaining wall, of which mention is made in the Report of last year, have been completed. (Appendix 3, p. 22.)

MARINE HOSPITAL.

The repairs mentioned in the Report of last year have been completed. (Appendix 3, p. 22.)

LEVIS FORTS.

A contract has been entered into for the construction of wooden roofs on Forts Nos. 2 and 3, to prevent water from penetrating the casemates. (Appendix 3, p. 22.)

MONTREAL.

INLAND REVENUE OFFICE.

The work of constructing the addition to this building, mentioned in the Report of last year, is in course of execution.

Plans for a heating apparatus are being prepared. (Appendix 3, p. 22.)

ST. HELEN'S ISLAND, MONTREAL.

BARRACKS, ETC.

A contract will be entered into for the repairs of the barracks, magazine, &c. (Appendix 3, p. 22.)

THREE RIVERS.

OLD BARRACKS.

The works undertaken to convert the old barracks into Government Offices and Customs and Inland Revenue Offices are now being completed. (Appendix 3, p. 22.)

ST. VINCENT DE PAUL.

PENITENTIARY.

The construction of the western wing, containing 132 cells, has been completed. Various repairs have been made to the residences of the Warden and Deputy Warden as well as to the guards' houses. (Appendix 3, p. 23.)

HULL.

POST OFFICE AND INLAND REVENUE OFFICE.

The Department has caused plans to be prepared for the building to be constructed on the lot granted by the Wright Estate and intended to contain the Post Office and the Inland Revenue Office. (Appendix 3, p. 23.)

GROSSE ISLE.

QUARANTINE STATION.

The construction of the hospital mentioned in last year's Report has been completed. (Appendix 3, p. 23.)

ST. JOHN'S.

POST OFFICE, CUSTOM HOUSE, &c.

The heating apparatus has been put in and the offices furnished. (Appendix 3, p. 23.)

SHERBROOKE.

POST OFFICE, CUSTOM HOUSE AND INLAND REVENUE OFFICE.

The building in which these offices will be installed is in course of erection. (Appendix 3, p. 23.)

CHICOUTIMI.

MARINE HOSPITAL.

This building is in course of erection. (Appendix 3, p. 24.)

PROVINCE OF ONTARIO.

OTTAWA.**PARLIAMENT BUILDING.**

The hall temporarily occupied by the Supreme Court has been converted into a reading room for the House of Commons. The old reading room has been altered into a room for the accommodation of newspaper reporters. By lowering the ceiling it has also been possible to construct a room overhead for the Sessional Translators (Appendix 3, p. 24.)

DEPARTMENTAL BUILDINGS—EASTERN BLOCK.

Various repairs have been made to the interior of this building. (Appendix 3, p. 24.)

DEPARTMENTAL BUILDINGS—WESTERN BLOCK.

Various repairs have been made to the interior of this building. (Appendix 3, p. 24.)

PARLIAMENT GROUNDS.

The new green house mentioned in the Report of last year has been erected. (Appendix 3, p. 24.)

MONUMENT IN MEMORY OF SIR GEORGE E. CARTIER, BART.

A notice will shortly be published inviting artists to submit models for this monument, for the approval of the Dominion Government. (Appendix 3, p. 24.)

NEW SUPREME COURT.

This building has been completed and furnished in accordance with the arrangements stated in the Report of last year. (Appendix 3, p. 25.)

GEOLOGICAL MUSEUM.

The glass cases, shelves, &c., have been completed, and a heating apparatus has been constructed. (Appendix 3, p. 25.)

DRILL SHED.

A contract has been entered into for the construction of cesspools and of double windows. (Appendix 3, p. 25.)

RIDEAU HALL.

Ordinary repairs have been made in the course of the year (Appendix 3, p. 25.)

General improvements and repairs have been made in the heating apparatus of the buildings above mentioned (Ottawa.) (Appendix 4, pp. 30-31.)

CORNWALL.**POST OFFICE, CUSTOM HOUSE AND INLAND REVENUE OFFICE.**

A lot has been acquired by the Department, on which will be constructed a building, plans of which are being prepared, which will provide accommodation for the Post Office and the Customs and Inland Revenue Offices. (Appendix 3, p. 25.)

BROCKVILLE.**POST OFFICE, CUSTOM HOUSE AND INLAND REVENUE OFFICE.**

The architect of the Department has been instructed to prepare plans of the building in which these offices are to be installed, and for the erection of which an appropriation was included in the Estimates for 1881-82. (Appendix 3, p. 25.)

KINGSTON.**POST OFFICE.**

The changes pointed out in the Report of last year have been completed. (Appendix 3, p. 25.)

PENITENTIARY.

The north wing of the southern work-shop has been completed. Work is being done on the apparatus intended to heat the three work-shops and the dining hall. The roof of this wing has been repaired, and a wood shed erected. (Appendix 3, p. 25.)

MILITARY COLLEGE.

The room mentioned in the Report of last year has been completed; and various repairs have been made to the barracks, &c. (Appendix 3, p. 26.)

BELLEVILLE.

POST OFFICE, CUSTOM HOUSE AND INLAND REVENUE OFFICE.

The building for the accommodation of these offices is in course of construction.
(Appendix 3, p. 26.)

ST. CATHARINES.

POST OFFICE, CUSTOM HOUSE AND INLAND REVENUE OFFICE.

The building for the accommodation of these offices is in course of construction.
(Appendix 3, p. 26.)

HAMILTON.

POST OFFICE, CUSTOM HOUSE AND INLAND REVENUE OFFICE.

The architect of the Department has been instructed to prepare plans of a building in which will be contained the Post Office, and the Custom House and Inland Revenue offices. (Appendix 3, p. 26.)

STRATFORD.

POST OFFICE, CUSTOM HOUSE AND INLAND REVENUE OFFICE.

The building for the accommodation of these offices is in course of erection.
(Appendix 3, p. 27.)

CHATHAM.

POST OFFICE, CUSTOM HOUSE AND INLAND REVENUE OFFICE.

The Department has purchased the land on which the building is to be erected to contain these offices, and it is hoped that it will be commenced this autumn.
(Appendix 3, p. 27.)

WINDSOR.

POST OFFICE, CUSTOM HOUSE AND INLAND REVENUE OFFICE.

The attics have been arranged and are now inhabited by the caretaker; the approaches to the building have been levelled and the surrounding wall and the side-walks have been constructed. (Appendix 3, p. 27.)

PROVINCE OF MANITOBA.

WINNIPEG.

PARLIAMENT BUILDING.

The erection of this building is not as far advanced as could be wished ; it is, however, hoped that in the course of the season the masonry of the foundations will be built up to the level of the ground floor. (Appendix 3, p. 27.)

LIEUTENANT-GOVERNOR'S RESIDENCE.

This building, a description of which is given in the Report of last year, is in course of construction, and will be completed before 1st July, 1883. (Appendix 3, p. 28.)

POST OFFICE.

An addition in the rear has been erected, and various improvements have been made in the interior of the office. (Appendix 3, p. 28.)

IMMIGRANT SHED.

This building has been constructed in accordance with plans and specifications prepared by the Department. (Appendix 3, p. 28.)

STONY MOUNTAIN PENITENTIARY.

The heating apparatus will shortly be completed. The outbuildings mentioned in last year's Report, are partly constructed and partly in course of being so. (Appendix 3, p. 28.)

BRANDON.

IMMIGRANT STATION.

This building has been constructed in accordance with plans and specifications prepared by the Department. (Appendix 3, p. 28.)

EMERSON.

IMMIGRATION AGENT'S OFFICE.

This building has been completed and is occupied. (Appendix 3, p. 28.)

PROVINCE OF BRITISH COLUMBIA.

— — —

VICTORIA.

— —

POST OFFICE.

The front of this building has been re-built, and general repairs to the interior will be made in the course of the coming fiscal year. (Appendix 3, p. 29.)

— — —

NEW WESTMINSTER.

— —

PENITENTIARY.

A workshop has been erected near the prison. (Appendix 3, p. 29.)

POST OFFICE AND CUSTOM HOUSE.

The building which is to contain these offices is in course of construction. (Appendix 3, p. 29.)

— — —

NANAIMO.

— —

POST OFFICE, CUSTOM HOUSE AND INLAND REVENUE OFFICE.

The architect has received instructions to prepare plans for the building in which these offices will be installed, and the erection of which will be begun in the coming fiscal year. (Appendix 3, p. 29.)

— — —

HARBORS AND RIVERS.

— — —

PRINCE EDWARD ISLAND.

— —

CAMPBELL'S COVE.

On the north-west coast, about nine miles from East Point.

A breakwater 300 feet long, constituting a prolongation of that erected by the Provincial Government in 1872, has been constructed. The old breakwater has been raised to the level of the new part. (Appendix 5, p. 32.)

— —

COLVILLE BAY.

Some indispensable repairs have been made to the breakwater mentioned in last year's Report. (Appendix 5, p. 32.)

SOUTH RIVER, MURRAY HARBOR.

Murray Harbor is a large natural bay situated in the south-eastern part of the County of King's, and opening into the Gulf of St. Lawrence.

The dredge "Prince Edward" has been employed during the season in straightening the channel and giving it a depth of eight feet of water at low tide. (Appendix 5, p. 32.)

PINNETTE RIVER.

This falls into the Strait of Northumberland to the east of Point Prim.

In October and November, 1881, the dredge "Prince Edward" was employed in straightening the channel and deepening the basin near the wharf. (Appendix 5, p. 33.)

HILLSBOROUGH RIVER.

Opposite Charlottetown.

In May, 1882, the dredge "Prince Edward" was employed in deepening the basin near the wharf at Fort Augustus. (Appendix 5, p. 33.)

NINE MILE CREEK.

At the entrance of Hillsborough Bay.

The dredge "Prince Edward" has been employed in completing the channel mentioned in the Report of last year. (Appendix 5, p. 33.)

ORAPAUD.

A small harbor at the mouth of the Brocklesby River.

On the 8th August, 1881, the channel was completed as far as the wharves of the village. (Appendix 5, p. 33.)

GRAND BUSTICO.

On the north coast, nearly half-way between North and East Points.

In the month of December the Department entered into a contract for the construction of two breakwaters, one 1,200 feet and the other 450 feet in length, which will have the effect of narrowing the entrance of the harbor, and thereby increasing the force of the current. (Appendix 5, p. 33.)

NEW LONDON.

On the north coast, about nine miles east of Cascumpec.

The part of the breakwater constructed by the Local Government before the Province entered the Confederation has been repaired and prolonged 93 feet. (Appendix 5, p. 33.)

TIGNISH.

On the north coast, about eight miles from North Point.

A contract has been entered into by the Department for the construction of a breastwork to protect the beach and for the re-construction of the end of the breakwater. (Appendix 5, p. 33.)

MIMINIGASH.

On the western coast of the Island. The facing of the breastwork has been renewed. (Appendix 5, p. 33.)

NOVA SCOTIA.

MAIN-À-DIEU.

A small harbor in the County of Cape Breton. The construction of the breakwater mentioned in the report of 1880-81 has been continued. (Appendix 5, p. 34.)

COW BAY.

Thirty miles south-east of Sydney, C. B. The repairs to the breakwater injured by a storm in 1880 have been continued. (Appendix 5, p. 34.)

PORT CALEDONIA.

Nineteen miles south of the harbor of Sydney, C. B.

The dredge "St. Lawrence" was employed in the month of June, 1882, in deepening the harbor, which will now admit large vessels engaged in the coal trade. (Appendix 5, p. 34.)

LITTLE GLACE BAY.

Fourteen miles south of the harbor of Sydney, C. B.

In the spring of 1881 the dredge "St. Lawrence" was engaged in deepening the entrance to the harbor. (Appendix 5, p. 34.)

NORTH SYDNEY.

This is the principal port on the east coast of Cape Breton.

The amount voted by Parliament and the sum supplied by the Sydney Harbor Commissioners have been applied to the construction, in part, of a breakwater which will prevent the accumulation of sand in the harbor. (Appendix 5, p. 34.)

SOUTH INGONISH.

On the eastern coast of Cape Breton, about half way between the harbor of Sydney and Cape North.

The breakwater on the north side of the entrance to this harbor has been repaired. (Appendix 5, p. 34.)

INDIAN ISLANDS BEACH.

These islands are situated in the north part of East Bay, which is a continuance of the Bras d'Or, Cape Breton.

The passage through the beach mentioned in the Report of last year has been completed. (Appendix 5, p. 34.)

BENACADIE.

In the County of Cape Breton.

The necessary works for opening and protecting the entrance to this little harbor have been commenced. (Appendix 5, p. 35.)

MABOU.

On the west coast of Cape Breton, 6 miles north of Port Hood, the chief town of the county.

Work has been done towards opening a passage through the shoal which is situated at the entrance of the harbor. (Appendix 5, page 35.)

PORT HOOD.

On the west coast of Cape Breton.

Provisional repairs have been made to the pier, which will have to be re-built and solidly protected by a stone slope. (Appendix 5, page 35.)

RAGGED POND.

In Chedabucto Bay, north side.

Efforts were made in vain to open a channel to give access to this little harbor. (Appendix 5, page 35.)

PETIT DE GRAT.

In Ile Madame, County of Richmond, C. B.

The channel mentioned in the Report of last year, has been completed. (Appendix 5, page 35.)

BURYING ISLAND, CANSO HARBOR.

Canso Harbor is situated at the eastern extremity of Guysborough, and south of the entrance to the Strait of Canso.

The breakwater, the building of which was mentioned in the Report of last year, has greatly improved the Harbor of of Canso. (Appendix 5, page 35.)

NEW GLASGOW.

On East River, 8 miles above the Harbor of Pictou.

The improvements mentioned in the Report of last year, have been completed. (Appendix 5, page 35.)

RIVER JOHN.

It falls into John Bay, 12 miles to the north of the Harbor of Pictou.

The channel work mentioned in last year's Report was continued. (Appendix 5, p. 36.)

TÊTÉ-À-MA-GAUCHE.

The river Tête-à-ma-Gauche falls into the bay of that name, on the Northumberland Strait.

The dredge "Cape Breton" was employed in opening a channel through the shoals which obstruct the entrance to the river. (Appendix 5, p. 36.)

PARRSBORO'.

In the County of Cumberland.

Piles were driven at the end of the pier.

The improvement of the channel of Partridge River was continued. (Appendix 5, p. 36.)

HAMPTON.

In the County of Annapolis.

A new wharf was built in place of that erected by the Local Government, which was in a ruinous condition. (Appendix 5, p. 36.)

DIGBY.

At the western extremity of the basin of Annapolis.

The wharf constructed by the Local Government prior to Confederation underwent various repairs. The steamer which does the mail service between Annapolis and St. John, N.B., touches at this wharf. (Appendix 5, p. 36.)

TROUT COVE.

On the south coast of the Bay of Fundy.

Considerable repairs have been made to the breakwater. (Appendix 5, p. 36.)

METEGHAN RIVER.

In the County of Digby.

The north and south breakwaters underwent sundry repairs. (Appendix 5, p. 36.)

CAPE ST. MARY.

On the south shore of the entrance to Bay St. Mary, County of Digby.

The wharf underwent various repairs. (Appendix 5, p. 37.)

YARMOUTH.

At the western extremity of the peninsula of Nova Scotia.

The sea wall constructed on the beach in 1874 was repaired. (Appendix 5, p. 37.)

BROOKLYN.

At the head of Liverpool Bay, County of Queens.

The breakwater underwent various repairs. (Appendix 5, p. 37.)

VOGLER'S COVE.

At the south-western extremity of the County of Lunenburg.

From the 17th September to the 6th December, 1881, the dredge "Canada" was employed in deepening the channel leading to this harbor. (Appendix 5, p. 37.)

LITTLE HARBOR.

In the County of Lunenburg, on the coast of the Atlantic.

The entrance was deepened, and fishing boats can enter at all times. (Appendix 5, p. 37.)

PORTER'S LAKE.

This is a large sheet of water, 13 miles long, with an average width of one half a mile, separated from the Atlantic by several small islands connected with one another by sand bars.

A passage has been made for fishing boats through one of these sand banks (Appendix 5, p. 37.)

NEW BRUNSWICK.

OLIFTON.

Fifteen miles east of Bathurst, on the Bay of Chaleurs.

The breakwater, damaged during the winter of 1880-81, was repaired. (Appendix 5, p. 38.)

SHIPPEGAN.

At the north-eastern extremity of New Brunswick.

The dam which closes the eastern gully was repaired and raised. (Appendix 5 p. 38.)

HORSE SHOE SHOAL.

At the entrance to the Miramichi, by the Gulf of St. Lawrence.

The dredging work mentioned in last year's Report was continued. (Appendix 5, p. 38.)

RICHIBUCTOU.

On the west shore of the Gulf of St. Lawrence, County of Kent.

The breast wall protecting the beach was lengthened 220 feet. (Appendix 5, p. 38.)

BUCTOCHE.

Twenty-one miles north of the Harbor of Shediac.

The dredge "Canada," was employed in opening a passage through a bank of shells which obstructed the entrance of the harbor. (Appendix 5, p. 38.)

OOCAGNE.

This harbour is situated ten miles north of Shediac, on the Strait of Northumberland.

A landing pier is being built here, on the north side.

During the month of August, 1881, the dredge "Canada" was employed at the entrance of the harbor. (Appendix 5, p. 38.)

POINT DU CHÊNE,

The extension of the breakwater which protects the railway wharf, is almost finished. (Appendix 5, p. 38.)

QUACO.

Thirty miles to the east of the City of St. John, in the Bay of Fundy.

In 1873 a breakwater 300 feet in length was built on the east side of the harbor. During the past fiscal year a similar work was commenced on the west side of the harbor, and on the 30th June last it was almost completed. (Appendix 5, p. 39.)

ST. JOHN.

The Department has entered into a contract for rebuilding the breakwater.

The dredges "Canada" and "New Dominion" were employed in the port. (Appendix 5, p. 39.)

FORT DUFFERIN.

On Negro Point, at the entrance of the port of St. John.

A block of crib work has been built to protect the base of the rock which was being undermined by the water. (Appendix 5, p. 39.)

HARBOR OF ST. ANDREW'S.

Between Passamaquoddy Bay and River St. Croix.

A contract has been entered into for the construction of a lighthouse on a rock at the entrance to the harbor from the west side; this contract is in course of execution. (Appendix 5, p. 39.)

RIVER ST. JOHN.

The navigation of this river has been improved by the removal of rocks at various points.

The Oromocto sheer dam has been extended to Thatch Island, and an apron of brush and stones constructed in order to protect the outer part of the dam. (Appendix 5, p. 39.)

RIVER TOBIQUE.

A tributary of the River St. John.

Rocks have been removed at several points to facilitate the descent of timber (Appendix 5, p. 39.)

RIVER MADAWASKA.

It takes its rise in Lake Temiscouata and falls into the St. John at Edmondston.

Rocks have been removed at various points in this river, in the Province of New Brunswick and in the Province of Quebec. (Appendix 5, p. 40.)

 QUEBEC.

ETANG DU NORD.

At the western extremity of Grindstone Island, one of the Magdalen Islands.

The construction of the breakwater mentioned in last year's Report has been continued; it already affords shelter to fishing boats. (Appendix 5, p. 40.)

PERCÉ.

Chef lieu of the County of Gaspé.

During the season of 1881, surveys were made and bearings taken in order to determine the position and cost of the works required for the protection during storms of the large fleet of fishing boats frequenting the Gulf of St. Lawrence. (Appendix 5, p. 40 and pp. 75, 76.)

NEW CARLISLE.

Chef lieu of the County of Bonaventure, north of the Bay of Chaleurs.

A length of 180 feet of breakwater has been built. (Appendix 5, p. 40.)

MATANE.

On the south shore of the St. Lawrence, in the County of Rimouski, 240 miles below Quebec.

The wharf which had been damaged by the ice in 1881 has been repaired. (Appendix 5, p. 40.)

TROIS PISTOLES.

On the south side of the St. Lawrence, in the County of Temiscouata, 148 miles below Quebec.

The building of a small wharf has been commenced, and a number of rocks removed from the harbor. (Appendix 5, p. 40.)

TADOUSAC.

At the mouth of the Saguenay.

The dams which form the ponds of the fish breeding establishment have been rebuilt. (Appendix 5, p. 41.)

ANSE DU PORTAGE.

Opposite Tadousac at the mouth of the Saguenay.

The construction of a landing has been commenced, in order to facilitate the carrying of the mails between Tadousac and the Cove during winter.

This landing will be finished for the winter of 1882-3. (Appendix 5, p. 41.)

ANSE ST. JEAN.

On the south side of the Saguenay, 24 miles from the mouth.

Work at the wharf has been continued, and will be carried on again during the winter of 1882-3. (Appendix 5, p. 41.)

ST. ALPHONSE DE BAGOTVILLE.

At the head of Ha! Ha! Bay, on the south side of the Saguenay, 66 miles from the mouth.

A length of 378 feet of the wharf burnt a few years ago, has been rebuilt. (Appendix 5, p. 41.)

RIVER SAGUENAY.

The dredging work mentioned in last year's Report has been continued. (Appendix 5, page 42.)

GRANDE DÉCHARGE.

This is the larger of the two channels by which the waters of Lake St. John flow into the River Saguenay.

The widening of the channel has been undertaken. (Appendix 5, page 42.)

RIVIÈRE DU LOUP (EN BAS).

On the south side of the St. Lawrence, 108 miles from Quebec.

The work of repairing the wharf has been continued. (Appendix 5, p. 42.)

CAP À L'AIGLE.

On the north side of the St. Lawrence, 3 miles from Murray Bay.

The wharf was finished at the end of the year 1881. (Appendix 5, p. 42.)

MURRAY BAY.

Ninety miles from Quebec, on the north shore of the St. Lawrence.

The wharf has undergone the repair needed, and a store house has been built on it. (Appendix 5, p. 43.)

RIVIÈRE OUELLE.

On the south shore of the St. Lawrence, 75 miles from Quebec.

The grant voted for raising the pier has been expended, but it is yet too low (Appendix 5, p. 43.)

LES EBOULEMENTS.

Sixty-nine miles from Quebec, on the north shore of the St. Lawrence.

The wharf has undergone various repairs. (Appendix 5, p. 43.)

ILE AUX COUDRES.

Twelve miles from Bay St. Paul, County of Charlevoix, on the north side of the St. Lawrence.

The wharf mentioned in last year's Report was finished at the close of the year 1881. (Appendix 5, p. 43.)

BAY ST. PAUL.

Sixty miles from Quebec, on the north shore of the St. Lawrence.

The building of a wharf has been commenced at Pointe Rouge, Cap aux Cor} beau. (Appendix 5, p. 43.)

CRANE ISLAND.

Thirty-six miles from Quebec, opposite Cap St. Ignace.

The construction of a pier 171 feet in length, starting from the lighthouse, has been commenced. (Appendix 5, p. 43.)

GROSSE ISLE.

Twenty-nine miles from Quebec.

The eastern pier leading to the quarantine establishment has been extended, raised and repaired. (Appendix 5, p. 43.)

SAINTE FAMILLE.

On the north shore of Orleans Island, 17 miles from Quebec.

Two blocks, constructed in 1879 and 1880, have been connected together, and small steamers can now use the wharf. (Appendix 5, p. 44.)

LES ECUREUILS.

In the County of Portneuf, on the north shore of the St. Lawrence, 25 miles above Quebec.

A small wharf has been constructed at this place. (Appendix 5, p. 44.)

RIVER NICOLET.

Falls into the St. Lawrence from the south, at the lower extremity of Lake St. Peter.

In the month of October, 1881, a contract was made for certain improvements in the harbor, but the water was so high last summer, that so far it has been impossible to do more than collect the necessary materials on the spot. (Appendix 5, p. 44.)

RIVER YAMASKA.

It takes its rise in the County of Brome, and after a course of over 90 miles, falls into the St. Lawrence at the upper extremity of Lake St. Peter.

In the month of August, 1881, a contract was made for the construction of a lift lock and a dam at Ile Cardin.

When these works shall have been finished and the channel dredged, the river will be navigable for vessels of medium tonnage as far as Grosse Roche Rapids.

These works are being carried out. (Appendix 5, p. 44.)

RICHÉLIEU RIVER.

It falls into the St. Lawrence at Sorel, 45 miles from Montreal.

During the months of July and August, the dredge "Nipissing" was employed in deepening the channel near the village of St. Ours. (Appendix 5, p. 44.)

BERTHIER (EN HAUT.)

Nearly opposite Sorel, 45 miles from Montreal.

On the 5th July, 1881, the work of deepening the channel was completed. (Appendix 5, p. 44.)

L'ASSOMPTION RIVER.

It falls into the St. Lawrence near the village of Repentigny.

Dredging has been done at the mouth of this river. (Appendix 5, p. 44.)

CHANNEL BETWEEN LONG POINT AND BOUCHERVILLE.

Dredging has been done in the channel of the River St. Lawrence between these two points. (Appendix 5, p. 45.)

ISLE AUX NOIX.

In the Richelieu river, near the southern frontier of the Province of Quebec.

A bridge spanning a ravine on the road leading to the island ferry has received extensive repairs. (Appendix 5, p. 45.)

LAPRAIRIE.

Chief town of the county of that name, 7 miles above Montreal, on the south side of the St. Lawrence.

In the month of May, 1882, dredging was done at the approaches to the wharf. (Appendix 5, p. 45.)

BEAUHARNOIS.

Chief town of the county of that name, 20 miles above Montreal, on the south side of the St. Lawrence.

Dredging has been done in the vicinity of the wharf and in the channel leading to the main channel of the St. Lawrence. (Appendix 5, p. 45.)

BAGOT HAYES SHOAL.—RIVER ST. LAWRENCE.

This shoal, $2\frac{1}{2}$ miles below the Village of Cedars, County of Soulanges, is an obstacle to steam navigation.

The opening of a new channel 150 feet wide, about 200 feet north of the old channel, has been undertaken. (Appendix 5, p. 45.)

THE CEDARS.

The Village of Cedars is situated on the north side of the St. Lawrence, 30 miles above Montreal.

The old wharf has received extensive repairs in place of constructing a new one, in accordance with the plan mentioned in last year's Report. (Appendix 5, p. 45.)

ST. PLACIDE.

In the County of Two Mountains, on the Ottawa River, about 9 miles from St. Andrews.

The work of opening a channel from the wharf at St. Placide to the main channel of the Ottawa has been continued. (Appendix 5, p. 46.)

RIVER À LA GRAISSE (RIGAUD).

It falls into the Ottawa River, 15 miles from Rigaud.

The work of dredging has been continued. (Appendix 5, p. 46.)

RIVER DU NORD.

It falls into the Ottawa River at the head of the Lake of Two Mountains.

The dredging work has been continued. (Appendix 5, p. 46.)

RIVER DU LIÈVRE.

It falls into the Ottawa 19 miles below the City of Ottawa.

Dredging work has been done at Little Rapids and at Long Rapids. (Appendix 5, p. 46.)

THE GATINEAU.

The principal tributary of the Ottawa River, into which it falls at a short distance from the City of Ottawa.

The water was so low during the fall of 1881, that it became necessary to open a channel through the sand banks near the railway bridge, in order to facilitate the passage of barges. (Appendix 5, p. 46.)

PROVINCE OF ONTARIO.

UNION SUSPENSION BRIDGE.

This bridge connects the cities of Ottawa and Hull.

In 1881-2 it underwent extensive repairs and the roadway was entirely renewed. (Appendix 5, p. 46.)

REEF BELOW SUSPENSION BRIDGE—OTTAWA RIVER.

This reef is at a short distance below the Suspension bridge.

At low water the bed of the reef was removed to a depth of 3 feet below the water level. This is a great advantage to the navigation of this part of the river. (Appendix 5, p. 47.)

PORTSMOUTH.

On the bay of that name, 2 miles west of Kingston.

Dredging has been done in this harbor. (Appendix 5, p. 47.)

SALMON RIVER.

It falls into the Bay of Quinté at Shannonville, 40½ miles west of Kingston.

Dredging has been done in the shoals which obstructed the entrance of the river. (Appendix 5, p. 47.)

BELLEVILLE.

County town of the County of Hastings, on the Bay of Quinté, 43 miles west of Kingston.

Dredging has been done in the harbor, near the east wharf and south of the island, as far the western wharves. (Appendix 5, p. 47.)

TRENTON.

At the mouth of the River Trent.

An old cribwork pier which obstructed the navigation, has been removed from the channel of the river. (Appendix 5, p. 47.)

PICTON.

County town of Prince Edward County, on the Bay of Quinté.

Dredging has been done in this harbor. (Appendix 5, p. 47.)

CONSECON.

At the head of Weller's Bay, Lake Ontario, County of Prince Edward.

Dredging has been done on the shoal which obstructed the entrance to this harbor. (Appendix 5, p. 47.)

COBOURG.

On Lake Ontario, 92 miles west of Kingston.

Work has been continued on the western wharf, the contract for which was taken from the contractor; a contract was also entered into for the extension of the eastern wharf. (Appendix 5, p. 47.)

PORT HOPE.

On the north shore of Lake Ontario, in the County of Durham, 63 miles east of Toronto.

Dredging has been done in this harbor, and the work of extending the eastern wharf commenced. (Appendix 5, p. 48.)

TORONTO.

Dredging has been done at the western entrance of this harbor.

During the summer of 1881, Mr. J. B. Eads, C.E., made an examination and survey of this harbor, and his Report will be found after Appendix 5, pp. 77-95.

PORT STANLEY.

Terminus of the London and Port Stanley Railway on Lake Erie.

The works erected heretofore for the protection of the harbor, on the west side of the entrance, have been of the greatest benefit.

A channel has been opened from the harbor through Mill Creek. (Appendix 5, p. 48.)

GODERICH.

On the east side of Lake Huron, 68 miles from Sarnia.

In February last the Department contracted for works for the protection of the beach between the north wharf and the breakwater, and for repairs to the south wharf.

Dredging has been done alongside the wharves and breakwater. (Appendix 5, p. 48.)

PORT ALBERT.

At the mouth of Nine Mile Creek, which falls into Lake Huron, nine miles north of Goderich.

Dredging has been done in the harbor. (Appendix 5, p. 49.)

KINGARDINE.

Thirty-one miles north of Goderich, on Lake Huron.

Pile protection work, 790 feet in length, is being constructed, under contract, for the protection of the south wharf at the entrance of the harbor; one-half of the work is finished. (Appendix 5, p. 49.)

PORT ELGIN.

On Lake Huron 24 miles from Kincardine.

The Department has contracted for a breakwater, and the necessary dredging to form a harbor at this point. (Appendix 5, p. 49.)

SOUTHAMPTON.

On Lake Huron at the mouth of the Saugeen River.

The superstructure of the western breakwater has been repaired, and the building of a small breakwater, 155 feet in length, opposite the lighthouse has been commenced. (Appendix 5, p. 49.)

TOBERMORY.

A natural harbor on the channel leading from Lake Huron to the Georgian Bay.

Iron rings and fenders have been inserted in the face of the rocks surrounding the harbor, for the mooring and protection of vessels. (Appendix 5, p. 49.)

BRUCE MINES.

On the north shore of Lake Huron, 45 miles from Sault St. Marie.

A channel 14 feet in depth has been opened up to the wharf, and the largest steam vessels navigating the lakes can now approach it. (Appendix 5, p. 49.)

LITTLE CURRENT.

Between Cloche Island and Great Manitoulin Island.

A bed of rock, which obstructed the channel, has been partially removed. (Appendix 5, p. 49.)

OWEN SOUND.

County town of Grey, at the mouth of the River Sydenham, on the Georgian Bay.

The works mentioned in last year's Report have been completed.

The amount voted in the Estimates of 1881-2, has been expended in dredging, giving a depth of 14 feet to this harbor. (Appendix 5, p. 50.)

THORNBURY.

At the mouth of the Beaver River on the Georgian Bay.

The town of Thornbury has voted a sum of \$7,000, and Parliament a grant, which will be expended in re-building the old wharf and excavating a basin in the harbor. A contract has been signed for the work. (Appendix 5, p. 50.)

COLLINGWOOD.

In the County of Simcoe, on the south shore of the Georgian Bay.

Dredging has been continued. (Appendix 5, p. 50)

 PROVINCE OF MANITOBA.

LAKE MANITOBA.

During the season of 1881, surveys and examinations have been made in order to ascertain the cause of the overflow of Lake Manitoba and the means of preventing it for the future. (Appendix 5, p. 50 and pp. 96-116.)

 BRITISH COLUMBIA.

The work undertaken for the removal of Beaver Rock has been finished and dredging has been done in the harbor. (Appendix 5, p. 50, and Appendix 6, pp. 117-132.)

SURVEYS.

During the fiscal year surveys and examinations have been made in various localities in the Provinces of Prince Edward Island, Nova Scotia, New Brunswick, Quebec and Ontario. Reports of this work, with a few exceptions, have been forwarded to the Department. (Appendix 5, p. 51.)

DREDGING.

The Department possesses the following dredging plant :—

IN THE MARITIME PROVINCES.

The hopper dredge "St. Lawrence."
 " " "Canada."
 The dipper " " "New Dominion," and 10 scows.
 " " "Cape Breton," 7 "
 " " "Prince Edward," 3 "
 " " "George McKenzie," 3 "

IN THE PROVINCE OF QUEBEC.

The dipper dredge "Queen of Canada," 2 scows and lifting barge.
 " " " "Nipissing," and 2 "
 " steam tug "Dennis."

IN ONTARIO.

The dipper dredge "Challenge," and 3 scows.
 The tug "Trudeau."

IN BRITISH COLUMBIA.

A hopper dredge and 4 scows.
 The tug "Georgia."

The Department has contracted with Messrs. D. & A. Campbell for the construction of four scows, three of which will work with the dredge "Prince Edward," and one with the dredge "Cape Breton." These scows are now being built at Tete-a-ma-Gauche.

The dredges worked at the following places during the fiscal year :—

The "St. Lawrence" at Horse Shoe Shoal, N.B., and at Sydney, Port Caledonia, and Little Glace Bay, C.B.

It removed a total of 50,313 cubic yards of material. (Appendix 5, p. 52.)

The "Canada" at Buctouche and Cocagne, N.B., Picton, N.S., St. John, N.B., and River St. Mary, County of Guysboro', N.S.

It removed a total of 28,080 cubic yards of material. (Appendix 5, p. 52.)

The "New Dominion" at Marble Cove, St. John, N.B., Murray & Burnhill's wharf, near St. John and on the Oromocto Shoals.

It removed a total of 47,180 cubic yards of material. (Appendix 5, p. 53.)

The "Cape Breton," at New Glasgow, River John and River Tête-a-ma-Gauche, N. S.

It removed a total of 30,910 cubic yards of material. (Appendix 5, p. 53.)

The "Prince Edward," at Crapaud, Nine Mile Creek, Pinnette, Fort Augustus and South Murray Harbor, P. E.I.

It removed, in all, 47,325 cubic yards of material. (Appendix 5, p. 54.)

The "George McKenzie," at Mabou, N.S., where it removed 12,724 cubic yards of material. (Appendix 5, p. 54.)

The "Challenge," at Port Albert, Bruce Mines and Goderich, Ont.

It removed a total of 53,342 cubic yards of material. (Appendix 5, p. 54.)

The "Nipissing," at Levesque Shoal, near Berthier (*en haut*), on the shoals near St. Ours, at Charlemagne, River l'Assomption, and St. Placide.

It removed a total of 28,237 cubic yards of material. (Appendix 5, p. 55.)

The "Queen of Canada," at Beauharnois, River à la Graisse, Gatineau River and Laprairie.

It removed a total of 53,342 cubic yards of material. (Appendix 5, p. 55.)

The "Dredger" in the harbor of Victoria, B.C., where it removed 22,356 cubic yards of material. (Appendix 5, p. 56.)

SLIDES AND BOOMS.

The Government slides were constructed to facilitate the floating of timber in places where nature presents obstructions to navigation.

The districts where lumbering is carried on and where the Government has constructed works, are situated on the Rivers Saguenay, St. Maurice, Ottawa and Trent, and in the Georgian Bay, and on some of their tributaries.

RIVER SAGUENAY.

The works on this river consist of a slide 5,840 feet long, 1,344 feet of boom, bulkheads, piers and dams. The slide was made in order to avoid the rapids located between Lake St. John and the Saguenay.

The works cover a distance of some six miles, and are located in the *Petite Décharge*, the smaller of the two outlets of Lake St. John. These works were commenced in 1856 and finished in 1860.

The head of the slide has been re-built, as also dam No. 7 and 669 feet of the slide, and 2,000 feet of the slide have been repaired.

Thirty-eight thousand pieces of timber passed through the slide during the fiscal year 1881-82. (Appendix 7, p. 133.)

RIVER ST. MAURICE.

The slides and booms on this river and on the *Vermillion*, one of its tributaries, are located in the following order:—

River St. Maurice.

Stations.	Distance from Three Rivers.
Booms at the mouth.....	0 miles.
Grès Falls.....	16 “
Shawinigan Falls.....	20 “
Grand Mère “.....	29 “
Little Piles “.....	31½ “
La Tuque “.....	100 “
Plamonden Eddy.....	106 “

Vermillion River.

Mouth of River.....	116 “
Iroquois Falls.....	121 “

The height of water has been very favorable, and over 500,000 logs passed through the slides.

The pay of staff and cost of maintenance amounted to \$16,579.20 for the year.

A sum of \$2,993 was placed at the disposal of the superintendent to cover the cost of repairs. Out of this vote, \$103.40 remains available.

At the mouth of the St. Maurice two piers were constructed under contract, and seven more were repaired. These works cost \$7,142.00. (Appendix 8, pp. 134-135.)

OTTAWA DISTRICT.

The Government works for the floating of timber in this district are located on the following rivers:—

On the Ottawa.....	11 stations.
“ Gatineau.....	1 “

On the Madawaska.....	15 stations.
“ Coulonge.....	2 “
“ Black.....	1 “
“ Petewawa.....	31 “
“ Dumoine.....	12 “

The following is a table of distances from St. Ann's Lock, at the mouth of the Ottawa, to the mouths of the principal tributaries ; also to the stations where there are slides or other works:—

Places.	Distance from St. Ann.
Carillon.....	27 miles.
Grenville.....	40 “
Nation River.....	63 “
River du Lièvre.....	79 “
“ Gatineau.....	96 “
Chaudière Falls.....	98 “
Little Chaudière.....	100 “
Remous.....	102 “
Lake Deschênes.....	105 “
River Quio.....	129 “
Chats Station.....	131 “
Head of Chats.....	134 “
River Mississippi.....	134 “
“ Madawaska.....	136 “
“ Bonnechère.....	148 “
Les Chenaux.....	152 “
Portage-du-Fort.....	156 “
Mountain Station.....	161 “
Calumet.....	163 “
River Coulonge.....	184 “
“ Black.....	193 “
“ Snake.....	204 “
“ Petewawa.....	218 “
Des Joachims.....	236 “
River du Moine.....	244 “
Rocher Capitaine.....	253 “
Deux Rivières.....	266 “
River Mattawan.....	286 “
“ Antoine.....	293 “
“ Beauchêne.....	315 “
“ Porc-Epic.....	326 “
“ Grand Opemiconne.....	333 “

River Keepawa.....	349 miles.
“ Montreal.....	355 “
Fort Temiscamingue.....	367 “
River Ottertail.....	381 “
“ Blanche.....	386 “
“ des Quinze.....	389 “

RIVER OTTAWA.

List of slide and boom stations on the River Ottawa.

The distances given are measured on the latest maps, following the channel by which lumber is floated down the river.

Names of Stations.	Distance from mouth of Ottawa at St. Ann.
1. Carillon.....	27 miles.
2. Chaudière { North side, Hull, { South side, Ottawa. }	98 “
3. Chaudière (Little).....	100 “
4. Remous.....	102 “
5. Deschènes.....	104 $\frac{3}{4}$ “
6. Chats Station.....	131 “
7. Head of Chats.....	134 “
8. Chenaux... ..	152 “
9. Portage-du-Fort.....	156 “
10. Mountain.....	161 “
11. Calumet.....	163 “
12. Joachims Rapids.....	249 “
13. Rocher Capitaine.....	253 “

The works at these thirteen stations consist of:—

2,000	lineal feet of canal.
4,234	“ “ slides.
29,855	“ “ booms.
8,665	“ “ dams.
405	“ “ bulkheads.
1,981	“ “ bridges.
52	piers.
4	slide-keepers' houses.
3	storehouses.

The following works were executed during the fiscal year ended 30th June last.

At Sault-au-Recollet, general repairs to the piers and slides.

At Hull, general repairs to the piers and slides.

At the Chaudière, repairs to the head of the slides, to the piers and to the booms; the wires and cables of the so-called "Union Bridge" have been minutely inspected, and measures taken to prevent corrosion.

Considerable repairs had to be executed at the following stations:—The Chats, the Chenaux, Portage-du-Fort, Calumet, Des Joachims and Rocher Capitaine. (Appendix 9, page 136).

RIVER GATINEAU.

The River Gatineau flows from the north, and discharges into the Ottawa at a point about 96 miles above the junction of that river with the St. Lawrence at St. Ann, and 2 miles below the City of Ottawa. The length of the Gatineau is about 400 miles, and it drains an area of about 9,000 square miles.

The Government works are all situated at one station, about a mile from its confluence with the Ottawa. They consist of:—

- 3,071 lineal feet of canal.
- 4,133 " " booms.
- 150 " " bridge.
- 10 piers.
- 1 boom-men's house.
- 1 storehouse.

Important repairs have been made to the boom and the piers; the channel has been cleansed, and the fences and bridge repaired. (Appendix 9, page 136.)

RIVER MADAWASKA.

The River Madawaska is 240 miles long. It waters an area of about 4,100 square miles, and discharges into the River Ottawa 136 miles above St. Ann.

List of the slide and boom stations on the Madawaska, numbered from the mouth of the river upward:

- | | |
|---------------------|----------------------|
| 1. Mouth of river. | 9. High Falls. |
| 2. Arnprior. | 10. Ragged Chute. |
| 3. Flat Rapids. | 11. Boniface Rapids. |
| 4. Bulmer's Island. | 12. Duck Island. |
| 5. Burnstown. | 13. Bailey's Chute. |
| 6. Long Rapids. | 14. Chain Rapids. |
| 7. Springtown. | 15. Opeongo Creek. |
| 8. Calabogie Lake. | |

The works at these stations consist of:—

	1,750	lineal feet of slides.
18,179	" "	booms.
4,080	" "	dams.
182	" "	bridges.
	42	piers.
	1	storehouse.

At Ragged Chute the channel has been dredged and straightened by lifting out the rocks which impeded the passage of timber, and the lateral piers and booms have been repaired.

At the High Falls, a little lower down, the booms and the piers have been repaired. At Bailey's Falls new aprons have been placed in the lateral dams.

At Springtown the boom and piers have been repaired for the season.

At Chats Lake, at the mouth of the Madawaska, the position of the booms and piers has been altered to suit the convenience of the proprietor of a large saw mill situated on the lot adjoining the Government booms. (Appendix 5, page 137.)

RIVER COULONGE.

This river waters an area of 1,800 square miles, and its length is 160 miles. It discharges into the River Ottawa, 184 miles above St. Ann, on the north shore.

The following is a list of the Government works on the river:—

Boom at mouth.....	300	feet long and 1 support pier.
Booms at Romain's rafting ground.....	400	" " 3 " "
Booms at head of High Falls' Slide.....	1,848	" " 6 " "
Single Stick Slide.....	2,900	" "

The repairs to the slides at High Falls mentioned in the Report of last year have been completed in a permanent manner. (Appendix 5, page 137)

BLACK RIVER.

This river empties into the Ottawa at a point about 193 miles above St. Ann. Its length is 128 miles, and the area which is watered by it is about 1,120 square miles on the north shore.

The works consist of:—

1,139	lineal feet of single stick boom.
873	" " slide.
346	" " glance pier.
135	" " flat dam.

The slide, which having a sharp pitch is very greatly damaged by the timber which passes through it, and which was detained in it for several days during the last season, has been repaired and strengthened. (Appendix 5, page 137.)

RIVER PETEWAWA.

The length of the Petewawa is about 138 miles, and the area of the territory watered by it is 2,200 square miles.

It flows from the south and discharges into the Ottawa, 219 miles above St. Ann. Seven miles from its mouth it separates into two branches. On these seven miles there are five stations; on the north branch 19 stations. All the works on the south branch were abandoned in accordance with an Order in Council, dated 27th July, 1871.

List of the slides and booms on this river, in the order in which they occur from the mouth upwards:—

1. Mouth of the River.
2. First Chute.
3. Second Chute.
4. Third Chute.
5. Bois Dur.

North Branch.

- | | |
|---|--|
| 1. Half Mile Rapid. | 11. Foot of Devil's Chute. |
| 2. Crooked Chute. | 12. Devil's Chute. |
| 3. Between High Falls and Lake Traverse (a slide and series of dams and booms.) | 13. Elbow of Rapids. |
| 4. Thompson's Rapids. | 14. Foot of Long Sault. |
| 5. Lake Traverse Slides. | 15. Middle of Long Sault. |
| 6. Sawyer's Rapids. | 16. Head of Long Sault. |
| 7. Meno Rapids. | 17. Between Long Sault and Cedar Lake (south shore.) |
| 8. Below Trout Lake. | 18. Between Long Sault and Cedar Lake (north shore.) |
| 9. Strong Eddy. | 19. Cedar Lake. |
| 10. Cedar Island. | |

The works at these 24 stations are as follows:—

On the Main River.

2,963 lineal feet of slides.
 8,469 " " booms,
 2,077 " " dams.
 10 piers.

On the North Branch.

1,080	lineal feet of slides.
2,671	“ “ booms.
1,131	“ “ dams.
23	piers.

The employees had to expend much labor in order to stop the leaks which existed in the dams and slides at this station, which have now been in operation for twenty-four years. (Appendix 5, page 137.)

RIVER DU MOINE.

The length of this river is about 120 miles, and it waters to the north an area of about 1,600 square miles. It flows into the River Ottawa at a point about 256 miles above Ste. Anne.

The works on this river are: a pier and a boom at the mouth, a single stick slide and a series of dams from the mouth upwards. Those works may be detailed as follows:—

4,000	lineal feet of slides,
800	“ “ booms,
1,324	“ “ dams, and
6	piers.

Repairs have been made to the long slide and dams at Chute No. 1. (Appendix 5, page 137.)

TRENT RIVER NAVIGATION.

The booms, piers and slides and all such portions of the works as are connected with the lumbering operations on the River Trent at Chisholm's Rapids, Ranney's Falls, Middle Falls, and Crook's Rapids, were transferred to a company formed purposely for the management and maintenance of those works, with the right of levying tolls thereon, at the rate of five shillings per crib, at each of the slides, except at Chisholm's and at Crook's Rapids, where the works constructed do not facilitate the descent of timber.

This rate was altered by an Order in Council, on the 8th of December, 1866, fixing the tolls to be levied at Ranney's Falls, Middle Falls, and Heely's Falls, at one cent for each log of 13 feet in length, and a proportionate sum on pieces of greater length; and one dollar on each crib of square timber.

The Company are not liable for the renewal of the works, in case of their failure from decay of materials, or their destruction by fire, flood or any other cause. It is

their duty to keep an exact account of all the moneys collected by them, and to transmit the same to the Minister of Public Works, as provided by the Orders in Council passed on the subject.

The extraordinary repairs which from time to time were required have been executed at the expense of the Government, as also new works at localities other than those mentioned.

The following table gives the distances of navigable and unnavigable reaches :—

	Navigable.	Unnavigable.
From Trenton, Bay of Quinté, to Nine Mile Rapids		9
“ Nine Mile Rapids to Percy Landing.....	19½	
“ Percy’s Landing to Heely’s Falls Dam.....		14½
“ Heely’s Falls Dam to Peterboro.....	51¾	
“ Peterboro to Lakefield. ..		9½
“ Lakefield to Burleigh	12	
“ Burleigh Rapids		1
“ Burleigh Rapids to Buckhorn Rapids	7	
“ Buckhorn Rapids.....		1
“ Buckhorn Dam to Lindsay	36½	
	126½	34¾
“ Lindsay to Port Perry at the head of Lake Scugog.	28¾	
	155¼	34¾
Total distance, Bay of Quinté to Port Perry.....	190 miles.	
Passing to Fenelon Falls the distance from Buckhorn Dam to Fenelon is.....		31½

The following is a list of the works now in use :—

Chisholm’s Rapids.

	Distance from Trenton in Miles.
The works here consist of a canal and lock, a dam and slide..	15½

Percy Landing.

A retaining boom for saw logs here.....	28½
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Campbellford.

Guide booms.....	34¾
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Middle Falls.

The works consist of 4 dams and 2 slides... ..	37¾
--	-----

Crow Bay.

A retaining boom.....	38
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<i>Heely's Falls.</i>	
	Distance from Trenton in Miles.
A dam and one slide are in operation here.....	42 $\frac{3}{4}$
<i>Crook's Rapids, Hastings.</i>	
The works consist of a lock, dam, and slide for timber.....	92 $\frac{5}{8}$
<i>Whitlaw's Rapids.</i>	
These works, situated below Peterboro, consist of a lock, dam, and canal.....	92 $\frac{7}{8}$
<i>Little Lake.</i>	
These works consist of three piers and a boom.	94
<i>Burleigh.</i>	
Timber slides.....	116
<i>Buckhorn Rapids.</i>	
This dam is important in keeping to a high level the water of the lakes west of it as far as Bobcaygeon, including Lakes Pigeon, Ball, Buckhorn, and Chemong. The dam is effective	125
<i>Bobcaygeon.</i>	
There are two dams here with canal, lock, and slide. The dams keep up the water to the same level as far as Fene- lon Falls, and to the reach as far as Lindsay Lock	140 $\frac{3}{4}$
<i>Fenelon Falls.</i>	
A large slide and booms	154 $\frac{3}{4}$

In accordance with the terms of the Act 42 Vic., Chap. 7, the canals and locks in the District of Newcastle are now under the control of the Department of Railways and Canals; whereas the slides, dams, and booms remain under the control of the Department of Public Works.

The following repairs have been effected at the various stations:—

At Fenelon Falls, while making temporary repairs, it was ascertained that the slide was in a very bad condition, and repairs were initiated which could not be completed, as it was not desirable to exceed the credit voted. (Appendix 10, page 143.)

In the Scugog River, a great number of saw-logs sunken in the bed of the river, and which impeded navigation, were removed. There is now a depth of five feet at low water. (Appendix 10, page 143.)

At Bobcaygeon the Department has removed obstacles hindering navigation at the entrance to the canal. (Appendix 10, page 143.)

At Buckhorn, repairs are being made to the head of the slide. (Appendix 10, page 143.)

At Lakofield the dam and slide require considerable repairs. (Appendix 10, page 144.)

At Peterborough, work is going on for removing the refuse and saw-dust from the river near the town. (Appendix 10, page 144.)

At Little Lake it is necessary to renew the boom. (Appendix 10, page 144.)

At Whitlaw's Rapids the guiding boom and the slide planking were repaired. (Appendix 10, page 144.)

At the River Otonabee the refuse and saw-dust have accumulated in such quantities that it is necessary to remove them in order not to hinder the running of the steamboats. (Appendix 10, page 145.)

At Hastings, general repairs to the slide have been effected, and the upper portion of the piers has been renewed. It is necessary to have the guiding booms renewed. (Appendix 10, page 145.)

At Heeley's Falls considerable repairs are now being made on the slide, and a coffer dam had to be constructed at the head of the slide, the planking of which has been repaired. (Appendix 10, page 145.)

At Middle Falls no repairs have been made, but next year they will be indispensable. (Appendix 10, page 145.)

At Chisholm's Rapids some repairs to the dam have been made, and the slide is also in need of repairs. (Appendix 10, page 145.)

TELEGRAPH AND SIGNAL SERVICE.

BRITISH COLUMBIA.

The system of telegraph lines in this Province has worked well; interruptions have been much less frequent and repairs promptly made. The receipts amounted to \$18,414.24 as against \$10,544, for the previous year. (Appendix 11, page 147.)

THE GULF OF ST. LAWRENCE.

All the cables have worked well, with the exception of that of the Bird Rocks which will be shortly repaired. (Appendix 11, page 147.)

BAY OF FUNDY.

The cable between the Grand Manan Island and Campo Bello was damaged by a wrecked vessel; but it has been repaired in a satisfactory manner. (Appendix 11, page 147.)

THE ATLANTIC COAST.

The line between Canso and Halifax has worked well. (Appendix 11, p. 148)

NORTH SHORE, RIVER ST. LAWRENCE, NEWFOUNDLAND.

A cable has been laid at the mouth of the Sagonay, between Portage Bay and Water Bay near Tadousac, in order to connect the telegraph lines between Murray Bay and Mille Vaches, and this cable works well. (Appendix 11, page 148.)

The land line fourteen miles long between Port au Basque and Cape Ray is now in course of construction. (Appendix 11, page 148.)

SIGNAL SERVICE.

Twenty-three signal stations have been established at the points mentioned in Appendix 11, page 148.

MANITOBA AND THE NORTH-WEST TERRITORIES.

By Order in Council the telegraph lines of these regions have been placed under the control of the Department of Public Works since the 30th June, 1882, and active steps are being taken to organize the service. (Appendix 11, page 148.)

GRAVING DOCK AT ST. JOSEPH DE LEVIS.

The extra works considered necessary at the entrance and mentioned in last year's Report, have been executed in part. The machinery, boilers, &c., which Messrs. Carrier, Lainé & Co., built in their workshops, have still to be placed in position. (Appendix 12, page 149-150.)

THE PRINCESS LOUISE WHARF AND DOCKS, RIVER ST. CHARLES, HARBOR OF QUEBEC.

The second portion of this immense undertaking is completed, and there remains to be done the dredging, the building of a cross-wall and other works which will go to make the tidal basin which it is proposed to establish at this place. (Appendix 12, page 150-151.)

DEEPENING THE CHANNEL BETWEEN MONTREAL AND QUEBEC.

By the Act 36 Victoria, chapter 60 (1873), and by Order in Council of 31st May, 1873, the Harbour Commissioners of Montreal were empowered to carry out these works.

The work of dredging the ship channel in order to give it a depth of 25 feet has been continued.

The places where the most considerable work has been done, are the following: Cape Charles, Pouillier Rayer, Cap la Roche, Becancour upper traverse, Port St. Francis, Lake St. Peter, Isle de Grâce, Contrecoeur Channel, Cape St. Michel, Varennes, Pointe-aux-Trembles and Montreal.

The dredging at all points represents a total quantity of 1,453,788 cubic yards for the last fiscal year.

The accounts of expenditure by the Harbor Commissioners are only closed on the 31st December of each year. (Appendix 13, pp. 152-154.)

PURCHASES AND SALES.

Appendix 14 (p. 155), gives a statement of sales and purchases effected by the Department during the last fiscal year.

ARBITRATIONS.

During the fiscal year only three claims were referred to the official arbitrators. (Appendix 15, pp. 156, 157.)

OPENING AND CLOSING OF NAVIGATION.

Appendix 16 (pp. 158, 159,) gives the dates of the closing of navigation at the most important ports of the Dominion, and shows the depth of water at low tide at those ports.

THE DEPARTMENTAL STAFF.

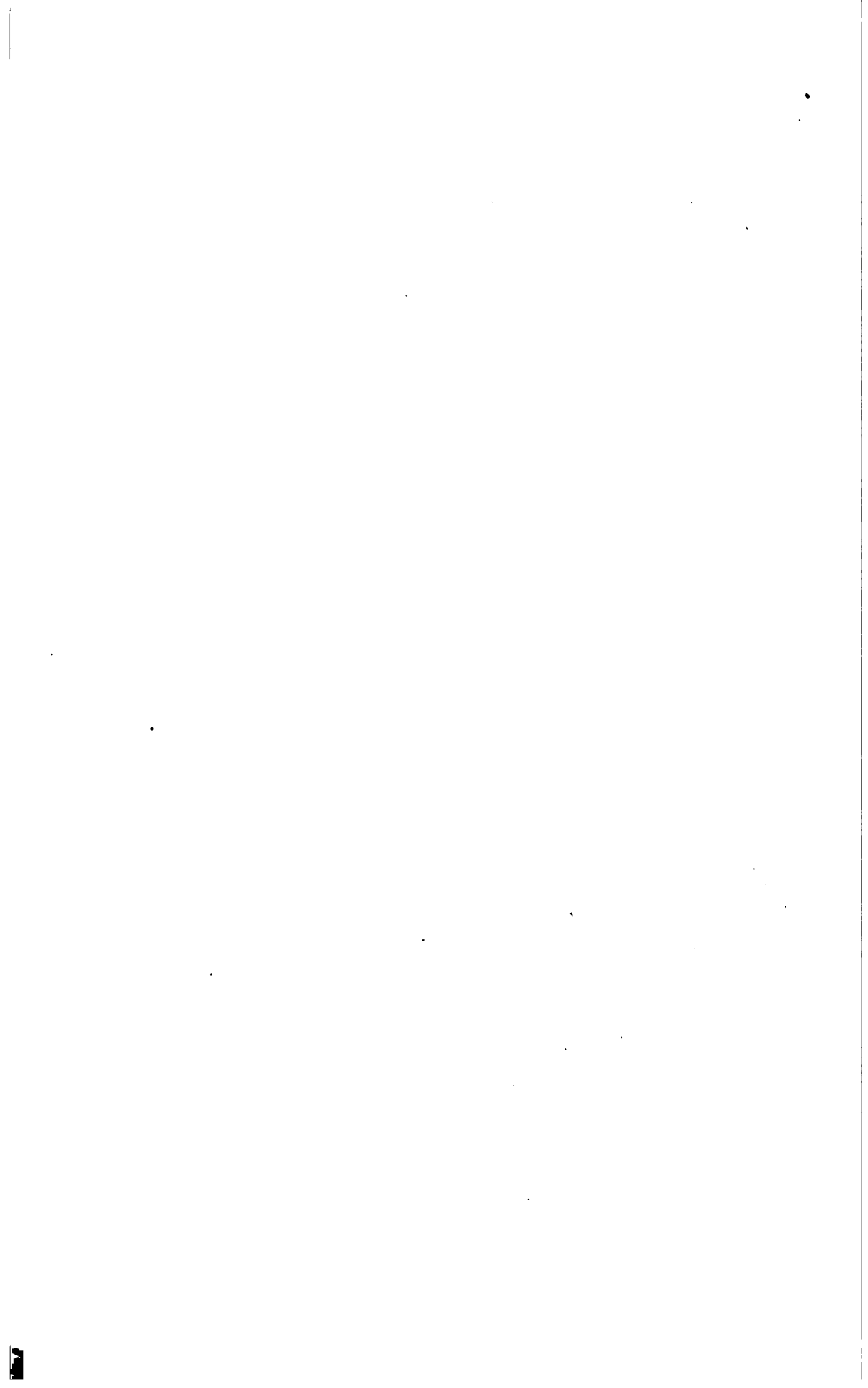
Appendix 17 (page 160,) gives a list of persons who filled, in the Department, from 1st July, 1867, to 30th June, 1882, the offices of Minister, Deputy Minister, Secretary, Chief Engineer and Chief Architect.

Respectfully submitted,

HECTOR L. LANGEVIN,

Minister of Public Works.

Ottawa, 20th January, 1883.



DOMINION OF CANADA,

REPORT

OF THE

MINISTER OF PUBLIC WORKS

FOR THE

FISCAL YEAR ENDED 30TH JUNE, 1882.

APPENDICES.



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APPENDIX No. I.

STATEMENT showing the Amount expended by the Department of Public Works of Canada, during the Fiscal Year ended 30th June, 1882.

Name of Work.	Construction	Repairs.	Staff and Maintenance.	Total.
PUBLIC BUILDINGS.				
Generally.....	\$ cts. 14,947 57			\$ cts. 14,947 57
<i>Nova Scotia.</i>				
Halifax Dominion Buildings.....		5,869 47		5,869 47
do Drill Shed.....		2,260 67		2,260 67
do Penitentiary.....		990 12		990 12
do Quarantine Station (Lawlor's Island).....		50 00		50 00
Lunenburg Marine Hospital.....		116 00		116 00
Pictou Custom House.....		905 19		905 19
do Marine Hospital.....	1,613 00			1,613 00
Sydney Quarantine Hospital.....	236 82			236 82
<i>Prince Edward Island.</i>				
Charlottetown Dominion Building.....		4,240 82		4,240 82
do Drill Shed.....		26 25		26 25
do Marine Hospital.....	68 06			68 06
<i>New Brunswick.</i>				
Chatham Custom House.....		307 34		307 34
Dorchester Penitentiary.....	55,625 70			55,625 70
Fredaricton Post Office.....	3,120 77	199 98		3,320 75
St. John Custom House.....	24,823 05	942 15		25,765 20
do Fort Dufferin, Negro Point.....		48 38		48 38
do Marine Hospital.....	861 43			861 43
do Military Buildings.....	2,000 00			2,000 00
do (Partridge Island) Quarantine Station.....		180 00		180 00
do Penitentiary.....		1,500 47		1,500 47
do Post Office.....	29,486 62	1,839 14		31,325 76
do Public Buildings.....		78 60		78 60
do Savings Bank.....		969 82		969 82
Sussex Post Office, Custom House, &c.....	1,918 30			1,918 30
Woodstock do do.....	1,680 22			1,680 22
<i>Quebec.</i>				
Beauport Rifle Range.....		893 49		893 49
Chicoutimi Marine Hospital.....	748 15			748 15
Dumdee Custom House.....		87 89		87 89
Grosse Isle Quarantine Station.....	14,421 60			14,421 60
Hull Post Office, &c.....	793 59			793 59
Ile aux Noix Forts.....		151 75		151 75
Levis Fortifications.....	3,831 08			3,831 08
Carried over.....	166,175 96	21,657 53		177,833 49

APPENDIX No. 1.—Continued.

Name of Work	Construction	Repairs.	Staff and Maintenance	Total.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Forward	158,176 06	21,657 63	.....	177,833 69
PUBLIC BUILDINGS—Continued.				
<i>Quebec—Concluded.</i>				
Montreal Custom House	4,071 00	7,247 76	.....	11,318 76
do Examining Warehouse	2,447 72	1,473 43	.....	3,921 15
do Immigrant Shed .....	.....	575 69	.....	575 69
do Inland Revenue Offices	10,353 87	.....	.....	10,353 87
do Military Cemetery .....	.....	590 50	.....	590 50
do Museum .....	.....	216 40	.....	216 40
do Post Office .....	.....	2,474 92	.....	2,474 92
Québec Artillery Barracks	3,010 07	.....	.....	3,010 07
do Cartridge Factory	12,018 76	99 74	.....	12,118 50
do Citadel	9,745 13	.....	.....	9,745 13
do do Cliff	10,377 61	.....	.....	10,377 61
do do Buildings	6,428 60	2,521 36	.....	8,949 96
do Custom House	3,574 00	609 65	.....	4,183 65
do Durham Terrace Extension	18,529 11	.....	.....	18,529 11
do Fortifications	18,017 59	.....	.....	18,017 59
do Marine Hospital .....	.....	4,722 32	.....	4,722 32
do Military Buildings .....	.....	846 50	.....	846 50
do Post Office .....	.....	1,357 21	.....	1,357 20
Sherbrooke Immigrant Shed .....	.....	400 00	.....	400 00
do Post Office, Custom House, &c	5,806 09	.....	.....	5,806 09
St. Helen's Island Military Buildings	144 63	.....	.....	144 63
St. John's Post Office	1,525 00	76 00	.....	1,601 00
St. Regis Custom House .....	.....	75 00	.....	75 00
St. Vincent de Paul Penitentiary	16,575 16	.....	.....	16,575 16
Three Rivers Old Barracks	5,102 36	.....	.....	5,102 36
<i>Ontario.</i>				
Belleville Custom House, &c	11,849 64	211 00	.....	12,060 64
do Inland Revenue Office .....	.....	118 85	.....	118 85
Brantford Post Office, &c	1,086 00	1,399 72	.....	2,485 72
Brockville Custom House, &c	3,090 00	.....	.....	3,090 00
Chatham do	8,137 88	3 78	.....	8,141 66
Cornwall Post Office, &c	8,233 97	.....	.....	8,233 97
Guelph Custom House, &c .....	.....	333 95	.....	333 95
Hamilton do .....	.....	569 50	.....	569 50
do Immigrant Shed	1,450 00	.....	.....	1,450 00
do Post Office, &c	37,941 70	205 56	.....	38,147 26
Kingston Custom House .....	.....	162 30	.....	162 30
do Fortifications .....	.....	9,919 78	.....	9,919 78
do Military College	4,660 03	.....	.....	4,660 03
do Penitentiary	8,340 53	.....	.....	8,340 53
do Post Office .....	.....	533 66	.....	533 66
London Custom House .....	.....	1,379 74	.....	1,379 74
do Immigrant Shed .....	.....	75 00	.....	75 00
do Post Office .....	.....	317 34	.....	317 34
Niagara Military Buildings .....	.....	637 25	.....	637 25
Ottawa Drill Shed	327 16	.....	.....	327 16
do Geological Museum	10,073 12	5,778 77	.....	15,851 89
do Public Buildings	24,934 96	97,428 58	.....	122,363 54
do do Gas .....	.....	.....	19,517 70	19,517 70
do do Grounds .....	.....	.....	7,640 54	7,640 54
do do Heating .....	.....	.....	40,031 99	40,031 99
do do Improving Ventilation	9,998 96	.....	.....	9,998 96
do do Removal of Snow .....	.....	.....	503 01	503 01
Carried over	414,026 61	164,018 67	67,693 24	645,738 52

APPENDIX No. 1—Continued.

Name of Work.	Construction	Repairs.	Staff and Maintenance	Total.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Forward.....	414,026 61	164,018 67	67,693 24	645,738 52
PUBLIC BUILDINGS—Concluded.				
<i>Ontario—Concluded.</i>				
Ottawa Public Buildings, Telephonic Service.....			358 30	358 30
do do Water.....			11,433 25	11,433 25
do Supreme Court.....	13,972 17	801 92		14,774 09
Point Edward Cattle Quarantine Station.....	1,577 10			1,577 10
Prescott Fort Wellington Barracks.....		399 87		399 87
Rideau Hall.....		22,254 52		22,254 52
do Allowance for Fuel and Light.....			8,000 00	8,000 00
do Removal of Snow.....			425 01	425 01
St. Catharines Post Office, &c.....	11,687 34			11,687 34
St. Thomas do.....	7,331 37			7,331 37
Stratford do.....	7,313 37			7,313 37
Toronto Custom House.....		2,597 41		2,597 41
do Examining Warehouse.....		9,646 93		9,646 93
do Immigrant Shed.....		966 18		966 18
do Inland Revenue Office.....		879 78		879 78
do Military Buildings.....		24 00		24 00
do Post Office.....		2,796 34		2,796 34
do Public Buildings.....		161 96		161 96
do Receiver General's Office.....		2 70		2 70
Windsor Post Office, &c.....	6,704 37	1,229 74		7,934 11
<i>Manitoba.</i>				
Brandon Immigrant Shed.....	9,934 20			9,934 20
Emerson Immigrant Shed.....	1,186 10			1,186 10
do Post Office.....		79 10		79 10
Stoney Mountain Penitentiary.....	16,829 26	153 67		16,982 93
Winnipeg Architect's Office.....		583 15		583 15
do Assistant Receiver General's Office.....	5,025 00			5,025 00
do Custom House.....		1,298 20		1,298 20
do Fort Osborne Barracks.....		1,474 03		1,474 03
do Immigrant Shed.....	13,243 26			13,243 26
do Lieutenant Governor's Residence.....	5,666 08			5,666 08
do Parliament Buildings.....	17,017 90			17,017 90
do Post Office.....	7,505 88			7,505 88
<i>North West Territories.</i>				
Battleford Buildings.....	3,025 91			3,025 91
<i>British Columbia.</i>				
Nanaimo Post Office.....	25 33			25 33
New Westminster Penitentiary.....	6,781 17	104 38		6,885 55
do Post Office.....	848 57			848 57
Victoria Custom House.....		60 00		60 00
do Marine Hospital.....		1,163 00		1,163 00
do Post Office.....	4,430 70	157 37		4,588 07
do Public Buildings.....		158 00		158 00
do Savings Bank.....		267 52		267 52
Carried over.....	554,031 69	211,280 42	87 909 80	853,231 91

APPENDIX No. 1—Continued.

Name of Work.	Construction	Repairs.	Staff and Maintenance	Total.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Forward.....	554,031 69	211,280 42	87,909 80	853,221 91
HARBOURS AND RIVERS.				
<i>Nova Scotia.</i>				
Benedicte Pond.....	716 20			716 20
Burying Island, Canso Harbour.....	4,000 00			4,000 00
Cape St. Mary.....	2,000 00			2,000 00
Cow Bay.....	6,000 00			6,000 00
Digby Pier.....	700 00			700 00
Hampton.....	1,572 37			1,572 37
Indian Island Beach.....	1,100 00			1,100 00
Ilgonish South.....	1,500 00			1,500 00
Little Harbour.....	200 00			200 00
Liverpool (Brooklyn).....	8,927 76			8,927 76
Mabou Harbour.....	4,126 00			4,126 00
Main-à-Dieu.....	8,530 12			8,530 12
Meteghan Breakwater.....	2,165 00			2,165 00
do River.....	2,000 00			2,000 00
North Sydney Harbour.....	2,000 00			2,000 00
Parbore' Pier.....		49 00		49 00
Partridge Island River.....	2,500 00			2,500 00
Petit de Grat.....	1,000 00			1,000 00
Porter's Lake.....	200 00			200 00
Port Hood Pier.....	1,000 00			1,000 00
Ragged Pond.....	500 00			500 00
Trout Cove.....		500 00		500 00
Yarmouth.....	1,700 00			1,700 00
<i>Prince Edward Island.</i>				
Campbell's Cove.....	7,291 20			7,291 20
Colville Bay, Souris East.....	1,254 09			1,254 09
Malpeque.....		43 00		43 00
Mimingash.....	1,500 00			1,500 00
New London.....		500 00		500 00
Rustico Harbour.....	4,549 60			4,549 60
St. Peter's Bay.....	302 79			302 79
Tignish.....	4,327 20			4,327 20
Wood Islands.....	1,956 52			1,956 52
<i>New Brunswick.</i>				
Campobello Breakwater (Wilson's Beach).....	207 11			207 11
Clifton.....		200 00		200 00
Cocagne.....	941 76			941 76
Madawaska River.....	1,037 06			1,037 06
Pointe-du-Chêne.....	11,072 69			11,072 69
Quaco.....	1,968 68			1,968 68
Richibucto.....	1,000 00			1,000 00
Shippegan Harbour.....	2,950 29			2,950 29
St. Andrews.....	72 52			72 52
St. John Harbour.....	5,299 55			5,299 55
do River.....	3,655 18			3,655 18
do do at Oromocto.....	714 58			714 58
Tobique River.....	1,000 00			1,000 00
HARBOURS, &C., MARITIME PROVINCES.....		1,507 28		1,507 28
Carried over.....	657,569 96	214,079 70	87,909 80	959,559 46

APPENDIX No. 1—Continued.

Name of Work.	Construction	Repairs.	Staff and Maintenance	Total.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Forward.....	657,569 86	214,079 70	87,909 80	959,559 46
HARBORS AND RIVERS—Continued.				
<i>Québec.</i>				
Anse du Portage Slip.....	584 43			584 43
Anse St. Jean Pier.....	1,091 72			1,091 72
Bagotville Pier.....	2,204 59			2,204 59
Bas St. Paul Pier.....	4,742 70			4,742 70
Berthier River (<i>en haut</i>).....	150 65			150 65
Cap-à-l'Aigle Pier.....	1,293 00			1,293 00
Carlston Pier.....	3,527 40			3,527 40
Cedars Pier.....	2,711 62			2,711 62
Chenal du Moine Pier.....		30 00		30 00
Chicoutimi Pier.....		824 30		824 30
Coteau Landing Pier.....		8 00		8 00
Eboulements Pier.....		272 97		272 97
Etang-du-Nord (Magdalen Islands) Pier.....	11,747 52			11,747 52
Grosse Isle Harbor.....	3,415 19			3,415 19
Harbors, &c., generally.....		1,597 51		1,597 51
Isle aux Coudres Pier.....	2,034 50			2,034 50
Isle aux Grues Pier.....	2,636 18			2,636 18
Les Écureuils Pier.....	1,571 13			1,571 13
Malbaie Pier.....		778 77		778 77
Matane Pier.....	1,199 00			1,199 00
Montreal Harbour.....	601 25			601 25
New Carlisle Pier.....	4,220 20			4,220 20
Percé Breakwater (Examination and Survey).....	499 43			499 43
Piers below Quebec.....		1,696 39		1,696 39
Piers and Booms, Belœil.....		21 05	184 66	205 71
Rivière du Lièvre.....	711 91			711 91
Rivière du Loup Pier.....		4,360 00		4,360 00
River Nicolet (Harbor of Refuge).....	594 52			594 52
River Ottawa (Bristol and Portage du Fort).....	299 00			299 00
Rivière Ouelle Pier.....		3,299 31	211 50	3,510 81
River Richelieu.....	799 20		358 75	1,157 95
do Saguenay below Chicoutimi.....	5,067 42			5,067 42
do do (Enlargement Grande Décharge, Lake St. John).....	6,303 16			6,303 16
do St. Lawrence.....	3,691 30	318 94		4,010 24
do do Removal of Chains and Anchors.....	10,041 11			10,041 11
St. Anne's Wharf, River Saguenay.....		128 20		128 20
St. Dominique Pier.....		26 75		26 75
Ste. Famille Pier.....	4,999 78			4,999 78
St. Jean Port Joli Pier.....		65 35		65 35
St. Timothée Pier.....		11 10		11 10
St. Zouique Pier.....	1,070 75			1,070 75
Tadoussac Fish Dams.....	3,464 32			3,464 32
Trois Pistoles Pier.....	3,500 00			3,500 00
Yamaska River.....	7,008 02			7,008 02
<i>Ontario.</i>				
Belleville Harbour.....	4,949 63			4,949 63
Cobourg Harbour.....	8,291 20			8,291 20
Collingwood Harbour.....	8,568 10			8,568 10
Goderich Harbour.....	2,387 06			2,387 06
Harbours and Rivers generally.....		6,194 43		6,194 43
Kincardine Harbour.....	3,486 48			3,486 48
Little Current.....	5,183 78			5,183 78
Meaford Harbour.....		10 00		10 00
Carried over.....	782,215 21	233,722 77	88,064 71	1,104,002 69

APPENDIX No. 1—Continued.

Name of Work.	Construction	Repairs.	Staff and Maintenance	Total.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Forward.....	782,215 21	233,732 77	88,664 71	1,104,602 69
HARBORS AND RIVERS—Concluded.				
<i>Ontario—Concluded.</i>				
Neebish Rapids, St. Mary's River.....	500 00	.....	.....	500 00
Ottawa River, removal of reef below Suspension Bridge.....	4,933 19	.....	.....	4,933 19
Owen Sound Harbour.....	29,942 57	.....	.....	29,942 57
Port Albert do Lake Huron.....	1,040 35	.....	.....	1,040 35
Port Elgin do do.....	3,180 97	.....	.....	3,180 97
Port Hope do do.....	5,083 14	.....	.....	5,083 14
Port Stanley do do.....	600 00	.....	.....	600 00
Portsmouth do.....	3,390 40	.....	.....	3,390 40
Rondeau do.....	6,460 00	.....	.....	6,460 00
Southampton do.....	2,559 60	.....	.....	2,559 60
Thornbury do.....	3,469 98	.....	.....	3,469 98
Tobermory do.....	349 20	.....	.....	349 20
Toronto do.....	14,280 49	.....	.....	14,280 49
<i>Manitoba.</i>				
Assiniboine River.....	160 00	.....	.....	160 00
Fairford and Partridge Crop River (Examination of question of overflow).....	3,951 43	.....	.....	3,951 43
Harbours generally.....	223 39	.....	.....	223 39
<i>North-West Territories.</i>				
Saskatchewan River.....	714 48	.....	.....	714 48
<i>British Columbia.</i>				
Courtenay River.....	474 65	.....	.....	474 65
Harbours generally.....	642 91	.....	.....	642 91
Nasas River.....	380 25	.....	.....	380 25
Victoria Harbour.....	1,785 99	.....	.....	1,785 99
HARBOURS GENERALLY.....	.....	6,083 25	.....	6,083 25
DREDGE VESSELS.				
Dredges.....	3,150 00	21,406 91	.....	24,556 91
New Dredging Plant.....	3,236 50	.....	.....	3,236 50
DREDGING.				
Maritime Provinces.....	45,742 64	.....	.....	.....
Quebec—	.....	.....	.....	.....
Beauharnois.....	\$1,396 58	.....	.....	.....
Gatineau River.....	1,126 35	.....	.....	.....
Laprairie.....	325 73	.....	.....	.....
L'Assomption River.....	1,496 04	.....	.....	.....
Rivière à la Graisse (Ri- gaud).....	1,816 02	.....	.....	.....
Rivière du Nord.....	370 74	.....	.....	.....
Saguenay River (below Chicoutimi).....	565 43	.....	.....	.....
St. Lawrence River.....	2,212 50	.....	.....	.....
Generally.....	9,215 76	.....	.....	.....
.....	18,515 15	.....	.....	.....
Carried over.....	64,257 79	872,724 70	261,212 93	88,664 71
				1,222,602 34

APPENDIX No. 1—Continued.

Name of Work.	Construction	Repairs.	Staff and Maintenance	Total.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Forward.....	872,724 70	261,212 93	88,664 71	1,222,602 34
DUNDAS—Concluded.				
Forward.....	61,257 79			
Ontario—				
Bruce Mines.....	1,581 33			
Consecon Harbour.....	3,236 13			
Goderich Harbour.....	418 00			
Hawkesbury (Ottawa River).....	159 23			
Rondeau Harbour.....	3,015 00			
Salmon River.....	1,068 43			
Picton Harbour.....	468 00			
Generally.....	1,311 48			
	11,277 60			
British Columbia.....	8 341 54			
	83,876 93			83,876 93
SLIDES AND BOOMS.				
Saguenay District Works.....	2,418 50	5,064 21	1,436 58	8,921 29
St. Maurice do.....	5,300 08	9,167 21	17,768 48	32,235 77
Ottawa do.....			22,103 22	22,103 22
Ottawa River.....	7,657 84	435 00		435 00
Oatineau River.....	1,128 92			
Madawaska River.....	4,398 22	4,317 81		4,317 81
Coulonge River.....	677 73			
Black River.....	587 56			
Petewawa River.....	990 53			
Dumoine River.....	2,192 05			
South Nation.....	528 68			
Mont au Recollet.....	301 66			
Ottawa Suspension Bridge.....	18 87	18,481 76		18,481 76
New Castle District Works.....	645 10	3,028 53	582 50	4,256 13
ROADS AND BRIDGES.				
Des Joachims Rapids Bridge.....	157 62			157 62
Portage du Fort Bridge.....		400 00		400 00
Ottawa Union Suspension Bridge.....	4,912 80			4,912 80
Métapédicac Road.....		223 30		223 30
Temiscouata Road.....		3,049 15		3,049 15
MISCELLANEOUS.				
Arbitrations and Awards.....			3,901 51	3,901 51
Surveys and inspections.....			27,060 09	27,060 09
TELEGRAPH LINES.				
Telegraph Extension, Baie St. Paul to Chicoutimi.	11,676 83			11,676 83
do Lines, Maritime Provinces.....	4,486 23			4,486 23
do do British Columbia.....	4,709 51		38,646 87	43,356 38
Land and Cable Telegraph Lines, Lower St. Lawrence, &c.....	33,635 43		8,655 15	42,290 58
Telegraph and Signal Service generally.....		7,254 27		7,254 27
Agent and Contingencies, British Columbia.....			2,195 84	2,195 84
Totals.....				
Carried over.....	1,029,296 54	307,881 36	211,016 95	1,548,194 85

APPENDIX No. 1—*Concluded.*

Name of Work.	Construction	Repairs.	Staff and Maintenance	Total.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Forward	1,029,296 54	307,881 86	211,016 95	1,548,194 85
WORKS AUTHORIZED BY SPECIAL ACTS OF PARLIAMENT.				
St. Lawrence River, deepening between Quebec and Montreal.....	194,000 00	.....	.....	194,000 00
Quebec Harbour Improvements	55,000 00	.....	.....	55,000 00
Levis Graving Dock.....	50,000 00	.....	.....	50,000 00
Esquimalt Graving Dock, B.C.....	37,769 22	.....	.....	37,769 22
Total	336,769 22	.....	.....	336,769 22
Grand Totals.....	1,366,065 76	307,881 86	211,016 95	1,884,964 07

O. DIONNE,
Accountant.

DEPARTMENT OF PUBLIC WORKS,
OTTAWA, 20th November, 1882.

APPENDIX No. 2

TABLES OF DISTANCES.

ST. LAWRENCE NAVIGATION.

FROM STRAITS OF BELLE-ISLE TO DULUTH, AT HEAD OF LAKE SUPERIOR, BY WATER. A

From	To	Sections of Navigation.	Statute Miles.	
			Inter- mediate.	Total to Straits of Belle-Isle.
Straits of Belle-Isle.....	Cape Whittle.....	Gulf of St. Lawrence.....	240	240
Cape Whittle.....	West Light, Anticosti.....	do.....	201	441
West Light, Anticosti.....	Father Point.....	River St. Lawrence.....	202	643
Father Point.....	Rimouski.....	do.....	6	649
Rimouski.....	Bic.....	do.....	12	661
Bic.....	Isle Verte.....	do.....	39	700
Isle Verte (opp. Saguenay)	Quebec.....	do.....	126	826
Quebec.....	Three Rivers.....	do to Tidewater.....	74	900
Three Rivers.....	Montreal.....	do.....	86	986
Montreal.....	Lachine.....	Lachine Canal.....	8½	994½
Lachine.....	Beauharnois.....	Lake St. Louis.....	15½	1,009½
Beauharnois.....	Ste. Océile.....	Beauharnois Canal.....	11½	1,021
Ste. Océile.....	Cornwall.....	Lake St. Francis.....	32½	1,053½
Cornwall.....	Dickinson's Landing.....	Cornwall Canal.....	11½	1,065½
Dickinson's Landing.....	Farran's Point.....	River St. Lawrence.....	5	1,070½
Farran's Point.....	Upper end of Croyle's Island.....	Farran's Point Canal.....	½	1,071
Upper end Croyle's Island.....	Williamsburg or Morris- burgh.....	River St. Lawrence.....	10½	1,081½
Williamsburg.....	Rapid Plat.....	Rapid Plat Canal.....	4	1,085½
Rapid Plat.....	Point Iroquois Village.....	River St. Lawrence.....	4½	1,090
Point Iroquois Village.....	Upper end Presqu'Isle.....	Point Iroquois Canal.....	3	1,093
Presqu'Isle.....	Point Cardinal, Edwards- burgh.....	Junction Canal.....	2½	1,095½
Point Cardinal.....	Head of Galops Rapids.....	Galops Canal.....	2	1,097½
Galops Rapids.....	Prescott.....	River St. Lawrence.....	7½	1,105
Prescott.....	Kingston.....	do.....	59	1,164
Kingston.....	Port Dalhousie.....	Lake Ontario.....	170	1,334
Port Dalhousie.....	Port Colborne.....	Welland Canal.....	27	1,361
Port Colborne.....	Amherstburgh.....	Lake Erie.....	232	1,593
Amherstburgh.....	Windsor.....	River Detroit.....	18	1,611
Windsor.....	Foot of St. Mary's Island.....	Lake St. Clair.....	25	1,636
Foot of St. Mary's Island.....	Sarnia.....	River St. Clair.....	33	1,669
Sarnia.....	Foot of St. Joseph's Island.....	Lake Huron.....	270	1,939
Foot of St. Joseph's Island.....	Foot of Sault St. Mary.....	River St. Mary.....	47	1,986
Sault St. Mary.....	Head of Sault St. Mary.....	Sault St. Mary Canal.....	1	1,987
Head of Sault St. Mary.....	Point aux Pins.....	River St. Mary.....	7	1,994
Point aux Pins.....	Duluth.....	Lake Superior.....	390	2,384

Of the 2,384 miles from the Straits of Belle-Isle to the Head of Lake Superior, 71½ miles are artificial navigation, and 2,312½ open navigation.

Straits of Belle-Isle to Liverpool, 1,942 geographical, or 2,234 statute miles.

The total fall from Lake Superior to Tidewater is about 600 feet.

APPENDIX No. 2.—Continued.

QUEBEC TO LIVERPOOL, *viâ* STRAITS OF BELLE-ILE AND MALIN HEAD, NORTH OF IRELAND.—B.

From	To	Sections of Navigation.	Geographical Miles.	Statute Miles.
Quebec.....	Saguenay.....	River St. Lawrence..	106	121
Saguenay	Father Point.....	do	53	61
Father Point.....	Lighthouse, west end Anticosti ...	do	176	202
West end of Anticosti....	Cape Whittle, Labrador Coast. ...	Gulf of St. Lawrence	175	201
Cape Whittle.....	Belle-Ile Lighthouse, east entrance of Straits.....	do	209	240
Belle-Ile.....	Malin Head, North of Ireland	Atlantic Ocean.	1,750	2,013
Malin Head.....	Liverpool.....	do and Irish Sea	192	221
Total from Quebec to Liverpool, <i>viâ</i> Belle-Ile and Malin Head, North of Ireland...			2,661	3,060

HEAD OF LAKE SUPERIOR TO LIVERPOOL, *viâ* STRAITS OF BELLE-ILE AND NORTH OF IRELAND.—C.

Sections of Navigation.	Geographical Miles.	Statute Miles.
Head of Lake Superior, at Fond du Lac, to Quebec	1,355	1,558
Quebec to Liverpool, <i>viâ</i> Straits of Belle-Ile and North of Ireland.....	2,661	3,060
Total from head of Lake Superior to Liverpool, <i>viâ</i> Belle-Ile and Malin Head, North of Ireland.....	4,016	4,618
N.B.—Route <i>viâ</i> Straits of Belle-Ile shorter than <i>viâ</i> Cape Race.....	158	182

Straits of Belle-Ile, 80 miles long by 14 average breadth.

APPENDIX No. 2—Continued.

QUEBEC TO LIVERPOOL, *viâ* CAPE RACE AND MALIN HEAD, NORTH OF IRELAND.—D.

From	To	Sections of Navigation.	Geographical Miles.	Statute Miles.
Quebec	Saguenay	River St. Lawrence..	106	122
Saguenay	Father Point	do ...	53	61
Father Point.....	Métis Point	do ...	22	25
Métis	Cap Ste. Anne des Monts.....	do ...	71	82
Cap Ste. Anne des Monts..	Cap de la Madeleine.....	do ...	48	53
Cap de la Madeleine.....	Fame Point.....	do ...	29	33
Fame Point.....	Cap des Rosiers.....	do ...	25	29
Cap des Rosiers	Cap St. Pierre de Miquelon.....	Gulf of St. Lawrence	343	394
Cap St. Pierre de Miquelon	Cape Race	Atlantic Ocean	132	152
Cape Race	Malin Head	do do	1,800	2,070
Malin Head	Liverpool.....	do and Irish Sea	192	221
Total from Quebec to Liverpool, <i>viâ</i> Cape Race and Malin Head, North of Ireland			2,819	3,242

HEAD OF LAKE SUPERIOR TO LIVERPOOL, *viâ* CAPE RACE AND NORTH OF IRELAND.—E.

Sections of Navigation.	Geographical Miles.	Statute Miles.
Head of Lake Superior, at Fond du Lac, to Quebec	1,355	1,558
Quebec to Liverpool, <i>viâ</i> Cape Race and North of Ireland	2,819	3,242
Total from head of Lake Superior to Liverpool, <i>viâ</i> Cape Race and Malin Head, North of Ireland.....	4,174	4,800
N.B.—Route <i>viâ</i> Cape Race longer than <i>viâ</i> Straits of Belle-Ile.....	158	182

APPENDIX No. 2—Continued.

LAKE NAVIGATION.—F.

Names of Lakes, and of Rivers connecting the same.	Statute Miles.			Depth in Feet.		Area, Square Miles.	Elevation above Sea at Three Rivers.
	Greatest Length.	Greatest Breadth.	Average Breadth.	Greatest.	Mean.		
Superior.....	390	160	80	.....	900	32,000	600
St. Mary's River.....	55	4	1	60	30	.....	582
Michigan.....	345	84	58	.....	1,000	22,400	586
Green Bay.....	100	25	18	.....	500	2,000	580
Mackinaw Straits.....	50 Not added below.	20	10	200	40	.....	580
Georgian Bay.....	130	55	40	.....	500	.....	578
Huron.....	270	105	70	900	450	23,000	578
St. Clair River.....	33	.....	.....	50	35	.....	.....
St. Clair Lake.....	25	25	20	27	15	360	573
River Detroit.....	25	3	1	37	29	.....	.....
Lake Erie.....	250	60	38	204	90	10,000	564
Niagara River.....	35	3	1	.....	30	.....	.....
Lake Ontario.....	190	52	40	600	412	6,700	234
Lake St. Francis.....	33	7	4	80	36	132	141
Lake St. Louis.....	15	5	5	68	30	75	58
Lake St. Peter.....	30	9	7	40	8	200	0
River St. Lawrence, connecting Lakes between Kingston and Three Rivers	186	.....	.....	.....	20	.....	.....
Total length of Lake Navigation	2,172	Inclusive of River Portions				96,867	.....
do do ...	1,778	Exclusive of River Portions.....				.....	.....

FROM PRINCE ARTHUR'S LANDING (LAKE SUPERIOR) TO FORT GARRY (WINNIPEG), BY THE DAWSON ROUTE.—G.

	Statute Miles.	
	Inter- mediate.	Total.
Prince Arthur's Landing to Shebandowan.....	45	45
Lake Shebandowan to North-West Angle.....	312	357
North-West Angle to Fort Garry (Winnipeg).....	95	452

The steamboat voyage from Collingwood to Prince Arthur's Landing is 532 miles.

APPENDIX No. 2.—Continued.

DISTANCE to Liverpool, from Halifax, (Nova Scotia), St. John (New Brunswick), Portland (State of Maine), and Quebec, as measured on Colton's Map of 1861.—H.

Halifax to Liverpool, *vid* Cape Clear.

FROM	TO	Sections of Navigation.	DISTANCE IN MILES.	
			Geographical.	Statute.
Halifax, Nova Scotia.	Cape Clear.	Across Atlantic to S.W. end of Ireland..	2,200	2,530
Cape Clear	Liverpool.	Up St. George's Channel.....	330	380
		Total	2,530	2,910

St. John to Liverpool, *vid* Cape Clear.

St. John, New Brunswick.	Cape Sable.....	Across Bay of Fundy to S.W. end of Nova Scotia.....	180	207
Cape Sable.....	Cape Clear.....	Across Atlantic to S.W. end of Ireland..	2,310	2,656
Cape Clear	Liverpool.	Up St. George's Channel.....	330	380
		Total	2,820	3,243

Portland to Liverpool, *vid* Cape Sable and Cape Clear.

Portland, State of Maine ...	Cape Sable.	Across Bay of Fundy to S.W. end of Nova Scotia.....	210	242
Cape Sable	Cape Clear.	Across Atlantic to S.W. end of Ireland..	2,310	2,656
Cape Clear	Liverpool.	Up St. George's Channel.....	330	380
		Total	2,850	3,278

Quebec to Liverpool, *vid* Cape Race and North of Ireland.

Quebec.....	Cape Race.....	River and Gulf of St. Lawrence to S.W. Point of Newfoundland	827	951
Cape Race.....	Malin Head.	Across Atlantic to North end of Ireland	1,800	2,070
Malin Head.....	Liverpool.	Down North Channel.....	182	221
		Total	2,819	3,242

Quebec to Liverpool, <i>vid</i> Straits of Belle-Ile and Malin Head, North of Ireland	2,661	3,060
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For further details, see pages 10 and 11 of this Appendix.

APPENDIX No. 2.—Continued.

TABLE OF DISTANCES from the Principal Seaports in North America, to Liverpool, Havre, Havana and Rio Janeiro.—I.

		Geographical Miles
Quebec	to Liverpool.	{ <i>Via</i> Belle Ile..... 2,649
		{ " Cape Race..... 2,808
	Havre....	{ " Belle-Ile..... 2,810
		{ " Cape Race..... 2,939
	Havana.....	2,891
	Rio Janeiro.....	5,546
Boston	to Liverpool.....	2,895
	Havre.....	2,993
	Havana.....	1,530
	Rio Janeiro.....	4,935
New York	to Liverpool.....	3,095
	Havre.....	3,228
	Havana.....	1,240
	Rio Janeiro.....	4,885
Philadelphia	to Liverpool.....	3,275
	Havre.....	3,358
	Havana.....	1,190
	Rio Janeiro.....	4,990
Baltimore	to Liverpool.....	3,450
	Havre.....	3,543
	Havana.....	1,160
	Rio Janeiro.....	5,000
Richmond	to Liverpool.....	3,380
	Havre.....	3,473
	Havana.....	1,090
	Rio Janeiro.....	4,930
New Orleans	to Liverpool.....	4,780
	Havre.....	4,838
	Havana.....	595
	Rio Janeiro.....	5,315

APPENDIX No. 2.—Continued.

TABLE OF DISTANCES from Quebec to Labrador along North Shore of the St. Lawrence.—J.

FROM	TO	Intermediate Mileage.	Total Mileage from Québec.	REMARKS.
Quebec.....	Beauport.....	3	3	Provincial Highway.
Beauport.....	Montmorency Falls.....	4	7	do
Montmorency Falls.....	Ange Gardien.....	3	10	do
Ange Gardien.....	Château Richer.....	6	16	do
Château Richer.....	Ste. Anne de Beaupré.....	6	22	do
Ste. Anne de Beaupré.....	St. Joachim.....	5	27	do
St. Joachim.....	St. Tite des Caps.....	9	36	do
St. Tite des Caps.....	St. Paul's Bay.....	24	60	do
St. Paul's Bay.....	Les Eboulements.....	9	69	do
Les Eboulements.....	St. Irénée.....	9	78	do
St. Irénée.....	Pointe à Pic.....	9	87	do
Pointe à Pic.....	Murray Bay.....	3	90	do
Murray Bay.....	Cap à l'Aigle.....	3	93	do
Cap à l'Aigle.....	St. Fidèle.....	6	99	do
St. Fidèle.....	St. Siméon or Black River.....	10	109	do
St. Siméon.....	Port au Persil.....	8	117	do
Port au Persil.....	Pointe au Bouleau.....	9	126	do
Pointe au Bouleau.....	Anse du Portage.....	5	131	do
Ferry Anse du Portage (across mouth of River Saguenay).....	Anse à l'Eau.....	1	132	do
Anse à l'Eau.....	Tadoussac.....	1	133	do
Tadoussac.....	Les Petites Bergeronnes.....	9	142	do
Les Petites Bergeronnes.....	Escoumains.....	9	151	do
Escoumains.....	Mille Vaches.....	18	169	do
Mille Vaches.....	Portneuf.....	9	178	Beach used.—2 portages.
Portneuf.....	Sault au Cochon.....	7	185	do
Sault au Cochon.....	Ilet de Jérémie.....	18	203	Track req. through forest.
Ilet de Jérémie.....	Betshiamits (or Bersimis).....	7 $\frac{1}{2}$	210 $\frac{1}{2}$	Beach used.
Betshiamits (or Bersimis).....	Pointe aux Outardes.....	12	222 $\frac{1}{2}$	do
Pointe aux Outardes.....	Manikouagan.....	15	237 $\frac{1}{2}$	Track req. through forest.
Manikouagan.....	River Godbout.....	27	264 $\frac{1}{2}$	do do
River Godbout.....	Pointe des Monts.....	12	276 $\frac{1}{2}$	do do
Pointe des Monts.....	Trinité.....	7	283 $\frac{1}{2}$	Beach used.
Trinité.....	Ilet Caribou.....	7 $\frac{1}{2}$	291	do
Ilet Caribou.....	Baie des Kani.....	22	313	do
Baie des Kani.....	Jambon.....	8	321	Track req. through forest.
Jambon.....	River Ste. Marguerite.....	12	333	do do
River Ste. Marguerite.....	Sept Isles.....	12	345	do do
Sept Isles.....	River Moisy.....	19	364	Beach used.
River Moisy.....	River à la Truite.....	8	372	do
River à la Truite.....	Cormoran.....	8	380	do
Cormoran.....	Pigou.....	7	387	do
Pigou.....	River au Bouleau.....	7	394	Fine Beach, short portage.
River au Bouleau.....	River Matemek.....	7	401	do do
River Matemek.....	River Chaloupe.....	8	409	do do
River Chaloupe.....	River Shaldrac.....	7	416	do do
River Shaldrac.....	River Tonnerre.....	7	423	do do
River Tonnerre.....	Portage du Loup-Marin.....	8	431	do do
Portage du Loup-Marin.....	River Magpie.....	7	438	do do
River Magpie.....	River St. Jean.....	7	445	do do
River St. Jean.....	Longue Pointe.....	9	454	do do
Longue Pointe.....	Poste de Mingan.....	5	459	do do
Poste de Mingan.....	Pointe aux Esquimaux.....	18	477	do do
Pointe aux Esquimaux.....	Nataskuan.....	64	541	do do
Nataskuan.....	Tshikaska.....	18	559	
Tshikaska.....	Mecatina.....	75	634	
Mecatina.....	Bonne Espérance.....	99	733	
Bonne Espérance.....	Blanc Sablon.....	24	757	Boundary of Labrador, Canada.

APPENDIX No. 2.—Continued.

POPULATION of various Settlements between Tadousac and Labrador, on the North Shore of the St. Lawrence.—K.

NAME OF PLACE.	POPULATION.		
	1864.	Census of 1871.	Census of 1881.
	Number of Families.	Number of Persons.	Number of Persons.
Tadousac.....	Not obtained.	765	1,542
Escoumains.....	do	1,023	520
Mille Vaches.....	do		1,115
Portneuf.....	40	1,790	
Sault au Cochon.....	2		
Ilet de Jérémie.....	1		
Betshiamits (or Bersimis).....	100 to 120	552	
Pointe aux Outardes.....	5		
Manikugan.....	3	86	
River Godbout.....	15 to 20		
Pointe des Monts.....	3	106	243
Trinité.....	3		
Rivière Ste Marguerite.....	2		
Sept Isles.....	30 to 40	191	
Rivière Moisy.....	15 to 20	336	241
Rivière à la Truite.....	2		
Cormoran.....	2		
Pigou.....	6		
Rivière au Bouleau.....	2		
River Matemek.....	2		
River Chaloupe.....	2		
River Shaldrake.....	6		
River Tonnerre.....	5		
Rivière du Loup-Marin.....	3		
River Magpie.....	6		
River St. Jean.....	12 to 15		
Longue Pointe.....	12 to 15		
Poste de Mingan.....	100 to 120	560	
Pointe aux Esquimaux.....	75	862	1,775
Nataskuan.....	44	358	480
Mecatina.....	Not obtained.	280	410
Bonne Espérance.....	do	266	341

NOTE.—Population of settlements given in Census of 1871 and Census of 1881 include intermediate places.

APPENDIX No. 2—Continued.

DISTANCES—New Road - Quebec to Lake St. John.—L.

FROM	TO	Intermediate Mileage.	Total Mileage.
Quebec	Boundary Post.....	18	
Boundary Post	1st Camp, Lachance (Stoneham)....	8	23
1st Camp, Lachance (Stoneham) ..	2nd do Noël	11½	34½
2nd do Noël.....	3rd do Lac des Roches.....	9	43½
3rd do Lac des Roches	4th do Lake Jacques Cartier.....	14	57½
4th do Lake Jacques Cartier.....	5th do Pikauba	13	70½
5th do Pikauba.....	6th do Bédard.....	12	82½
6th do Bédard	7th do Rivière Upika.....	12	94½
7th do Rivière Upika.....	8th do do Pika.....	10½	104½
8th do do Pika.....	9th do do aux Ecorces.....	11	115½
9th do do aux Ecorces.....	10th do Lake Belle Rivière.....	10½	126
10th do Lake Belle Rivière.....	St. Jérôme, at lower end of Lake St. John, on south side	14	140
St. Jérôme.....	Chicoutimi.....	50	

Mail passes three times a week. Winter and Summer.

Time : 20 hours, Quebec to Lake Jacques Cartier (per mail).

do 28 hours. Lake Jacques Cartier to St. Jérôme (per mail).

Total 48 hours, Quebec to Lake St. John (per mail).

Total distance 140 miles, Quebec to Lake St. John.

GREAT CIRCLE or Air Line Distances in Geographical Miles, as per Map of the Dominion of Canada. Published by order of the Hon. the Minister of the Interior, the 1st November, 1878.—M.

FROM	TO	MILES.
Yokohama (Japan).....	Port Simpson	3,865
do	Port Moody (Burrard Inlet).....	4,374
do	San Francisco.....	4,470
San Francisco.....	New York	2,228
do	Montreal.....	2,202
Burrard Inlet.....	do	1,992
Port Simpson	do	2,194
St. John (N'fd).....	Cape Clear	1,670
do	Tory Island.....	1,693
Montreal.....	Quebec (River St. Lawrence).....	145
do	Cape Race (via St. Paul).....	1,013
do	Belle Isle	892
Belle Isle	Tory Island.....	1,657
Cape Race.....	do	1,736
do	Cape Clear	1,708
Tory Island.....	Liverpool	240
Cape Clear	do	310
Halifax.....	Cape Race.....	470
Portland	do	767
Boston.....	do	808
New York.....	do	1,010

 APPENDIX No. 3.

 REPORT OF THE CHIEF ARCHITECT.

DEPARTMENT OF PUBLIC WORKS,

(Ref. No. 29,725.)

OTTAWA, 30th November, 1882.

SIR,—I have the honor to report on the various works executed in connection with Public Buildings under the control of this Department, during the fiscal year ended 30th June, 1882.

THOMAS FULLER,
Chief Architect.

F. H. ENNIS, Esq.,
Secretary Department of Public Works.
Ottawa.

PROVINCE OF NOVA SCOTIA.

HALIFAX.

DOMINION BUILDING.

Works mentioned in last year's report have been completed.

PICTOU.

MARINE HOSPITAL.

Plans have been prepared for this building and tenders will be called for at an early date.

The site chosen fronts on Pictou Harbour and the rear abuts on the road to the beaches.

It will be a brick building on a stone foundation, two stories in height, roofed with wood. On the ground floor there are to be a dining room, surgery, nurses rooms and two wards of 4 beds each; and on the second floor four bedrooms and a store room.

There will be necessary outbuildings attached.

Plans, &c, prepared by this Department.

PROVINCE OF PRINCE EDWARD ISLAND.

CHARLOTTETOWN.

DOMINION BUILDING.

Repairs reported on last year are completed.

PROVINCE OF NEW BRUNSWICK.

DORCHESTER.

GENERAL PENITENTIARY FOR MARITIME PROVINCES.

Works contracted for by Mr. A. E. Killam, which were alluded to at length in report of last year, have been completed.

The contract works of Messrs T. McManus & Sons have not progressed as favorably as was expected.

An extension of the water service to the officers' residences, and also of the prison drainage is now in progress.

ST. JOHN.

CUSTOM HOUSE.

Works treated of in last report are now completed, viz., footpaths, hoist, boundary wall and furniture.

NEW MARINE HOSPITAL.

This building is being erected in the grounds connected with the present Marine Hospital, which it is to replace. The works now under contract embrace the administrative portion and one of the wards only. The administrative portion will have a basement, two full stories and an attic; while the ward will have a basement and two full stories. The walls are of brick resting on stone foundations, and the floors and roofs wood; the roof being covered with slates on slope and galvanized iron on flats.

In the basement is a boiler-room, a fuel cellar, a kitchen, a scullery, a larder, a pantry, storage, baths, &c. On the ground floor is the waiting room, surgery, convalescents' dining and sitting rooms, nurses' rooms and a ward 28 feet by 48 feet; in the second floor are the surgeon's, matron's, steward's and nurses' rooms, and a ward similar to that on ground floor; the attic will be devoted to bed rooms, &c.

The arrangement of plan admits of two additional wards being added when required.

Architect, Mr. D. E. Dunham.

Contractor, Mr. Wm. Lawlor.

SUSSEX.

POST OFFICE, CUSTOM HOUSE &c.

A contract has been entered into for this building which is to be situated in the Parish of Sussex on the north west side of the main road to Halifax. The basement walls are to be stone, and the outside walls above plinth brick, with floors and roof of wood. The ground floor will be occupied by the local Post Office, Examining Warehouse, Custom House and Weights and Measures. The first floor by the Inland Revenue. The attic will not be finished at present. Brick safes are provided for the various offices.

The general entrance is on the principal front.

Plans, &c., prepared by this Department.

Superintending Architect, Mr. G. E. Fairweather.

Contractor, Mr. Wm. Toms.

WOODSTOCK.

POST OFFICE, CUSTOM HOUSE &c.

I have been instructed to prepare plans for this building for which an appropriation was made last session.

PROVINCE OF QUEBEC.

QUEBEC.

CITADEL.

General repairs have been executed during the fiscal year as follows :—

King's Bastion.—Pointing and repairing walls.

Diamond Bastion and Sally port.—Rebuilding wall.

Officers Quarters.—Repairing floors, painting, colouring and roofing.

Curtain between Mann's and Diamond Bastions.—Renewing facing of wall.

A reception room for the Governor General has been constructed at the eastern end of His Excellency's quarters on the site of the officer's stables, a portion of the walls of which serves as a foundation. The reception room is on the first floor, communicating with the drawing room of His Excellency quarters; the lower story being utilized for cloak rooms, water closets and men's bedrooms.

Works executed under the immediate superintendence of this Department.

Contractors for repairs, Citadel, Mr. P. Chateauvert, Mr. B. Leonard, Mr. E. Roussel, Mr. Ch. Jobin, Mr. H. Hatch, Mr. Z. Vandry, and Mr. G. Langlais.

Contractor for reception room, Mr. W. J. Piton.

QUEBEC FORTIFICATIONS.

Sections of the fortification walls (1) between the Citadel and St. Louis Gate; (2) between St. Louis and Kent Gates, and (3) the St. Vallier St. wall having the facing stone loose and partly fallen have been taken down and rebuilt, using the old materials.

Works carried out under the immediate superintendence of this Department.

Contractor for (1) Mr. A. Lortie, (2) Mr. C. Jobin, and (3) Mr. Owen Kelley.

WALL UNDER DUFFERIN TERRACE.

Further addition to works reported on last year have been effected under contracts with Mr. Thos. Pampalon and Mr. J. O'Leary.

Works executed under the immediate superintendence of this Department.

KENT AND ST. LOUIS GATES.

Pointing of walls referred to in last report has been executed.

Contractor, Mr. H. J. Beemer.

Plans, &c., prepared by this Department and works carried out under its immediate superintendence.

CARTRIDGE FACTORY.

Works involved in the conversion of the Artillery Barracks into a Cartridge factory have been completed and the buildings are occupied.

Contractors, Mr. H. Hatch and Mr. Jos. Mathieu for buildings; and Mr. Antoine Rousseau for boiler, engine and heating.

Works carried out by this Department.

LABORATORY AND FULMINATE MIXING BUILDINGS.

The works treated of in report for 1880-81 have been completed and a heating apparatus is being constructed in accordance with a specification and drawings furnished by the Department of Militia and Defence.

Contractors for buildings, Mr. H. Hatch and Mr. N. Piton.

Contractor for heating apparatus, Mr. Ant. Rousseau.

Works carried out under the immediate superintendence of this Department.

CHAMPLAIN STREET CLIFF.

The retaining wall reported on last year has been completed and an extension of same in the direction of Mountain Hill is contemplated.

Contractor, Mr. H. Hatch.

Works carried out under the immediate superintendence of this Department.

CUSTOM HOUSE.

Works in conversion of attic into caretaker's apartments and storage rooms, &c., have been completed under the immediate superintendence of this Department.

Contractor, Mr. J. O'Leary.

POST OFFICE.

Grading and retaining walls treated of in last year's report have been executed under the superintendence of this Department.

MARINE HOSPITAL.

Repairs to and renewals of floors and drainage alluded to in report for 1880-81 have been completed under the superintendence of this Department.

LEVIS FORTS.

Owing to the difficulty experienced in preventing the water from the ramparts percolating through the coverings of the casemates, a contract for the construction of a wooden roof over those at Forts No. 2 and No. 3 has been entered into.

Plans, &c., prepared by this Department.

Contractor, Mr. Nicholas Piton.

MONTREAL.

INLAND REVENUE OFFICES.

An extension of this building, on the river front, 26 ft. in depth by the width the original building is now in progress.

The stones composing the facade on the square have been carefully taken down and re-used for the new front, and the remaining portions have been carried out in accordance with the work already existing.

Additional accommodation is thus provided on basement ground and first floors, with a readjustment of offices.

Drawings are being prepared for a warming apparatus.

Superintending Architect, Mr. Alph. Raza.

Contractor, Mr. H. J. Beemer.

ST. HELEN'S ISLAND, MONTREAL.

MILITARY BUILDINGS.

Repairs connected with the wooden and the stone buildings, the barracks for married soldiers, the range of buildings, quarters of the armourer and powder magazine, are about to be placed under contract.

Superintending Architect, Mr. Alph. Raza.

THREE RIVERS.

OLD BARRACKS.

The works involved in the conversion of the Old Barracks into a Custom House and Inland Revenue Office, are now under contract and nearly complete.

Superintending Architect, Mr. O. Z. Hamel.
Contractors, Messrs Potier and Dussault.

ST. VINCENT DE PAUL.

PENITENTIARY.

The western dormitory wing of the prison containing 132 cells is completed, the basement walls of the prison dining hall have been built, and the prison yard extended 100 feet westward, and is enclosed by a wooden fence $19\frac{1}{2}$ feet in height.

The Warden's residence was repaired, repainted, the outside of stone work tinted, and on the east side coated with cement. A new cooking range and wash basins were provided, and a conservatory 14 ft. x 10 ft. added.

The Deputy Warden's quarters were repainted, repapered and supplied with a new kitchen range.

The guards cottages were repaired, the outside of brick walls coated with cement, and the attics counter floored, lathed and plastered.

Plans, &c., prepared by this Department.

Superintending Architect, Mr. John Bowes.

HULL.

POST OFFICE AND INLAND REVENUE OFFICE.

A site was donated for a new Post Office by the heirs Wright on part of the Court House reserve, with a frontage of 125 feet on Main Street by a depth of 120 feet.

The external walls of the building are to be of stone, the internal walls brick, and the floors and roofs of wood.

The ground floor is to be occupied as a Post Office, a Money Order and Weights and Measures offices. The Post Office portion to be one story. On the first floor there will be three offices with an unfinished attic over.

Brick safes will be provided on each floor.

Plans, &c., prepared by this Department.

GROSSE ILE.

QUARANTINE STATION.

The hospital reported last year as in course of construction has been completed.

Plans, &c., prepared by this Department.

Contractor, Mr. J. E. Askwith.

ST. JOHN'S.

POST OFFICE, CUSTOM HOUSE, &c.

The hot water heating apparatus and the furniture and fixtures mentioned in report for 1880-81 have been furnished.

Drawings prepared by this Department.

Superintending Architect, Mr. A. C. Hutcheson, Montreal.

Contractor for heating, Mr. John Howie.

SHERBROOKE.

POST OFFICE, CUSTOM HOUSE AND INLAND REVENUE OFFICES.

This building is being constructed on a lot at the corner of Commercial and Bank Street and covers an area of 3,550 sq. ft. The external walls are to be of stone, and roof and floors of wood; flat of roof to be covered with galvanized iron. In the

basement will be the boiler room and fuel room. The ground floor will be devoted of the Post Office, the first floor to the Custom House and Inland Revenue Offices and the attics to the local militia purposes. The ground and first floor entrances are on Commercial Street and the attic entrance on Bank Street.

In the rear is a one story L shaped brick building for an Examining Warehouse and a Weights and Measures Office.

Plans, &c., prepared by this Department.
 Superintending Architect, Mr. F. X. Berlinguet.
 Contractors, Messrs Robillard & Murphy.

CHICOUTIMI.

MARINE HOSPITAL.

This hospital is being constructed on a plot of land outside and bordering on the town line at the rear of the College. It will be of brick with a stone basement, and a roof of wood. The administrative portion, which is central, will have two stories above the basement, and the two wards flanking it one story. There will be accommodation for nurses and 12 patients in the wards.

Plans, &c., prepared by this Department.
 Contractor, Mr. Wm. Warren.

PROVINCE OF ONTARIO.

OTTAWA.

PARLIAMENT BUILDING.

Owing to the Supreme Court having vacated its temporary quarters in this building the portion which was occupied by it became available, and was rearranged and furnished for the House of Commons Reading room; the original Reading room was rearranged and the ceiling lowered, thus admitting of the erection of attic rooms above, the lower flat being for the use of the sessional reporters, and the upper for the sessional clerks. The late Judges' rooms were devoted to the special use of the Members of the House of Commons during session.

Drawings prepared by, and work executed under the superintendence of this Department.

EASTERN BLOCK DEPARTMENTAL BUILDING.

Portions of the corridors have been painted and trifling repairs have been effected to various portions of the building.

Work done under the superintendence of this Department.

WESTERN BLOCK DEPARTMENTAL BUILDING.

Painting of corridors and trifling alterations and cleaning of various rooms have been effected.

Work done under the superintendence of this Department.

PARLIAMENT GROUNDS, &c.

The additional propagating house reported upon last year has been erected. Work carried on under the superintendence of this Department.
 Contractors, Messrs. Veale and Adams.

MONUMENT TO THE LATE SIR GEORGE E. CARTIER, BART.

It is intended at an early date to publicly invite artists to submit models and proposals in connection with this work for the approval of the Dominion Government.

NEW SUPREME COURT.

This building has been completed in conformity with report of last year, and the court has been furnished partly with new and partly with the furniture used when in the Parliament House. The Royal Canadian Academy collection of pictures have been hung in the rooms appropriated for the purpose.

Plans, &c., prepared by this Department.

Contractors, Messrs. Veale & Adams.

GEOLOGICAL MUSEUM.

The fittings, counters and show cases have been completed and a hot water apparatus constructed.

Drawings &c, prepared by and work executed under the supervision of this Department.

Contractor for heating apparatus, Mr. N. S. Blaisdell.

DRILL SHED.

A contract was entered into for the erection of latrines and provision of winter sashes throughout.

The latrines are placed between the Drill Shed and the canal and are of brick on a stone foundation and roofed with wood.

Plans and specifications prepared by this Department.

Contractor, Mr. Wm. Toms.

RIDEAU HALL.

Ordinary and essential repairs and renewals have been executed during the past year, under the immediate superintendence of this Department.

CORNWALL.

POSTAL, CUSTOMS AND INLAND REVENUE OFFICES.

A site has been acquired on the corner of Pitt and Second Streets and I have been instructed to prepare plans &c., for a building to furnish accommodation for the local Postal, Customs and Inland Revenue services.

BROCKVILLE.

POST OFFICE, CUSTOM HOUSE AND INLAND REVENUE OFFICES.

I have received instructions to prepare plans, &c., for this building, an appropriation for the construction of which was made in the estimates 1881-82.

KINGSTON.

POST OFFICE.

Works reported on last year,—viz: new screen to public lobby, new delivery circle and alterations to registered letter office have been completed.

Local Architects, Messrs. Power & Son.

PENITENTIARY.

The north wing of the south workshop has been completed. It contains two stories and basement, having walls of stone, floors of stone, supported by iron joists, and roof of wood covered with metal. There is a brick smoke stack, 80 feet in height.

The works in connection with heating the three workshops and the dining hall are now in progress.

The roof of the south workshop has been repaired, and a new cupola erected to replace that destroyed by fire.

A wooden storehouse for lumber 190 × 16 feet and 13 feet in height, has been constructed outside the boundary wall.

Plans, &c., prepared by this Department.
Superintending Architect, Mr. J. Bowes.

MILITARY COLLEGE.

The pump house mentioned in last year's report has been completed and is now in use.

Repairs and minor alterations have been executed at Tête du Pont Barracks, Fort Henry and other military works.

Superintending Architects, Messrs. Power & Son.

BELLEVILLE.

POST OFFICE, CUSTOMS AND INLAND REVENUE OFFICES.

This building which is now in progress will have external walls of brick with stone dressings resting on stone foundation, the floors and roof of wood.

It will consist of a basement, ground, first and attic floors; the basement for the warming apparatus, fuel, &c.; the ground floor for the local Post Office and Weights and Measures Office, and the first floor for the Custom House and Inland Revenue Offices. The attic will be unfinished at present.

The Post Office entrance is to be on Bridge Street, and that of the Customs and Inland Revenue Offices on Pinnacle Street.

The frontages on Bridge and Pinnacle Streets are 65 feet and 74 feet respectively.

Brick safes are provided for the several Departments.

Architect, Mr. R. E. Windeyer.

Contractors, Messrs. Northcott & Alford.

ST. CATHARINES.

POST OFFICE, CUSTOMS AND INLAND REVENUE OFFICES.

This building is now in course of construction at the corner of King and Queen streets. It will have brick walls (with stone dressings and portico) resting on stone foundation, and wooden floors and roof, roof covering to be slate on slopes and galvanized iron on flats. The frontages are 62 feet on Queen street and 64 feet on King street.

There is to be a basement containing heating apparatus, fuel rooms and store rooms, a ground floor occupied by the Post Office, a first floor devoted to the Custom House and Inland Revenue and an unfinished attic.

The Post Office entrance is to be on King street and that of the Custom House on Queen street.

Brick safes will be provided for the various departments.

A detached one story brick building in the rear will be used as an examining warehouse and an office for the Inland Revenue.

Architect, Mr. R. C. Windeyer.

Contractor, Mr. Nelson Carter.

HAMILTON.

POST OFFICE, ETC.

In accordance with your instructions plans, &c., are now in course of preparation for a building to accommodate the local Postal, Customs and Inland Revenue services of the city of Hamilton.

STRATFORD.

POST OFFICE, CUSTOM HOUSE AND INLAND REVENUE OFFICES.

The site is an irregularly shaped piece of ground at the intersection of Ontario and Erie Streets. The plan of the building is an irregular polygon covering an area of 3,672 sq. feet.

A contract for the construction was entered into in January, 1880, and the works are now in progress.

The external walls are to be brick with stone dressings, the foundations stone, and the floors, partitions and roof wood; the roof covering is to be slate on slopes and galvanized iron on flats.

The basement will contain examining warehouse, boiler house, fuel room and two offices. The ground floor is to be devoted entirely to the Post Office, the first floor to the Inland Revenue and Customs, and the attic rooms for the caretaker, and the rest unfinished.

The chief front which contains the two principal entrances is on Ontario street. The centre and both ends of this facade are to be slightly projected, the centre, which contains the Post Office entrance, being carried up to the roof where it will terminate in a ornamental pediment; the right hand projection, which is to contain the Customs and Inland Revenue entrances and stairway, will be carried up an additional story and a clock arranged for; the projection on the left being carried up a few feet above eaves, both turrets terminating in pyramidal roofs. The remaining elevations are to be more plainly treated. In the rear a one story brick building will contain two rooms, one each for the Weights and Measures, and Gas Inspector's office.

Plans, &c., prepared by this Department.

Superintending Architect, Mr. J. R. Kilburn.

Contractor, Mr. J. E. Askwith.

CHATHAM.

POST OFFICE, CUSTOM HOUSE AND INLAND REVENUE OFFICES.

A site has been procured for this building on the corner of King and Fourth Streets, plans are now in course of preparation and it is expected that a contract will be entered into in time to admit of the foundations being laid this autumn.

WINDSOR.

POST OFFICE, CUSTOMS AND INLAND REVENUE OFFICES.

The attic story has been divided, finished and occupied by the caretaker of the building.

Stone flag footpaths, stone fence walls, grading, &c., have been executed about the building.

Superintending Architect, Mr. Wm. Scott.

PROVINCE OF MANITOBA.

WINNIPEG.

PARLIAMENT BUILDING.

Works in connection with this building have not progressed as favorably as was anticipated, but it is expected that the foundations will be completed to ground floor level this season.

Drawings, &c., prepared by this Department.

Superintending Architect, Mr. J. P. M. Lecourt.

Contractors, Messrs. J. and P. Lyons & Co.

LIEUTENANT GOVERNOR'S RESIDENCE.

This building of which a complete description was furnished in last year's report, is now under contract and the work in progress.

Plans, &c., prepared by this Department.
 Superintending Architect, Mr. J. P. M. Lecourt.
 Contractors, Messrs. Bowles & Williams.

POST OFFICE.

Owing to the rapid increase of postal business it was found necessary in order to allow sufficient space for the public in the lobby to make a one story wooden addition in rear of the present building. The screen in lobby has been fitted up with lock letter boxes and such additional fittings provided as were required for the easier working of the office.

IMMIGRANT SHED.

This depot is situated 450 yards west of Main Street, on the main line of the Canada Pacific Railway. The buildings are of wood resting on blocks and comprise a two story main building, 29 feet by 100, divided transversely by a partition on each floor and having a kitchen 18 ft. by 18 ft., also a luggage room and hospital in two stories 50 ft. by 26 ft., two temporary sheds 18 ft. by 100 ft. each, and a cook house 24 ft. 6 in. by 16 ft. 4 inches.

Plans and specifications prepared by this Department.
 Contractors, Messrs Grant & Gelley.

STONY MOUNTAIN PENITENTIARY.

Arrangements are being made for the extension of the heating apparatus.

Of the outbuildings, &c., mentioned in last report, three double and two single guards-cottages, a school-house, an ice house and a stable have been completed, and there is in course of construction one single, and two double cottages, stables, a root house, a blacksmith's shop and an implement house.

All the works constructed, or in course of construction, are executed by convict labour assisted by skilled workmen.

Plans, etc., prepared by this Department.
 Superintending Architect, Mr. J. P. M. Lecourt.

BRANDON.

IMMIGRANT STATION.

These buildings are situated between third and fourth streets on the bank of the Assiniboine River. There are constructed of wood and rest on blocks. The main building is 100 ft. by 29 feet and is two stories in height, each flat divided by a transverse partition. There is a kitchen 18 feet x 18 feet attached, also a detached two story hospital and luggage room 50 feet by 26 feet, with necessary outbuildings.

Plans and specifications prepared by this Department.
 Superintending Architect, Mr. J. M. P. Lecourt.
 Contractors, Messrs. Grant & Gelley.

EMERSON.

IMMIGRANT AGENTS OFFICE.

This wooden building has been completed and occupied.

PROVINCE OF BRITISH COLUMBIA.
VICTORIA.**POST OFFICE, ETC.**

The work of restoring the front of the building, which was alluded to in last year's report, has been completed and it is intended to re-arrange the Post Office fittings during the coming year.

Plans, &c., prepared by this Department.

Superintending Architect, Mr. H. O. Tiedman.

NEW WESTMINSTER.**PENITENTIARY.**

A wooden workshop with stone foundations and brick chimneys has been erected near the prison building.

It is two stories in height and provides work rooms for carpenters, blacksmiths, shoemakers and tailors.

POST OFFICE AND CUSTOM HOUSE.

A contract for the construction of this building was entered into 8th December, 1881, and the works are now in progress.

The external walls will be of brick with dressings and foundations of stone. The ground floor will be devoted to Post Office, Savings Bank and Telegraph Office, and the second floor to the Custom House.

Plans prepared by this Department.

Contractor, Mr. Chas. Hayward.

NANAIMO.**POST OFFICE, CUSTOM HOUSE AND INLAND REVENUE OFFICES.**

I have been instructed to prepare plans, &c., with a view to having this building placed under contract during the present season.

GENERAL.

Repairs and renewals have been executed to buildings, &c., throughout the Dominion not specially referred to above.

I have the honor to be, Sir,

Your obedient servant,

THOS. FULLER,
Chief Architect, P. W.

APPENDIX No. 4

REPORT OF THE MECHANICAL ENGINEER.

(Ref. No. 29,435.)

MECHANICAL ENGINEER'S OFFICE,
OTTAWA, 21st November 1882.

SIR,—I have the honor to report as follows in reference to the Public Buildings, Ottawa, during the fiscal year ended the 30th June, 1882, viz:—

PARLIAMENT BUILDING.

Considerable changes have been made in the heating arrangements with a view to moderating the temperature of the rooms and corridors which were always too warm, and, while adding comfort to the occupants, the apparatus, as altered, is now under complete control, and an economy in fuel has also been attained.

The main members lavatory, etc., in the Commons corridor being found too limited in accommodation, the premises were altered, the accommodation doubled, and the apartment renewed throughout.

This lavatory, the new reporters room, the translators room, and the corridors generally were improved in ventilation, but, owing in many cases to long runs of horizontal pipes between remote points and the various ventiduct shafts, the upward currents are not always as strong as could be desired, and purely mechanical means must be here applied as has been done in the Commons Chamber, to attain constant interchange of air.

The Railway Committee room had special ventilating arrangements, separate from the rest of the building, constructed before last session, which were found efficient in operation.

A powerful fan with steam engine attached was placed in a specially arranged central apartment in the basement, prior to last session, to collect the odours emanating from the dining rooms, kitchens, and adjoining corridors and apartments of the Senate and Commons.

This fan accomplished the object and also made a very marked improvement in the ventilation of other parts of the building, on the floor above, adjoining the stairways, from the restaurants.

Alterations to the four main ventiducts of the Commons and Senate Chambers were also made with considerable advantage—there being now a stronger upward draught, and no tendency to down currents on gusty days, such as formerly existed.

Several large iron ventilating caps were placed on other porticns of the building, giving improved draught.

The iron pipes and valves of the warming apparatus were placed in the building in 1864 and, as a natural consequence, are begining to give out. The renewal of this work is carried out as occasion presents itself in the most economical manner, and the system modernized as the work progresses. This course permits of a large reduction in the quantity of piping used, and consequently an ultimate saving of fuel must follow—and in every instance the old material is used where it can safely be done.

The three Cornish steam boilers (the only ones in the building that are bricked in) were stripped during the summer of 1881 and, after careful examination and hydraulic test, were found to be almost as good as new after a service of 17 years.

The general apparatus of heating, gas, water and electric bells is in good working order.

EAST AND WEST BLOCKS, DEPARTMENTAL BUILDINGS.

Beyond extending the heating, water and gas pipes, and electric bell services to a few new offices that were fitted up in these buildings, no work was undertaken beyond the ordinary running repairs and maintenance of the different apparatus, all of which are in good working order.

SUPREME COURT BUILDING.

This building after its alteration from being workshops, was fitted up throughout with new heating apparatus, water, gas and bell services, the boiler previously used for workshop engine being retained for the heating apparatus.

RIDEAU HALL.

The hot air furnaces of this building were carefully examined and repaired during the fall of 1881, and with the exception of a couple of cracked castings, which were renewed, the apparatus is in efficient condition.

Beyond ordinary running repairs, no work was executed to the gas, water and bell services—which are in good condition.

OTTAWA POST OFFICE AND CUSTOMS BUILDING.

The heating, gas and water services of this building remain in good condition. A large ventilating pipe carried from the long room over the deck of the roof has been found of much benefit.

GEOLOGICAL MUSEUM.

The new heating apparatus placed in this building was tested last winter and gave ample warmth. Electric bells were put up. A special gas pipe from the gas works was laid to this building, as it was found that the day pressure usually turned on to the City, was inadequate to the wants of the Laboratory room.

PARLIAMENT GROUNDS-FLOWER PROPAGATING HOUSE.

Additional heating apparatus was constructed to warm the new extension of this house, which operates in a satisfactory manner.

I have the honor to be, Sir,
Your obedient servant,

JNO. R. ARNOLDI,
Mechanical Engineer.

F. H. ENNIS, Esq.,
Secretary, Department of Public Works.

APPENDIX No. 5.

REPORT OF THE CHIEF ENGINEER.

(N^o 29643.)

CHIEF ENGINEER'S, OFFICE,
PUBLIC WORKS DEPARTMENT,
OTTAWA, 28th November, 1882.

SIR,—I have the honor to report on the Harbor Works and Surveys of the last fiscal year.

I have the honor to be, Sir,
Your obedient servant,

HENRY F. PERLEY,
Chief Engineer.

F. H. ENNIS, Esq.,
Secretary, Department of Public Works.

PRINCE EDWARD ISLAND.

CAMPBELL'S COVE

Is on the north-west coast, about nine miles from East Point.

In 1872 the Provincial Government built a breakwater 300 ft. long on a reef which extends from the western point of the Cove.

Under a contract dated January, 1882, an additional length of 300 ft. has been constructed, the original work raised two feet and connected with the shore.

COLVILLE BAY

On the east coast about 16 miles from East Point.

The breakwater is situated at Knight's Point, on the eastern side of the Bay. It was originally built by the Local Government and extended during 1875-1880 by the Dominion. The structure stands in deep water and exposed to a very heavy sea in southerly storms. During the past year some necessary repairs were made to the old, or first built portion.

SOUTH RIVER, MURRAY HARBOR.

South River empties into the southern part of Murray Harbor, (so called) a large bay in the south eastern part of King's County, opening into the Gulf of St. Lawrence.

Early in June 1882, the work of straightening the channel of this river and deepening it to 8 ft. at extreme low water was commenced, and at the close of the fiscal year 5,415 cubic yards of sand and mud had been removed by the dredge "Prince Edward."

PINNETTE.

The Pinnette River empties into the Strait of Northumberland to the eastward of Point Prim on the eastern side of Hillsborough Bay.

At this place the dredge "Prince Edward" was engaged during October and November 1881 in straightening the channel of the river, and in deepening the loading berths at the public wharf, and the approach thereto.

HILLSBOROUGH RIVER.

The East or Hillsborough River flows from the eastward of Charlottetown, and in May 1882, the "dredge "Prince Edward" was engaged in deepening at the public wharf at Fort Augustus.

NINE MILE CREEK.

Nine Mile Creek, Queen's County, is situated just within the entrance and on the western side of Hillsborough Bay.

The dredge "Prince Edward" was engaged from 10th August to 25th October, 1881, in completing the channel through the flats to the public wharf to which reference was made in the report of last year.

CRAPAUD.

Crapaud, Queen's County, is a small harbor at the mouth of the Brockelsby River, which empties into the Strait of Northumberland to the westward of Hillsborough Bay.

The channel carrying deep water up to the wharves of the Village, was completed on the 8th of August, 1881, by the dredge "Prince Edward." The total quantity of material removed amounted to 75,970 cubic yards at a cost of \$19,151.46.

RUSTICO.

Grand Rustico is on the north coast, nearly midway between North and East Points.

In December, 1881, a contract was entered into for the construction of a breakwater 1,200 ft. in length on the western side, and one of 450 ft. in length on the eastern side of the entrance to the harbor, to reduce its width for the purpose of concentrating the current and so deepening the water on the bar.

NEW LONDON

On the north coast about nine miles east of Cascumpec.

The portion of the breakwater constructed before Confederation by the Local Government at the entrance to this harbor having been damaged during a storm, was repaired in the past year, and a length of 93 ft. was rebuilt.

TIGNISH

Is on the north coast, about 8 miles from North Point.

A contract for the construction of a breastwork of piles, brush and stone for the protection of the beach and for the rebuilding of the outer part of the northern breakwater was made in December, 1881. At the close of the fiscal year the works were nearly finished.

MIMINIGASH

Is on the west coast 17 miles from North Point and 20 from West Point.

The works consist in two piers at the mouth of the "Run."

The work done during 1881-82 consisted in rebuilding the portion of the beach protection on the north side, in driving a second row of sheet piling on the south side, and in putting in brush and stone for the protection of such parts of the river bank as seemed to require it.

NOVA SCOTIA.

MAIN-À-DIEU.

A small harbor in Cape Breton County, lying inside of Scattarie Island. The work of constructing the breakwater mentioned in the report of 1881 was actively prosecuted during the year, at the end of which it was seven eighths completed.

COW BAY.

Thirty miles from Sydney, C. B., to the South East.

During the winter of 1880 this breakwater was damaged by easterly gales, and the amount appropriated was expended in rebuilding the third buttress from the shore end, in replacing ballast, re-sheathing a portion of the face on the seaward side and re-covering the top.

This work owing to its exposed position will necessitate an annual expenditure for repairs.

PORT CALEDONIA.

Is in Cape Breton Co. and 19 miles to the southward of Sydney Harbor.

The dredge "St. Lawrence" was engaged during the month of June, 1882, in deepening the harbor at this place to admit of the entrance of a larger class of vessels engaged in the coal trade.

LITTLE GLACE BAY.

Little Glace Bay, Cape Breton Co., is 14 miles to the southward of Sydney Harbor.

During the Spring of 1881, the dredge "St. Lawrence" operated in deepening the entrance to the harbor.

NORTH SYDNEY.

North Sydney is the principal harbor on the east coast of Cape Breton.

The amount appropriated has been expended in connection with a sum furnished by the Harbor Commissioners of Sydney in the construction of a portion of a breakwater on the north bar for the purpose of preventing the sand forming the bar from being washed into the harbor during easterly gales, and to provide a place for the deposit of ballast from vessels.

SOUTH INGONISH.

In Victoria County, is situated on the eastern side of Cape Breton, about midway between Sydney Harbor and Cape North.

A large breach made by the ice of the previous winter in the pier on the northern side of the entrance was repaired.

INDIAN ISLANDS BEACH.

The Indian Islands lie on the north side of East Bay, a branch of the Bras d'Or, Cape Breton.

The works of opening a passage through the beach connecting the islands with the shore referred to in last year's report have been completed.

BENACADIE.

Is in Cape Breton County.

Part of the amount appropriated was expended in procuring materials during the past winter, and the works of opening and protecting an entrance to the pond are in progress.

MABOU.

The Harbor of Mabou, Inverness County, is situated on the western coast of Cape-Breton, 6 miles northward of Port Hood, the shiretown.

The amount appropriated was expended in partly opening a channel through the shoal of hard clay and stone lying off the entrance to the harbor.

PORT HOOD.

Port Hood is on the west coast of Cape Breton Island, 20 miles north-east of the Gut of Canso.

The pier at this place is much exposed to north-easterly gales and the timber weakened by the attacks of sea-worms. The northern and western faces of the pier have been strengthened by sheet piling and the top repaired where necessary. In November last it received serious injury during a storm, a breach 73 feet in length having been made through it near the shore and the outer end much damaged. Temporary repairs have been made and plans submitted for a thorough reconstruction of the pier and its protection by heavy stone slopes.

RAGGED POND.

Is situated on the northern side of Chedabucto Bay, Guysboro' County, 5½ miles to the eastward of the entrance to Guysboro' Harbor.

An attempt was made to dredge the channel into this pond, the protection works for which were constructed in 1879 and 1880, but without success, for owing to the very exposed position of the entrance, it was found difficult and unsafe for a dredge to remain, as there was no shelter in the event of a storm arising.

PETIT DE GRAT.

In Ile Madame, Richmond County, is a passage from the Atlantic into St. Peter's Bay.

The channel through the stony beach closing the northern end of the passage and referred to in last year's report, was completed.

BURYING ISLAND, CANSO.

Canso Harbor is at the extreme eastern end of Guysboro' County and southward of the entrance to the Gut of Canso.

As reported last year, an island formerly existed off this harbor which afforded protection and shelter to vessels. The works undertaken by the Department consisted in the construction of a breakwater for the purpose of giving the same protection as the island did originally, and its erection has proved of much benefit to the harbor.

NEW GLASGOW.

New Glasgow is situated on the East River of Pictou, about 8 miles from the harbor proper.

At the close of the fiscal year 1881, the dredge "Cape Breton" was employed in deepening the channel of the East River from the highway bridge to above the shipyards of Messrs. Carmichael and McCaul and continued until 13th July of that year when the work was completed.

RIVER JOHN.

The River John, Pictou County, empties into John Bay at the south-eastern corner of Amet Sound, Northumberland Strait, about 12 miles northwardly of the entrance to Pictou Harbor.

Work on the channel through the bar at the entrance to the river was resumed on 22nd July 1881 and continued until 31st October, up to which date the dredge "Cape Breton" had removed 18,175 cubic yards of sand and mud. At the latter part of May, 1882, a point in the channel of the river off the ship-yard of Mr. James Kitchen was removed.

TATAMAGOUCHE.

The Tatamagouche River, Colchester County, empties into the south-west corner of Tatamagouche Bay, Strait of Northumberland.

During the month of June 1882, the dredge "Cape Breton" operated at the mouth of the river in opening a channel through the bar which prevents the entrance of vessels.

PARRSBORO',

In Cumberland County.

A small amount was expended in driving some piles at the outer end of the pier.

The work of improving the channel of Partridge Island River was continued through the year, and a further quantity of 9,100 cubic yards of mud, sand and saw-dust removed.

HAMPTON,

Annapolis County, is situated on the southern shore of the Bay of Fundy, 5 miles from Bridgetown.

The old pier built by the Local Government having been found to be useless and much out of repair, it was deemed advisable to construct a new one about half a mile to the eastward of the original pier.

DIGBY.

Digby is situated at the western end of Annapolis Basin.

The work done during the past season consisted in replacing a number of the pile bents forming part of the landing pier which had been destroyed by sea-worms, with the necessary caps, braces, &c., and in renewing parts of the flooring. This pier was built by the Government of Nova Scotia prior to Confederation, and it is the point of call for the mail steamer between Annapolis and St. John, N.B.

TROUT COVE.

Trout Cove is situated on the southern coast of the Bay of Fundy, nearly midway between Digby Gut and Petit Passage.

During the past year extensive repairs were made to the breakwater, 100 feet of the older portion of which was carried away by a gale in 1879.

The original structure was built in 1858 by the inhabitants assisted by a grant from the Local Government, and expenditures for its extension and repair were made by the Department in 1876 and 1880.

METEGHAN RIVER.

Meteghan River, Digby Co., is on the south shore of St. Mary's Bay, about 40 miles from Digby and about 25 miles from Yarmouth.

The harbor is formed between two breakwaters which were built many years ago by the Provincial Government, the older portions of which are much decayed. During the past year the following repairs were effected.

The outer end of the north breakwater was rebuilt for a height of 10 feet, and a "break" constructed on the seaward side—The top of the south breakwater was rebuilt for a length of 280 ft, and for a distance of 420 ft floored with flatted timber six inches thick; a number of sheeting piles were driven and several small but necessary repairs were effected.

CAPE ST. MARY.

In Digby County, on the southern side of the entrance to St. Mary's Bay.

The pier at this place was built many years ago at the joint expense of the Local Government and the inhabitants.

Owing to age and decay, and the action of sea and ice this structure had become much dilapidated, and only a part of the repairs necessary to place it in good order were executed during the year.

YARMOUTH.

Yarmouth is situated at the western extremity of the Peninsula of Nova Scotia.

During the year repairs have been made in the sea wall constructed in 1874 by the Department which had been undermined in several places by the action of the sea on the gravel beach on which it is built.

BROOKLYN.

Is situated at the head of Liverpool Bay, Queen's county.

Owing to its exposed position and the action of the sea-worm, the breakwater at this place was found to be in a precarious state, and a contract was entered into in October 1881 for the formation of a stone slope on the outer or seaward side and around the end of the breakwater, and for close piling a certain length of the inner side, and also repairing the roadway with new planking and ballast. At the close of the year the work was completed.

VOGLER'S COVE.

Vogler's cove is situated in the extreme south-western part of Lunenburg County, about 2 miles to the eastward of the boundary between Lunenburg and Queens.

The dredge "Canada" operated here from the 17th September until the 6th December 1881, in straightening and deepening the channel leading to the harbor to 10 ft at low water.

LITTLE HARBOR.

Little Harbor is on the Atlantic Coast of Nova Scotia in Lunenburg Co.

The entrance has been improved by deepening the water on the bar so that fishing boats can now enter at all times of tide.

PORTER'S LAKE.

Porter's Lake is a large body of water about 13 miles long with an average width of about half a mile, lying 18 miles east of Halifax. The southern end is separated from the Atlantic by several small islands which are connected by beaches of sand and shingle.

A small amount, has been expended in cutting a passage through one of these beaches with a view of giving boats access to the lake.

NEW BRUNSWICK.

CLIFTON.

Gloucester Co. is on the south shore of the Baie des Chaleurs, 15 miles east of Bathurst.

A small amount has been expended in repairing the damage done to the breakwater at this place by the ice during the winter of 1880-81.

SHIPPEGAN.

Gloucester Co., is at the extreme north east point of New Brunswick.

During the past year the dam closing the East Gully was repaired and raised two feet higher than before, as it was found that the sea drove the ice over it and damaged the top. It has also been strengthened by driving piles 10 feet apart on both sides.

HORSE SHOE SHOAL.

This shoal is situated at the mouth of the River Miramichi, Northumberland County, and lies in the direct course of vessels entering or leaving the river.

Since 1875 dredging has been carried on with the view of opening a channel 150 feet in width and 20 feet in depth at low water, and during 1881 the dredge "St. Lawrence" operated from the 1st July until the 1st September. It will require two if not three seasons further work of this dredge before the channel will be completed.

RICHIBUCTO.

Richibucto, Kent Co., is on the west shore of the Gulf of St. Lawrence.

An extension of the breastwork for the protection of the North Beach 220 feet in length has been built during the past season, this work being needed to prevent a breach being made through the beach to the westward of the breakwater at the entrance to the harbor.

BUCTOUCHE.

In Kent County, on the eastern side of New Brunswick, about 21 miles northward from the harbor of Shediac.

The dredge "Canada" was engaged up to 16th August, 1881, in opening a passage through a mussel bed obstructing the entrance to the harbor, and in widening the channel by the removal of an old wreck.

COCAGNE.

Cocagne Harbor is on the east coast of New Brunswick and opens on the Strait of Northumberland about 10 miles north of Shediac.

A landing pier is being constructed under contract on the north side of the harbor near the highway bridge, and at the close of the year was about half finished.

During August, 1881, the dredge "Canada" operated at the mouth of the harbor with the view of giving an increased depth of water.

POINT DU CHÊNE.

Point du Chêne, Westmorland County, is the Eastern terminus of the New-Brunswick Division of the Intercolonial Railway.

The contract for the additional length of 600 ft. to the breakwater which protects the Railway wharf was nearly completed at the close of the fiscal year.

QUACO.

Saint John County, is on the north side of the Bay of Fundy, about 30 miles east of the City of St. John.

The construction, by contract, of a breakwater 300 feet in length on the western side of the harbor is in progress, and at the close of the year was partly completed.

SAINT JOHN.

A contract has been entered into for the rebuilding of the portion of the breakwater at the western entrance to the harbor, which was destroyed during a gale in January, 1879. At the close of the fiscal year the works were well under way.

The dredge "Canada" operated in the harbor between the 28th December, 1881, and the end of March, 1882, in the removal of the "tail of the bar" extending southwardly from Navy Island, which interfered during times of low water with the ferry boat plying across the harbor.

At Marble Cove the dredge "New Dominion" worked from 8th July until the 20th September, 1881, in opening a channel to the Public Wharf.

FORT DUFFERIN.

This fort stands on Negro Point, a promontory composed of clay and gravel, at the western entrance of the Harbor of St. John, N. B. Owing to the base of the cliff being washed by the sea during high tides, it was undermined, and in March 1879, a large portion of the bank gave way and fell, partially destroying the battery.

During 1881-82 a crib-work retaining wall was constructed around the foot of the cliff, and the glacis of the fort restored.

ST. ANDREWS HARBOR.

The town of St. Andrews is situated on the point between Passamaquoddy Bay and the River St. Croix. A contract has been made for the construction of a "Block and Beacon" on a reef at the western entrance of the harbor and the works are now in progress.

ST. JOHN RIVER.

The work of improving navigation between River de Chute and Bear Island has been advanced by the removal of boulders at the following points:

Hartland, Woodstock, Dibblee's Bar, Eel River, Belvisor Bar, Meductic Falls, Lower Southampton, Nackawic, Kirk's, Morehouse's, Bear Island and Knapp's Bar.

Further dredging was done by the "New Dominion" on the Oromocto Shoals, between the 15th October and 5th November, 1881.

The extension of the sheer-dam at Oromocto to the head of Thatch Island was brought to completion in December, 1881. During the Spring of 1882 an apron of brush and stone was placed on the lower side of the dam, to prevent scour in time of freshets.

RIVER TOBIQUE

Is a tributary of the St. John, into which it flows about 24 miles below Grand Falls.

The work done consisted in blasting and removing rock in reefs and boulders at "the Narrows," "Upper Red Rapids," "the Oxbow" and "the Gulquac," for the improvement of the river for the passage of timber, &c.

RIVER MADAWASKA.

The Madawaska rises in lake Temiscouata, and running southwardly falls into the river St. John at Edmundston, N.B., 239 miles above the city of St. John.

The sum of \$600 was expended on the portion of this river in New Brunswick during the summer of 1881, in repairing the tow path, and the removal of boulders which obstructed navigation; and the sum of \$100 was expended for the same purpose on the Quebec portion of the river.

QUEBEC.

ETANG DU NORD.

Etang du Nord is at the western end of Grindstone Island, one of the Magdalen group, in the Gulf of St. Lawrence.

The work of constructing a breakwater at Etang du Nord was commenced in June, 1881, and during the fiscal year a length of 225 feet was completed; and this portion has been found to be of benefit in affording shelter to boats and fishing craft.

PERCÉ.

Percé the capital of Gaspé County, is situated on the Gulf of St. Lawrence about 36 miles from Gaspé Basin.

During the season of 1881, an examination was made for the purpose of determining the position and cost of works for the protection of the large fleet of fishing craft frequenting the Gulf during stormy weather. The report submitted will be found as an appendix to this report.

NEW CARLISLE,

Is the shire town of the County of Bonaventure, and lies on the northern side of the Baie des Chaleurs.

Owing to the exposed site of the breakwater at this place, only 180 feet of work to the level of high tide was put *in situ* during the working season of 1881. There remains a length of about 300 feet still to construct to connect with the shore, together with the superstructure over the whole length.

CARLETON.

Carleton, situated in the County of Bonaventure, is on the north shore of the Baie des Chaleurs, and distant from Campbellton, N. B., 36 miles.

During the year the work of constructing the pier at this place was actively prosecuted, and with the sum appropriated for expenditure during 1882-83, it is expected that the work will be brought to completion.

MATANE.

Matane, County of Rimouski, is on the southern shore of the St. Lawrence, 240 miles below Quebec.

During 1879 a pier was commenced at this place, but was only partly completed with the amount available.

An examination made in the fall of 1881 showed that much damage had been done by the ice to the unprotected corners of the crib work piers, and immediate repairs were made.

TROIS-PISTOLES,

In the county of Temiscouata, is on the southern shore of the St. Lawrence, 148 miles below Quebec.

During the year a small isolated block was constructed off the western side of the harbor for a landing pier, and many boulders were removed from the harbor proper. Further work will be prosecuted to connect this block with the shore, and thus made it available as a landing, provision having been made for its cost.

TADOUSAC.

Situated at the mouth of the Saguenay, and on the northern side.

The dams which form the ponds in connection with the Fish Breeding establishment at Tadousac, were rebuilt during 1881-82, as follows:—

Dam No. 1,	40 feet in length and 4 feet in height.
“ 2,	200 “ “ 8 “ “
“ 3,	110 “ “ 19 “ “
“ 4,	64 “ “ 18 “ “

Over dam No. 4 has been constructed a bridge 150 feet in length by 12 feet in width.

A part of the ponds made by dams No. 3 and 4 have been cleansed.

Repairs have been made to the roads and wharfing in connection with the establishment.

ANSE DU PORTAGE.

Opposite Tadousac, at the mouth of the River Saguenay.

During the year a commencement was made in the construction of a landing at Anse du Portage for the purpose of facilitating the transportation of the mails during the winter across the Saguenay to and from Tadousac.

This landing when complete will consist of an inclined plane 90 feet in length at the head of which, on a platform, will be placed a windlass by the means of which the mail boat can be drawn up and placed in safety. To prevent the accumulation of ice on the slip when the wind is from the N. E. and E. a jetty 180 feet in length will be constructed on the eastern side.

At the close of the year the works were well under way, and would be completed to be of service during the winter of 1882-83.

ANSE ST. JEAN.

Anse St. Jean is 24 miles up the Saguenay on its southern shore.

The pier at this place is 351 feet in length and 26 ft in breadth up to the head which is 50 by 40 ft., and 33 feet in height. At low water spring tides there is a depth of 7½ feet at the end of the pier.

During the fiscal year the upper part of the pier was completed, the head sheathed and fenders put in place, and a large quantity of ballast placed in the central portion which was nearly empty.

Further works required to complete this pier will be proceeded with during 1882-83.

ST. ALPHONSE DE BAGOTVILLE

Is at the head of Ha ! Ha ! Bay, on the southern shore of the River Saguenay, 66 miles from its mouth.

The wharf at St. Alphonse is 444 feet in length and 24 ft. in breadth, the head being 76 ft. long and 52 ft. broad.

As stated in a previous report the inshore portion of this wharf was burnt some years ago.

During the year just ended, a length of 378 feet was reconstructed to a mean height of 10 ft., a large portion of the flooring renewed, the outside sheathed to a mean height of 14 feet, and fenders placed where required.

A sum of \$3,500 has been granted for the construction of a block at the outer end of the wharf.

RIVER SAGUENAY.

The work of increasing the depth of the channel through the shoals in the river below Chicoutimi was prosecuted from July to November 1881, and 2350 rocks and boulders were removed over a distance of $\frac{3}{4}$ of a mile and a breadth of 300 feet, and placed either on the bank or in deep places in the river where there is not less than 20 feet of water at low tide.

Dredging was commenced in September 1881, the special apparatus devised for the purpose having been found to answer very well.

CHICOUTIMI.

Chicoutimi is situated on the southern shore of the Saguenay, at the head of navigation, and 75 miles from the St. Lawrence.

The wharf is 282 feet in length and 30 feet in width, with a head 127 feet in length parallel with the stream, and 34 feet in breadth. When first constructed there was a depth of 10 feet at the end of the wharf at low tide, but, owing to the accumulation of deposit, this depth has been reduced to 7 feet.

During the past year heavy repairs were made to the flooring of this pier, a new right shed was built, and the old shed placed in order.

LA GRANDE DÉCHARGE, RIVER SAGUENAY.

La Grande Décharge is the larger of the two channels through which the waters of Lake St. John flow into the River Saguenay.

Lake St. John receives the waters of a number of rivers, and during spring freshets it rises generally from 15 to 20 ft. above its summer level, and has been known to have attained heights of 30 and 35 feet; and, as the lands surrounding the lake are low, a general flooding takes place annually.

The outlets, the Grande and Petite Décharge, are comparatively small, the discharge through them being far less than the discharge into the lake, and consequently the level of the lake is slowly reduced, and as a rule the submerged lands dry out too late to be used for agricultural purposes.

The work of widening the Grande Décharge at one or two points has been undertaken, with the view of increasing its area, and thus permitting a greater flow of water during the continuance of freshets, and a quicker subsidence of the lake.

RIVER DU LOUP (EN BAS).

On the southern side of the St. Lawrence, in the County of Temiscouata, 103 miles below Quebec.

With the amount available, the work of raising the level of the pier at this place was carried on during the summer of 1881.

The sheathing and fenders referred to in the report of last year were put in place.

A shed for freight and passengers was also built during the year.

CAP À L'AIGLE,

In the County of Charlevoix, 3 miles from Murray Bay, on the northern side of the St. Lawrence.

The pier at this place constructed under a contract with a number of the inhabitants of the locality, was finished at the close of 1881.

MURRAY BAY.

Murray Bay or Malbaie, is on the northern shore of the St. Lawrence, 90 miles below Quebec.

During the past year, a shed was built on the public wharf at this place, and some necessary repairs made to the wharf itself.

RIVIÈRE OUELLE.

On the southern shore of the St. Lawrence, 75 miles below Quebec.

With the amount appropriated, a commencement was made of raising the pier at this place, as it was found to be too low, for, during storms at high water spring tides, the waves washed over it, rendering access to the outer end dangerous, and at times impossible.

LES EBOULEMENTS,

On the northern shore of the St. Lawrence, 69 miles below Quebec.

During September and October, 1881, a portion of the flooring of the wharf at this place was renewed, fenders placed where required, the sheathing completed and the corners protected with boiler plate which had been provided some time ago but never placed in position.

ILE AUX COUDRES,

In the County of Charlevoix, 12 miles from Bay St. Paul, on the north side of the St. Lawrence.

The landing pier referred to in the report of last year as being constructed by a number of the residents of Ile aux Coudres on behalf of the municipality, under a contract with the Department, was brought to completion at the close of 1881.

BAY ST. PAUL.

Bay St. Paul, in the County of Charlevoix, is situated 63 miles below Quebec, and on the northern shore of the St. Lawrence.

During the winter of 1881-1882 a large quantity of timber was procured for a landing pier at Pointe-Rouge, Cap-aux-Corbeaux, and its construction was commenced in May last.

At the close of the year the work was well in hand.

ILE AUX GRUES.

Ile aux Grues, or Crane Island, is an island in the St. Lawrence, opposite Cap St. Ignace, 36 miles below Quebec.

A block to carry a light house was constructed in 1862 near the upper end of the island, and has been used as a landing for passengers and freight at times of high water, access being had from the main land during the period of low water. To enable vessels to call and land goods etc., at low tide, a contract was entered into in November 1881, for the construction of a pier projecting from the block a distance of 171 feet into 6 feet at low water. At the close of the year the work was one third completed.

GROSSE ILE,

Is an Island in the St. Lawrence, 29 miles below Quebec.

During the year the works in progress of extending, raising, and repairing the eastern landing pier, in connection with the Quarantine Establishment, were brought to a conclusion.

 STE. FAMILLE,

Is on the north shore of the Island of Orleans, 17 miles below Quebec.

The isolated blocks built in 1879 and 1880 were connected with the shore during 1881, and the pier thus rendered available for the smaller class of steamers and vessels which ply below Quebec.

LES ECUREUILS.

Les Ecureuils, in the County of Portneuf, is on the northern shore of the St. Lawrence, 25 miles above Quebec.

At this place a small landing pier has been constructed, having 12 feet at high water, spring tides, at its outer end.

NICOLET.

The Nicolet empties into the St. Lawrence on its southern side, at the foot of Lake St. Peter.

A contract was entered into in October, 1881, for the construction of works for the improvement of the harbor and the entrance thereto, but, owing to the extreme height of the water in the St. Lawrence during the past summer, the work of pile driving, etc., was not proceeded with, and therefore at the close of the year nothing had been done except the delivery of materials.

RIVER YAMASKA.

The Yamaska takes its rise in the County of Brome, and, after a course of over 90 miles, falls into the St. Lawrence at the head of Lake St. Peter.

During August, 1881, a contract was entered into with Messrs Brecken, Gaherty & Davis, for the construction of a lift lock and dam at Ile à Cardin, 1½ miles below the Village of St. Michel, and about 4½ miles from the mouth of the river.

By the construction of these works, and dredging through the shoals below the lock, the river will be rendered navigable for vessels of moderate draught, to Bell Point or Rapid de la Grosse Roche, a distance of 21 miles.

At the close of the year about one-sixth of the work had been completed.

RIVER RICHELIEU.

This river empties into the St. Lawrence on its southern side at Sorel, 45 miles below Montreal.

The dredge "Nipissing" was engaged between 7th July and 27th August 1881, in opening a channel to 10 feet in depth at low water, through two shoals, respectively one and three miles below the Village of St. Ours.

BERTHIER EN HAUT.

Situated on the northern side of the River St. Lawrence, 45 miles below Montreal, and almost opposite Sorel at the mouth of the Richelieu.

The work of deepening the channel to 9 feet below the usual low water mark was brought to a close on the 5th July, 1881.

RIVIÈRE L'ASSOMPTION.

This river discharges into the St. Lawrence, a short distance above the Village of Repentigny.

At Charlemagne, at the mouth of the river, dredging was carried on between 27th August and 5th November, 1881, on the boulder shoal off the steamboat wharf, and in making a cut to the mill channel, giving 10 feet depth at low water.

LONGUE POINTE TO BOUCHERVILLE.—RIVER ST. LAWRENCE.

It having been found that obstructions existed in the channel on the route used by the ferry steamer between Longue Pointe and Boucherville, 6 miles below Montreal, a dredge was placed at work in May last for the purpose of making 7 feet at low water in the St. Lawrence, and, at the close of the fiscal year, it had removed 10,228 cubic yards of materials.

ILE AUX NOIX,

Is an island in the River Richelieu near the Southern boundary of the Province of Quebec.

On this island is situated Fort Lennox, built by the British Government many years ago as a military post, and transferred to the Province of Canada in 1855. It was opened as a Reformatory prison in 1858 and closed in 1862. Access to this fort is had by a road from the public highway at the Village of St. Valentin to the river, and thence by ferry to the island. This road being, it is maintained, the property of the Dominion, extensive repairs had to be made to the bridge crossing a dry gully, which had become dangerous.

LAPRAIRIE,

The *chef-lieu* of the County of Laprairie, is situated on the southern shore of the St. Lawrence, 7 miles above Montreal.

In May, 1882, a dredge was placed at work in deepening to 7 feet at low water around the front and sides of the public wharf, and was so engaged at the close of the fiscal year.

BEAUHARNOIS.

The chief town of the County of Beauharnois, on the southern side of Lake St. Louis, River St. Lawrence, and 20 miles above Montreal.

The dredge "Queen of Canada" remained at Beauharnois until the 20th July, 1881, and completed the deepening in front of the wharves at that place, and the channel therefrom to the main channel of the river.

BACOT HAYES SHOAL.—RIVER ST. LAWRENCE.

This shoal is an obstruction in the steamboat channel about $2\frac{1}{2}$ miles below the Village of Cedars, in the county of Soulanges.

During the season of 1881 operations were commenced and carried on, in opening a new route 150 ft. in width, with 8 ft. depth at lowest water, about 200 ft. to the northward of that heretofore used.

Owing to the swiftness of the current, special vessels and machinery had to be devised and built for the purpose of lifting and removing the large boulders and stones of which the shoal is composed. At the close of the year about two-thirds of this new channel had been completed.

THE CEDARS.

The Village of Cedars in the County of Soulanges, is situated on the northern bank of the St. Lawrence, 30 miles above Montreal.

During the year the landing pier at this place was largely repaired, as it was found to be more desirable to do this, than to engage in the construction of a new pier, referred to in last year's report.

ST. PLACIDE.

St. Placide, in the County of Two Mountains, is situated on the River Ottawa about 9 miles from St. Andrews.

In 1879 the work of opening a channel from the main channel of the Ottawa to the public wharf at St. Placide was commenced, and work was resumed in June, 1882, for the purpose of completing the same, and at the close of the fiscal year fair progress had been made.

RIVIÈRE À LA GRAISSE (RIGAUD)

This river empties into the Ottawa on its southern side about 15 miles above Vaudreuil.

Work was resumed on 21st July in deepening the channel towards the village of Rigaud, and continued until 23rd September, when 15,400 cubic yards of clay were removed.

RIVIÈRE DU NORD.

This river enters the Ottawa on its northern side, at the head of the Lake of Two Mountains.

From 1st August to 6th September, 1881, the work of removing boulders from the channel about $\frac{1}{2}$ mile below the Village of St. Andrews was continued, leaving a depth of $5\frac{1}{2}$ feet at low water over a width of 70 feet.

RIVIÈRE DU LIÈVRE.

This river empties into the Ottawa on its northern side, 19 miles below the City of Ottawa.

A small expenditure was made during the Summer of 1881 in deepening the channel of the river at Little Rapids, about 10 miles above the village of Buckingham, by blasting a reef which extends across the river at that point; and also in removing boulders from the Long Rapids, for the purpose of facilitating the navigation of the river by craft engaged in the transportation of phosphates.

THE GATINEAU.

This river, one of the principal tributaries of the Ottawa, flows into the latter below the City of Ottawa.

Owing to the extreme lowness of the water in this river during the fall of 1881, it was necessary to open a passage for barges through the shoals in the channel near the railway bridge, which were found to be composed of sand, mingled with sawdust and refuse from the mills up the river, and as long as this refuse finds its way into the river so long will a shoaling of the water take place, and the usefulness of the river be destroyed.

ONTARIO.

UNION SUSPENSION BRIDGE.

This bridge, connecting the Cities of Ottawa and Hull, crosses the Ottawa immediately below the Chaudiere Falls. It was constructed in 1844, and in 1861 iron was substituted for wood in the floor beams.

An examination made in 1880 shewed that the roadway of the bridge required extensive repairs, and during 1881-82 the whole of the superstructure, with the exception of the iron floor beams, was renewed, and advantage was taken of the opportunity afforded to reduce the suspended weight of the bridge and to increase the strength and stiffness of the roadway by marked changes in the quantities of materials used and the form of trussing adopted.

REMOVAL OF REEF BELOW SUSPENSION BRIDGE.—OTTAWA RIVER.

Immediately below the Union Suspension Bridge there existed a small rocky island the top of which was removed some years ago to nearly the summer level of the water in the Ottawa, and this, during the seasons of freshet, became a submerged reef which was a cause of much hindrance to navigation.

During the extremely low water of 1881, the top of this reef was removed to an average depth of about 3 feet, which has caused a marked improvement in the navigation of the channel.

PORTSMOUTH.

Portsmouth is situated on a bay of that name 2 miles west from Kingston.

The appropriation for this harbor was expended in dredging to 13 feet of water over a portion of the basin, the material removed being mud and stone.

SALMON RIVER.

The Salmon River empties into the Bay of Quinté at Shannonville, 40½ miles westward of Kingston.

A dredge was employed in opening a passage through the bar obstructing the mouth of the river, 1700 feet in length and 40 feet in width, to a depth of 8 feet which was all that could be made, as operations were stopped by the closing of navigation.

BELLEVILLE.

Belleville which is the capital of the County of Hastings, is situated on the Bay of Quinté 43 miles west of Kingston.

The work done in this place was dredging along the pier at the eastern side of the harbour, across to the southward of the island, and up to the wharves on the western side, the material removed being loose rock, boulders, some earth, stones saw-dust, &c.

TRENTON.

Trenton, County of Hastings, is at the mouth of the river Trent which empties into the Bay of Quinté, and is distant 60 miles from Kingston and 12 from Belleville.

The work at this place consisted in the removal of an old crib-work pier from the channel of the river, leaving from 15 to 16 feet of water.

PICTON.

The capital of the County of Prince Edward is situated on the Bay of Quinté 40 miles west of Kingston and 34 miles from Belleville.

A few days dredging was done during May, 1852, to remove some points left unfinished in 1879.

CONSECON.

At the head of Weller's Bay, Lake Ontario, in the County of Prince Edward.

During October and November, 1881, dredging was done on the shoal obstructing the entrance to Consecon Harbor, affording only a partial relief.

COBOURG.

Cobourg is on Lake Ontario, 92 miles west of Kingston.

Owing to the failure on the part of the contractor to complete the work of extending the western pier it was taken out of his hands by the Department, but

not before it had received much damage during a gale. Last spring work was carried on under a foreman, and as the crib-work had settled into the sandy bottom, about 9 feet in height had to be built by divers—a tedious operation.

The extension of the Eastern pier was placed under contract in September last, but at the close of the fiscal year no work had been done.

PORT HOPE.

On the North shore of Lake Ontario, in the County of Durham, 63 miles east of Toronto.

During the fiscal year 12,442 cubic yards of material were dredged out of this harbor at a cost of 22½ cents per cubic yard.

The construction of an extension of the eastern pier 100 feet in length was commenced and was ready to sink at the close of the fiscal year.

TORONTO.

Dredging the western entrance to the harbor was continued until 8th October, 1881, and 25,570 cubic yards of material were removed, leaving the entrance the full width of 300 feet.

During the summer of 1881, this harbor was examined by James B. Eads Esq. C.E. with a view to its improvement and preservation, and his report thereon is attached as an appendix hereto.

PORT STANLEY.

Port Stanley is the terminus on Lake Erie of the London and Port Stanley Railroad, and is distant from Port Colborne, at the entrance to the Welland Canal, about 85 miles.

The block at the end of the western pier built in 1876-77 having settled at its outer end was rebuilt to its original height for the purpose of placing a lighthouse thereon.

RONDEAU.

The harbor of Rondeau on Lake Erie is 140 miles west of Port Colborne, the Southern entrance of the Welland Canal.

Under their contract Messrs F. B. McNamee & Co., only completed the piling in the protection work on the western side of the entrance to the harbor.

The work so far done has proved to be eminently successful, for not only have the breaches through the sand beach become closed, but the beach itself has formed on the lake side for a distance varying from 50 to 100 feet beyond the former line of high water.

A channel was opened from the harbor into and through Mill Creek, 15,485 yards of mud and clay having been removed at a cost of 18 cts. per cubic yard.

GODERICH.

Goderich is situated at the mouth of the River Maitland on the eastern coast of Lake Huron, 68 miles north of Sarnia.

It having been found that the beach between the northern pier and the breakwater was being gradually washed away, a contract was entered into in February last for the construction of works for its preservation, and also for repairing and raising the outer end of the southern pier and rebuilding the portion of the inner end of the northern pier which had been destroyed by the ice.

From 7th September until the close of navigation in 1881, and from 31st May until the close of the fiscal year 1882, the Dredge "Challenge" was engaged in deepening along the breakwater and the wharfing inside the harbor, and to 16 feet through the shoal off the entrance.

PORT ALBERT.

Port Albert is at the mouth of Nine Mile Creek which runs into Lake Huron 9 miles north of Goderich.

The work done in this harbor during the year consisted, first, in dredging materials which had washed into the harbor amounting to 4002 cubic yards and, second, the placing of 85 feet of pile protection work on its northern side.

KINCARDINE.

Kincardine is situate at the mouth of the River Penetangore which empties into Lake Huron, 31 miles north of Goderich.

A contract was entered into in November 1881, with Messrs Rooklidge and McLaren for the construction of 790 feet of pile protection work on the south side of the southern pier at the entrance to the harbor. At the close of the year the work was one half completed.

PORT ELGIN.

In the County of Bruce, on Lake Huron, 4 miles from Southampton and 24 from Kincardine.

For the purpose of affording shelter and the formation of a harbor at this place, the construction of a breakwater 600 feet in length and necessary dredging was let to Messrs. Sutton and McKnight in November last. At the close of the year about one eighth of the work had been accomplished.

Towards the construction of this work the Village of Port Elgin has contributed \$5,000.

SOUTHAMPTON.

On Lake Huron, at the mouth of the River Saugeen.

The sum of \$2,500 has been expended in restoring a length of 700 feet of the superstructure and flooring of the west breakwater, in placing 500 cubic yards of stone on the lake side of this breakwater at its junction with Chantry Island, and in the construction of a small breakwater 155 feet in length opposite the lighthouse, in order to protect the island at that point.

TOBERMORY.

The harbor of Tobermory is situate at the extreme northern end of the County of Bruce on the channel leading from Lake Huron to Georgian Bay.

It is a large and safe natural harbor of refuge, and the sum of \$250.00 was expended in placing 15 large iron ring bolts and 7 fenders in the rocky sides of the harbor for the purpose of mooring and protecting vessels.

BRUCE MINES.

Bruce Mines in the District of Algoma is situated on the northern shore of Lake Huron, 45 miles below Sault Ste. Marie.

The dredge "Challenge" operated between 21st July and 5th September, 1881, in opening a channel with 14 feet of water to the public wharf at this place to enable the larger class of steamers now plying on the lakes to call.

LITTLE CURRENT.

Little Current is the passage between Cloche Island and the Great Manitoulin, and is on the direct route to Sault Ste. Marie from ports on the Georgian Bay, and distant about 140 miles from Collingwood.

Work was commenced in May and finished in October, 1881, on the rocky ledge obstructing the navigable channel, and 3,752 cubic yards were blasted and removed. This rock was deposited between Manitoulin and Spider Islands and has had the effect of reducing the current in the steamboat channel; the water which formerly flowed between these islands now runs to the north east of Spider Island where the channel is wide and deep.

About 10,000 yards of rock remain to be removed towards which an appropriation was made at the last session of Parliament.

OWEN SOUND.

Owen Sound, the shiretown of the County of Grey, is situated at the mouth of the River Sydenham, which discharges its waters into Georgian Bay.

The harbour works referred to in the report of last year were brought to a conclusion in November last.

With the amount placed in the Supplementary Estimates for expenditure in 1881-82, the dredging was completed in this harbor to the depth of 14 feet.

THORNBURY.

Thornbury is situated at the mouth of the Beaver River, in the County of Grey on Georgian Bay, 13 miles from Collingwood.

At this place a pier was constructed some years ago by the residents of the locality, but was allowed to fall out of repair and to become useless.

The vote of the session of 1881 having been supplemented by the sum of \$7,000.00 furnished by the Town of Thornbury, a contract was entered into for the reconstruction of the pier and the dredging a basin 100 feet in width to 10 feet in depth on its eastern side, and at the close of the year one fifth of the work was done.

COLLINGWOOD,

Is in the County of Simcoe, and situated on Nottawassaga Bay, south shore of Georgian Bay, 95 miles N.W. from Toronto.

The work of deepening the entrance to the harbor to 14 feet was prosecuted during the year, and 26,500 cubic yards of hardpan and clay were removed at a cost of 32 cents per cubic yard.

MANITOBA.

LAKE MANITOBA.

During the season of 1881 an examination was made to determine the cause of the overflow of Lake Manitoba, and the means to be taken to prevent it for the future.

A report by Mr. Thos. Guerin, C.E., on this subject is appended hereto.

BRITISH COLUMBIA.

From the report of the Hon. J. W. Trutch it is learned that the removal of the obstruction in the Harbor of Victoria known as the "Beaver Rock" was completed on the 22nd August, 1881, and that there is now a depth of 12½ feet at low water spring tides over the whole site of the rock.

Dredging was carried on from 19th January until the end of April 1882, to obtain a depth of 14 feet in front of the wharves in Victoria Harbor.

From 1st May to the end of the fiscal year, the dredge worked on the spit off Shoal Point at the entrance to the harbor.

SURVEYS AND EXAMINATIONS.

During the year surveys and examinations were made at the undermentioned localities, and with a few exceptions, plans, reports and estimates have been forwarded.

South River, Murray Harbor,	Kings Co.,	P. E. I.
Nail Pond,	Prince Co.,	do
Cape Traverse,	do	do
Tracadie,	Queens Co.,	do
Belle Creek,	do	do
South West River, New London,	do	do
Annapolis,	Annapolis Co.,	N. S.
Parker's Cove,	do	do
Anderson's Cove,	do	do
Port Lorne,	do	do
Arisaig,	Antigonish Co.,	do
Cow Bay,	Cape Breton Co.,	do
Open Pond,	do	do
East Bay,	do	do
Grand Narrows,	do	do
Ramshead River,	Cumberland Co.,	do
Port Greville,	do	do
Bear River,	Digby Co.,	do
Meteghan River,	do	do
St. Mary's River,	Guysboro Co.,	do
Cheverie,	Hants Co.,	do
Hantsport,	do	do
Three Fathom Harbor,	Halifax Co.,	do
Port Hood,	Inverness Co.,	do
Petite Rivière,	Lunenburg Co.,	do
White Point,	Queens Co.,	do
Brooklyn,	do	do
Liverpool Bay,	do	do
Campbell's Harbor,	Richmond Co.,	do
River Inhabitants,	do	do
Yarmouth,	Yarmouth Co.,	do
Shippegan,	Gloucester Co.,	N. B.
River Miramichi,	Northumberland Co.,	do
The Traverse, River Restigouche,	Restigouche Co.,	do
Cross Point to Campbellton,	do	do
St. Michel,	Bellechasse Co.,	Quebec.
Port Daniel,	Bonaventure Co.,	do
Caplan,	do	do
Port-au-Saumon,	Charlevoix Co.,	do
Grande Décharge, Lake St. John,	Chicoutimi Co.,	do
Barachois de Malbaie	Gaspé,	do
Percé,	do	do
St. François,	Island of Orleans,	do
St. Jean, Port Joli,	L'Islet, Co.,	do.
Pointe aux Trembles,	Portneuf Co.,	do
Bacot Hayes Shoal,	River St. Lawrence,	do
The Traverse,	do	do
River St. Francis,	do	do
Escoumains,	Saguenay Co.,	do.
Three Rivers,	St. Maurice Co.,	do
Upper River Ottawa,	do	do

River au Sable	Bruce Co.,	Ontario.
Warton,	do	do
Tobermory	do	do
Southampton,	do	do
Kincardine,	do	do
Newcastle,	Durham Co.,	do
Kingsville,	Essex Co.,	do
Kingston,	Frontenac Co.,	do
Bayfield,	Huron Co.,	do
Goderich,	do	do
Port Albert,	do	do
Sarnia,	Lambton Co.,	do
The " Narrows " between lakes Simcoe and Couchiching,	do	do
Wellington,	Prince Edward Co.,	do
Collingwood,	Simcoe Co.,	do
Lake Manitoba,		Manitoba.
River Assiniboine,		do
Water Hen River,		do
River Saskatchewan,		N. W. T.
Victoria Harbor,		B. C.

DREDGING.

" *The St. Lawrence.* "

At the beginning of the fiscal year this dredge was operating on the Horse Shoe Shoal, at the mouth of the River Miramichi, N.B., remaining until 1st September when she left for Port Caledonia, Cape Breton, having removed 16,800 cubic yards of sand. Arriving at Port Caledonia on the 10th, only a few days work was done, for, owing to the lateness of the season and the exposed position of that harbor, it was found that satisfactory work could not be accomplished, and in consequence, the dredge proceeded to Sydney, C.B., and resumed work on the shoal in the harbor off the loading pier of the Cape Breton Coal Company, on the 16th September, remaining until the 28th November, when 24,500 cubic yards of gravel, stone, clay and mud had been removed.

During the winter of 1881-82 this dredge was quartered at Little Glace Bay, where necessary repairs were made, and, on the 17th April last, work was commenced in that harbor and continued until the 9th May, when the Gulf ice set in and jammed on the coast,—4,375 cubic yards of mud, clay, etc., having been removed. On the 29th May work was resumed at Port Caledonia, and at the close of the fiscal year the dredge had removed a total of 4,638 cubic yards of mud and clay.

Owing to unfavorable weather much time was lost whilst on the Horse Shoe Shoal, and also at Little Glace Bay and Port Caledonia, where additional difficulty was caused by the jamming of the Gulf ice.

The total quantity dredged during the year amounts to 50,313 cubic yards, at a cost of 28 $\frac{25}{100}$ cents per cubic yard.

The sum of \$29.50 was received from the Glace Bay Mining Company for old rubber valves and iron rivets and the amount placed to the credit of the Honorable the Receiver General.

" *The Canada.* "

On the 1st July, 1881, the Canada was engaged at Buctouche, N.B., opening a passage through a mussel bed obstructing the entrance to the harbor, and in widening the channel by the removal of an old wreck. Up to the 16th August, 1881, 7,560 cubic yards of mud, sand, clay, stones and shells were removed; and, on that date this dredge went to Cocagne harbor for the purpose of improving the entrance,

remaining until the 31st and removing during her stay 1,800 cubic yards of sand and clay.

At this date it was found that repairs were required, and the vessel left for Pictou, N.S., where they were executed, and after their completion she sailed for Vogler's Cove, Lunenburg County, N.S., where work was commenced on the 17th September and continued until 6th December, when it was brought to a close by the formation of ice, 11,610 cubic yards of mud having been removed.

On the 28th December operations were commenced on the tail of the Navy Island Bar, in the harbor of St. John, N.B., and continued until the end of March, when 6,300 cubic yards of clay had been removed. The dredge was then laid up.

On the 26th May the "Canada" sailed for Halifax, N. S., where after arrival she went on the Marine slip for painting and repairs. On the 17th June, the work of removing an obstruction in the St. Mary's River, between Sherbrooke and Goldenville, Sussexboro' County, N. S., was commenced, and at the close of the fiscal year, 810 cubic yards of gravel, stones and sand, and a number of old trees had been removed. At this place dredging could only be done between half-flood and half-ebb tide, and the dredged material had to be taken ten miles to a place of deposit.

The total quantity of materials removed during the year amounts to 28,080 cubic yards, at a cost of 33 $\frac{7}{10}$ cents per cubic yard.

The sum of \$15.80 was received for coal sold from this dredge, and placed to the credit of the Honorable the Receiver General.

"The New Dominion."

On the 8th July, 1881, this dredge commenced work at Marble Cove, Saint John, N. B., in opening a channel to the public wharf, completing the same on the 20th September, having removed 29,925 cubic yards of mud and clay, and many old roots and pieces of birch timber.

Between the 20th September and the 10th October work was done off the wharves of Messrs. Murray & Barnhill, near St. John, and 9,310 cubic yards of red clay removed. On the 15th October work was resumed on the Oromocto Shoals in the River St. John, and continued until the 5th November, resulting in the removal of 7,945 cubic yards of sand.

After arrival at St. John work on the tail of the Navy Island Bar was attempted, but, owing to the decayed state of the hull it was not deemed safe to continue the work, and the dredge was placed in winter quarters.

During the winter a contract was entered into with Mr. Isaac J. Olive, for the construction of a new hull, and the transference and fitting up of the machinery of the dredge, and at the close of the year the work was nearing completion.

The total quantity dredged during the year amounted to 47,180 cubic yards, at a cost of 14 $\frac{8}{10}$ cents per yard.

For work done by this dredge for Messrs. Murray & Barnhill, the sum of \$700.00 was received from that firm and placed to the credit of the Honorable the Receiver General. The birch timber raised at Marble Cove was sold for the sum of \$47.10, which was also placed to the credit of the Receiver General.

The "Cape Breton."

At the beginning of the fiscal year, this dredge was engaged at New Glasgow, Pictou County, N.S., in deepening the channel of the East River from the highway bridge to above the shipyards of Messrs. Carmichael and McCaul. This work was finished on the 13th July, and 5,410 cubic yards of gravel removed. On the 22nd July work was commenced in the River John, and continued until the 31st October, when the dredge was laid up for the winter, after having removed 18,175 cubic yards of sand and mud.

During the spring of 1882 repairs were made to the dredge and scows, and between the 28th and 31st of May last, 455 cubic yards of mud were removed out of the channel of the river opposite the ship-yard of Mr. James Kitchen.

On the 3rd June operations for the improvement of the mouth of the Tatamagouche River, Colchester County, N.S., were commenced and continued until the 30th June, up to which date 6,870 cubic yards of mud had been removed.

During the year this dredge removed 30,910 cubic yards of materials, at a cost of 30½ cents per yard.

The "Prince Edward."

This dredge was engaged at Crapaud, Queen's County, P.E.I., at the commencement of the fiscal year, and remained there until the 8th August, when the work in the channel was finally completed, and 12,990 cubic yards of sand, mud and stone removed.

From the 10th August to the 25th October, work was proceeded with in completing the channel at Nine Mile Creek through the flats to the public wharf, and 21,900 cubic yards of mud, clay and sand were removed.

At Pinnette, dredging was prosecuted between the 26th October and the 16th November, and the channel straightened, and the loading berths deepened at the public wharf, 3,825 cubic yards of sand and mud having been removed.

The "Prince Edward" wintered at Charlottetown, where some necessary repairs were executed.

On the 22nd May, 1882, dredging was commenced at Fort Augustus, East River, Queen's County, in deepening at the public wharf, and up to 30th May, 3,195 cubic yards of mud and sand were removed.

On the 1st June, the dredging plant left for South Murray Harbor, King's County, where the work of straightening the channel was commenced, and at the close of the fiscal year 5,415 cubic yards of sand and mud had been removed.

The total quantity removed by this dredge during the year amounted to 47,325 cubic yards, at a cost of 19 $\frac{77}{100}$ cents per yard.

The "Geo McKenzie."

As stated in the last report this dredge was at work at the close of the year at Mabou, Inverness County, N.S., engaged in opening a channel to 14 feet at low water through a shoal lying off the entrance to the harbor. Owing to the very high winds which prevailed during the summer of 1881, and the strong currents and undertow, which exist off the coast, it was only possible to work during mild and moderate weather, and when the wind was off shore. Work was prosecuted until the 30th October, when 12,448 cubic yards of clay, stone, and sand had been removed.

During the winter repairs were made to the dredge, and the plant was ready for work early in the spring, but, owing to the late period to which the ice remained and the difficulty of procuring tug service as soon as required, work was not resumed until the 19th June, 1882, and up to the 30th, a further amount of 276 cubic yards of materials were removed.

The total quantity of work done by this dredge during the year was only 12,724 cubic yards, at a cost of 68 $\frac{88}{100}$ cents per yard, and the smallness of the amount dredged is entirely due to the hard nature of the material operated upon, the exposed position of the locality where the work had to be performed, and the delays caused by high winds, etc., for a dredge of the "Geo McKenzie" class, is—from its build and construction, only capable of working in comparatively smooth water.

The sum of \$4 was received from the sale of an old [s]forge, and placed [t]o the credit of the Receiver General.

The "Challenge."

At the commencement of the fiscal year this dredge was at Port Albert, Lake Huron, and remained there until the 19th of July in deepening a portion of the harbor to 10 feet, removing 3,422 cubic yards of sand, clay and stones.

On the 21st July work was commenced at Bruce Mines, in opening a channel with 14 feet water to the public wharf at that place, and continued until the 5th September, having removed 22,388 cubic yards of clay and mud.

Dredging was begun at Goderich on the 7th September, in deepening to 13 feet along the breakwater and the wharfing inside the harbor, and to 16 feet through the shoal off the entrance, remaining at work until the close of navigation.

Owing to the delay in repairing the scows attached to this dredge, work was not resumed until the 31st May last, and up to the close of the year, 27,532 cubic yards of gravel, clay, sand and boulders had been removed.

During the winter the machinery of the dredge and the tug "Trudeau" were thoroughly overhauled and repaired, and the scows in a great measure rebuilt.

The work done by this dredge during the year amounted to 53,342 cubic yards, and cost 17 $\frac{1}{4}$ cents per yard.

The "Nipissing."

On the 1st July, 1881, this dredge was engaged in deepening the channel 9 feet through Levesque's Shoal, below the town of Berthier, (*en haut*), Quebec, completing the work on the 5th. On the 6th the plant was removed to the River Richelieu, to work on two shoals, respectively one and three miles below the Village of St. Ours, to obtain 10 feet at low water. These channels were completed on the 27th August by the removal of 9,300 cubic yards of clay, stone and sand.

At Charlemagne, at the mouth of the River L'Assomption, dredging commenced on the 27th August, and ended on the 5th November, and a depth of 10 feet left through the boulder shoal off the steamboat wharf, and in a cut made to the mill channel, 15,675 cubic yards of boulders, clay and sand having been removed.

During the winter, this dredge, the tug "Dennis," and the scows were thoroughly overhauled and repaired at Ottawa.

On the 9th June, 1882, the work of extending a channel commenced some years ago, from the main channel of the Ottawa to the public wharf at St. Placide, Quebec, was begun, and at the close of the year, 3,037 cubic yards of clay were removed, and a depth of 6 feet at low water obtained.

This dredge removed during the year 28,237 cubic yards of stone, clay and sand, at a cost of 29 $\frac{1}{2}$ cents per cubic yard.

The "Queen of Canada."

At the commencement of the year this dredge was at Beauharnois, Quebec, deepening to 9 feet in front of the wharves, and in making a cut to the same depth to the main channel of the St. Lawrence.

On the 21st of July work was resumed in dredging the channel of the Rivière à la Graisse, towards the village of Rigaud, to a depth of 7 feet, and continued until the 23rd September, when 15,400 cubic yards of clay were removed.

On the 27th September, work on the shoals in the channel of the Gatineau, in the vicinity of the railway bridge was commenced, to obtain a depth of six feet at low water, and continued until the close of navigation, when 3,700 cubic yards of sand, mingled with elabs, saw-dust and mill refuse were removed.

Extensive repairs were made during the winter to the hull of the dredge and the scows; and the machinery was placed in thorough working order.

On the 17th May, 1882, this dredge and scows were sent to Laprairie, arriving and commencing work at that place on the 29th, in deepening to 7 feet at low water around the front and sides of the public wharf, and at the close of the year 1,725 cubic yards of hard packed gravel had been removed.

The total quantity of materials removed by this dredge during the year amounted to 24,475 cubic yards of hard gravel, clay and sand, costing 33 $\frac{1}{4}$ cents per yard.

The "Dredger"—British Columbia.

The dredging plant, consisting of dredge, tug and scows, remained at Coquitlem River, near New Westminster, until early in January, when they were removed to Victoria Harbor, and commenced work on the 19th January last, in the removal of deposit along the front of the wharves to 14 feet, at low water spring tides, which depth, owing to the presence of rock was not fully obtained.

On the 1st May, operations were commenced at the entrance to the harbor to obtain a depth of 14 feet at low-water spring tides, through the Spit shoal, which extends about 450 feet off Shoal Point, and were in progress at the close of the year.

The total quantity of materials removed during the year amounted to 22,356 cubic yards, at a cost of 48 $\frac{1}{8}$ cents per yard.

DREDGING PLANT.

The dredging plant belonging to the Department is as follows :

IN THE MARITIME PROVINCES.

The steam hopper dredge—	" St. Lawrence "	
" " "	—" Canada. "	.
The dipper dredge	—" New Dominion " and	10 scows.
" "	—" Cape Breton "	5 "
" "	—" Prince Edward "	3 "
" "	—" Geo. McKenzie "	3 "

IN QUEBEC.

The dipper dredge—" Queen of Canada," 2 scows and stone lifter.
 " "—" Nipissing " 2 scows, and the steam tug " Dennis."

IN ONTARIO.

The dipper dredge—" Challenge, " 2 scows, and the steam tug " Trudeau."

IN BRITISH COLUMBIA.

An elevator dredge and 4 scows.
 The steam tug " Georgia."

During the winter of 1881, a new hull was constructed for the " New Dominion " and the dredging machinery, &c., transferred thereto. Under a contract with Messrs. D. and A. Campbell, four scows are being built at Tatamagouche, three of which are to be attached to the dredge " Prince Edward," the other to the " Cape Breton." A scow attached to the " Challenge " was condemned during the year, and will be replaced by another to be constructed during the ensuing winter.

As will be seen by reference to the details of expenditure in connexion with the dipper dredges in the Maritime Provinces, a large amount, about one-third of the whole, was paid for towage, performed by tugs hired for the purpose. This service would be more satisfactorily rendered and performed, and at a large saving in yearly expense, if proper tugs were provided by the Department.

CLASSIFICATION of Disbursements of the following Dredges, during the year ended 30th June, 1882.

"ST. LAWRENCE."

Items.	July.	August.	Sept.	October.	November.	Dec.	January.	Feb'y.	March.	April.	May.	June	Grand Totals.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Wages	508 33	513 25	512 87	507 70	560 33	463 25	458 33	463 50	483 33	512 16	510 17	458 33	5,951 56
Coal	77 00	.....	984 07	161 85	.....	.....	120 95	.....	.....	.....	.....	.....	1,343 87
Provisions	314 51	.....	437 31	128 38	132 22	.....	181 68	147 51	138 04	184 94	26 87	.....	1,681 47
Stores	94 93	45 25	180 89	7 72	8 50	.....	6 80	.....	3 75	.....	174 96	58 21	1,691 01
Equipment .....	.....	.....	.....	.....	29 79	.....	.....	.....	.....	.....	.....	.....	29 79
Water .....	.....	18 00	.....	.....	12 00	.....	.....	.....	.....	.....	.....	.....	30 00
Repairs	130 00	2,816 60	63 75	4 40	.....	11 50	93 87	.....	.....	387 57	308 79	.....	3,632 73
Pilotage .....	.....	160 00	.....	51 00	.....	.....	30 00	.....	.....	24 00	54 00	52 00	535 75
Towage .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	30 00
Contingencies .....	.....	37 59	.....	10 00	6 65	2 25	12 20	.....	.....	.....	.....	.....	72 28
Totals	1,124 77	3,590 69	2,178 89	872 05	749 49	477 00	903 83	611 01	625 13	1,122 26	1,074 79	568 54	13,898 45
Working expenses...	1,124 77	774 09	2,178 89	867 65	749 49	.....	.....	.....	.....	724 69	591 04	510 39	7,520 95
Repairs, ordinary...	.....	2,816 60	.....	4 40	.....	477 00	903 83	611 01	625 13	397 57	483 75	58 21	6,377 50
Totals	1,124 77	3,590 69	2,178 89	872 05	749 49	477 00	903 83	611 01	625 13	1,122 26	1,074 79	568 54	13,898 45

CLASSIFICATION of Disbursements of the following Dredges, during the Year ended 30th June, 1882.

"CANADA."

Item.	July.	August.	Sept.	October.	November.	Dec.	Jan.	Feb'y.	March.	April.	May.	June.	Grand Totals.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Wages	463 00	398 00	402 50	450 33	373 00	373 00	380 39	446 63	371 02	394 37	398 00	.....	4,450 24
Coal	518 12	.....	357 57	280 00	10 71	98 50	.....	248 75	112 59	.....	.....	.....	1,626 15
PROVISIONS	236 00	.....	168 69	38 12	231 10	148 37	.....	116 26	112 18	89 50	.....	169 43	1,289 85
Stores	107 04	.....	22 27	.....	6 66	16 31	22 25	.....	.....	93 00	60 62	354 41	1,682 56
Equipment .....	.....	.....	.....	.....	60 61	.....	.....	127 03	.....	.....	.....	241 67	429 31
Water	10 00	.....	1 00	.....	.....	.....	.....	.....	.....	.....	.....	20 00	31 00
Repairs .....	.....	420 25	.....	167 73	.....	.....	.....	.....	.....	.....	165 44	1,528 91	2,282 33
Pilotage .....	.....	72 50	84 00	.....	92 50	103 00	67 50	.....	67 50	.....	105 00	25 00	617 06
Wharfage	50 00	.....	20 00	.....	36 00	.....	.....	4 20	.....	.....	.....	27 50	137 70
Contingencies .....	.....	23 01	.....	.....	9 56	20 71	.....	.....	55 00	.....	.....	.....	108 28
Totals	1,384 16	913 76	1,056 03	936 18	810 14	760 09	470 14	942 87	718 20	570 87	729 06	2,366 92	11,664 42
Working expenses..	1,364 16	493 51	1,056 03	768 45	810 14	760 09	470 14	942 87	718 20	576 87	729 06	225 93	8,206 39
Repairs, ordinary ..	.....	420 25	.....	167 73	.....	.....	.....	.....	.....	.....	.....	.....	3,458 03
Totals	1,384 16	913 76	1,056 03	936 18	810 14	760 09	470 14	942 87	718 20	576 87	729 06	2,366 92	11,664 42

CLASSIFICATION of Disbursements of the following Dredges, during the Year ended 30th June, 1882.

H. PRINCE EDWARD.

Items.	July.	August.	Sept.	October.	November.	Dec.	Jan.	Feb.	March.	April.	May.	June.	Grand Totals.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Wages.....	484 50	487 75	472 11	484 50	484 50	117 50	145 00	140 00	147 50	142 50	370 69	360 00	3,866 55
Coal.....	288 30		109 46			93 00							490 76
Stores.....	99 30		151 88								42 41		293 59
Equipment.....			61 44			180 80							242 24
Water.....		22 08	20 00	179 51	10 00					13 20			244 82
Repairs.....	51 84				65 00	49 37					410 79		577 50
Pilotage.....			75 00										75 00
Towage.....		1,200 00	1,070 00		360 00						150 00	250 00	3,030 00
Wharfrage.....			50 00										50 00
Contingencies.....			2 24	15 50							2 45		20 19
Totals.....	923 94	1,709 83	2,012 13	679 54	920 50	470 67	145 00	140 00	147 50	155 70	975 84	610 00	8,890 65
Working Expenses.....	872 10	1,709 83	2,012 13	679 54	854 50	240 50				13 20	565 55	250 00	7,197 35
Repairs, Ordinary.....	51 84				66 00	230 17	145 00	140 00	148 50	142 50	410 29	350 00	1,693 30
Totals.....	923 94	1,709 83	2,012 13	679 54	920 50	470 69	145 00	140 00	147 50	155 70	975 84	610 00	8,890 65

"GEO. MCKENZIE."

Wages	484 50	487 75	484 50	484 50	145 00	147 50	145 00	140 00	147 50	241 00	347 38	3,257 63
Coal	69 45	170 50	170 50	170 50	.....	.....	.....	.....	.....	60 00	60 00	289 96
Stores	51 15	119 12	33 04	33 04	.....	.....	.....	.....	.....	48 58	7 93	269 22
Equipment .....	.....	.....	.....	.....	.....	198 80	.....	.....	.....	.....	.....	198 80
Water	37 63	117 50	22 75	19 25	.....	.....	.....	.....	.....	85 42	39 04	97 13
Repairs	1,450 00	991 23	900 00	182 90	.....	.....	.....	.....	.....	4 00	.....	1,115 69
Towage .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3,079 15
Wharfage .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4 00
Contingencies	22 25	.....	.....	.....	.....	4 91	.....	.....	.....	.....	.....	27 16
Totals	2,114 98	1,496 48	1,696 87	719 69	691 25	351 21	145 00	140 00	147 50	382 00	443 75	8,328 73
Working Expenses	2,114 98	505 25	1,696 87	719 69	691 25	152 41	145 00	140 00	147 50	382 00	404 71	6,285 16
Repairs, Ordinary .....	.....	991 23	.....	.....	.....	198 80	145 00	140 00	.....	.....	39 04	2,043 87
Totals	2,114 98	1,496 48	1,696 87	719 69	691 25	351 21	145 00	140 00	147 50	382 00	443 75	8,328 73

"NIPISSING."

Wares	418 50	411 00	425 94	407 45	289 80	56 00	56 00	53 00	.....	.....	.....	450 88
Coal	1 50	.....	.....	.....	27 9	.....	.....	.....	.....	.....	.....	147 60
Wood	38 38	13 05	.....	103 56	8 43	.....	.....	.....	.....	.....	.....	91 90
Stores .....	.....	.....	.....	64 35	2 89	.....	.....	.....	.....	.....	.....	7 50
Equipment .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	222 47
Repairs	13 95	44 02	.....	128 01	26 60	225 00	.....	.....	.....	571 36	144 37	154 20
Pilotage	60 00	.....	.....	5 00	.....	.....	.....	.....	.....	.....	.....	9 83
Towage	3 02	5 40	11 28	0 85	17 55	.....	.....	.....	.....	.....	.....	56 47
Contingencies .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	10 00
Totals	535 35	473 47	437 23	709 22	430 46	281 09	56 00	53 00	.....	571 35	4,009 07	8,338 84
Working Expenses	521 40	429 45	437 22	681 21	403 86	56 00	56 00	53 00	.....	.....	240 67	3,505 04
Repairs, Ordinary	13 95	44 02	.....	77 73	26 60	.....	.....	.....	.....	.....	93 87	312 64
do Extraordinary .....	.....	.....	.....	50 28	.....	225 00	.....	.....	.....	571 35	3,674 53	4,521 16
Totals	535 35	473 47	437 22	709 22	430 46	281 00	56 00	53 00	.....	571 35	4,009 07	8,338 84

CLASSIFICATION OF Disbursements of the following Dredges, during the Year ended 30th June, 1882.

"QUEEN OF CANADA."

Items.	July.		August.		Sept.		October.		November.		ec.		Jan.		Feb.		March.		April.		May.		June.		Grand Totals.	
	£	cts.	£	cts.	£	cts.	£	cts.	£	cts.	£	cts.	£	cts.	£	cts.	£	cts.	£	cts.	£	cts.	£	cts.	£	cts.
Wages.....	615	19	638	88	638	88	546	55	369	25	56	00	56	00	53	00	309	26	93	35	194	13	442	25	3,667	98
Coal.....	32	50	80	54	64	63	147	68	21	88	39	77	57	71	5	95	309	26	5	95	57	80	7	65	224	43
Wood.....	22	00	10	30	14	05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Stores.....	39	91	20	74	79	84	2	18	57	71	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Equipment.....	12	75	20	74	79	84	2	18	57	71	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Repairs.....	40	00	121	50	121	50	424	10	25	00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Towage.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Contingencies.....	.....	.....	10	85	.....	.....	.....	.....	5	00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Totals.....	762	35	729	16	918	90	1,120	49	708	61	56	00	56	00	53	00	309	26	889	12	1,509	50	785	74	7,898	13
Working Expenses.	749	60	708	42	839	06	1,118	31	650	90	56	06	56	00	53	00	.....	.....	99	30	531	33	681	75	5,543	67
Repairs, Ordinary...	12	75	20	74	79	84	2	18	57	71	.....	.....	.....	.....	.....	.....	.....	.....	46	63	10	70	103	99	334	54
do Extraordinary.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	743	19	967	47	.....	.....	2,019	92
Totals.....	762	35	729	16	918	90	1,120	49	708	61	56	00	56	00	53	00	309	26	889	12	1,509	50	785	74	7,898	13

"CHALLENGE."

Wages.....	293	55	398	70	322	00	319	04	260	35	40	00	48	00	106	25	107	50	156	83	248	08	340	00	2,640	30
Coal.....	101	00	155	50	158	25	143	81	33	00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	24	01	2	63	160	64
Wood.....	111	06	125	55	128	33	116	08	85	68	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	45	50	195	06	758	06
Provisions.....	25	86	9	05	27	53	17	40	17	40	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	32	76	121	50	719	96
Stores.....	2	50	46	15	39	15	20	92	200	33	70	00	.....	.....	.....	.....	.....	.....	.....	.....	90	37	37	48	225	19
Repairs.....	415	00	.....	.....	418	00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Towage.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Contingencies.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Totals.....	978	97	734	95	1,065	73	639	70	656	76	110	00	86	00	106	25	107	50	1,043	79	461	94	3,178	64	9,170	23
Working Expenses.	976	47	688	80	1,026	58	618	78	456	43	40	00	86	00	106	25	107	50	188	48	461	94	698	89	5,456	12
Repairs, Ordinary...	2	50	46	15	39	15	20	92	200	33	70	00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
do Extraordinary.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Totals.....	978	97	734	95	1,065	73	639	70	656	76	110	00	86	00	106	25	107	50	1,043	79	461	94	3,178	64	9,170	23

"ST. LAWRENCE."

DESCRIPTION OF MATERIAL DREDGED.	July.	August.	Septemb'r	October.	November.	Dec'ber.	Jan'y.	Feb'y.	March.	April.	May.	June.	Grand Totals.
Gravel			1,838	2,800	1,487								C. yds. 6,125
Clay													1,759
Clay and Stone			1,839	2,800	1,487								6,126
Sand—ordinary	9,625	7,175	2,185	2,800	1,488					963	525	3,062	27,823
Mud			1,838	2,800	1,488					962	1,400		8,488
Totals	9,625	7,175	7,700	11,200	5,950					1,925	3,325	3,412	50,312

"CANADA."

Hard-pal													360
Gravel													360
Clay	3,780	800				180	1,440	1,980	2,700				11,070
Clay and Stone	315												315
Sand—ordinary	315	810	2,880	4,500	3,960	270						90	900
Mud		3,150											15,075
Totals	4,410	4,950	2,880	4,500	3,960	450	1,440	1,980	2,700			810	28,080

CLASSIFICATION AND QUANTITIES OF MATERIALS REMOVED BY THE FOLLOWING DREDGES, DURING THE YEAR ENDED 30th JUNE, 1882—Continued.

"NEW DOMINION."

DESCRIPTION OF MATERIAL DREDGED.	July.	August.	September.	October.	November.	December.	Jan'y.	Feb'y.	March.	April.	May.	June.	Grand Totals.
Clay.....			13,255	4,410									C. Yds. 17,665
Sand—ordinary.....				6,740	2,205								7,945
Mud.....	7,735	13,790	45										21,570
Totals.....	7,735	13,790	13,300	10,150	2,205								47,180

"CAPE BRETON."

Gravel.....	5,410												5,410
Sand—ordinary.....	2,400												2,400
do very fine.....		4,815	3,625	2,308									10,748
Mud.....		1,030	1,690	2,308							455	6,870	12,352
Totals.....	7,810	5,845	5,315	4,615							455	6,870	30,910

"PRINCE EDWARD."

Hard-pan.....	1,800			90									1,890
Clay.....	450		1,410	1,470									3,330
Sand—ordinary.....	6,540	1,620		45	360							3,450	13,613
Mud.....	1,980	7,820	9,390	2,220	3,420							1,985	28,492
Totals.....	10,770	9,540	10,800	3,825	3,780							3,195	47,325

CLASSIFICATION AND QUANTITIES OF MATERIALS REMOVED BY THE FOLLOWING DREDGES, DURING THE YEAR ENDED 30th JUNE, 1882—Continued.

"CHALLENGE."

DESCRIPTION OF MATERIAL DREDGED.	July.	August.	Septemb'r	October.	November.	Dec'ber.	Jan'y.	Feb'y.	March.	April.	May.	June.	Grand Totals.
Boulders			561	3,364	580						180	2,050	C. yds. 6,985
Gravel			4,263	3,451	609						150	2,200	10,873
Clay	4,930	15,312	1,740	608	261							1,450	24,302
Clay and Stone	348											1,450	4,888
Sand—ordinary	1,450												1,450
do very fine		928	348	406								2,450	3,204
Mud	1,102												2,030
Totals	7,830	16,240	6,902	9,222	3,318						300	9,600	53,342

"THE DREDGER"—(British Columbia.)

Hard Clay							1,404	2,160	2,844				6,408
Sand									720	360			1,080
Clay and Sand									756	972			1,728
Gravel and Boulders										864			864
Coal and Sand										1,224			1,224
Coal and Shingle										504			504
Sand and Shingle											5,282		10,548
Totals							1,404	2,160	4,320	3,924	5,282	5,282	23,356

Working Expenses \$7,459 72 Quantity dredged 22,356 cubic yards.
 Repairs 3,372 98 Cost per yard 48 1/2 cents.

Total \$10,832 70

EXPENDITURE for dredging in Prince Edward Island, from 1st July 1873, to 30th June, 1892.

COUNTY.	LOCALITY.	Total for the nine years ended 30th June, 1881.			For the Year 1881-82.			Total Cost.	Total Quantity.	Cost for each County.
		Quantity.	Cost.	Cost for County.	Quantity.	Cost.	Cost for County.			
		C. yds.	\$ cts.	\$ cts.	C. yds.	\$ cts.	\$ cts.			
King's	Grand River.....	46,110	8,963 97	26,083 40	.....	.....	8,963 97	46,110	.....
	Montague River.....	106,140	17,119 43	.....	.....	.....	17,119 43	106,140	.....
	Murray Harbour.....	.....	.....	.....	5,415	1,070 59	1,070 59	5,415	27,163 99
Queen's	Charlottetown Railway Wharf.	41,303	10,264 56	.....	.....	.....	.....	41,303	10,264 56
	do Ferry.....	300	43 48	.....	.....	.....	.....	300	43 48
	Crepand.....	62,980	16,583 23	.....	12,990	2,688 23	.....	76,970	19,151 46
	Pownal.....	41,970	9,197 62	.....	.....	.....	.....	41,970	9,197 62
	Rocky Point Ferry.....	21,360	3,066 29	.....	.....	.....	.....	21,360	3,066 29
	Vernon River.....	17,860	6,326 72	.....	.....	.....	.....	17,860	6,326 72
	Wood Islands.....	2,780	548 00	.....	.....	.....	.....	2,780	548 00
	Nine Mile Creek.....	9,750	1,968 63	.....	21,900	4,329 83	.....	31,650	6,286 46
	Hickey's Wharf.....	750	150 51	.....	.....	.....	.....	750	150 51
	Carr's Point.....	12,165	2,441 28	.....	.....	.....	.....	12,165	2,441 28
	Pinette.....	.....	.....	.....	3,625	756 24	.....	3,625	756 24
	Fort Augustus.....	.....	.....	.....	3,195	631 68	.....	3,195	631 68
		363,468	76,691 72	76,691 72	47,325	9,356 57	9,356 57	417,793	86,048 29	

EXPENDITURE for dredging in Quebec for the ten years ended 30th June, 1882, from Appropriations for Maritime Provinces.

Magdalen Islands,	.....	.....	.....	.....	.....	.....	.....	.....	.....
Co. Gaspé.....	House Harbour.....	6,800	2,392 92	.....	Nil.	.....	.....	6,800	2,392 92
	Amherst Harbour.....	495	242 06	2,634 97	Nil.	.....	.....	495	242 06
Temiscouata.....	River du Loup.....	2,587½	825 47	825 47	Nil.	.....	.....	2,587½	825 47
		9,882½	3,460 44	3,460 44	.....	.....	.....	9,882½	3,460 44

EXPENDITURE for dredging in Nova Scotia for the Ten Years ended 30th June 1882.

County.	Locality.	Total for nine years ended 30th June, 1881.			For the Year 1881-82.			Total Quantity.	Total Cost.	Cost for each Country.
		Quantity.	Cost.	Cost for County.	Quantity.	Cost.	Cost for County.			
		C. yds.	\$ cts.	\$ cts.	C. yds.	\$ cts.	\$ cts.			
Antigonish.	Antigonish.....	22,025	3,649 15	.....	.....	.....	22,025	3,649 15	.....
	Havre au Bouche.....	10,668	2,498 48	.....	.....	.....	10,668	2,498 48	.....
	Tracadie.....	2,580	675 26	6,822 89	.....	.....	2,580	675 26	6,822 89
Cape Breton	Lingan.....	22,267	9,275 56	.....	.....	.....	22,267	9,275 56	.....
	Sydney.....	50,100	10,668 91	.....	24,870	7,122 63	54,600	17,761 54	.....
	Little Glace Bay.....	13,387½	3,488 67	23 418 14	4,375	1,271 89	17,762½	4,755 58	.....
	Port Caledonia.....	.....	.....	.....	4,637½	1,348 20	4,637½	1,348 20	33,160 86
Colchester.....	Tatamagouche.....	17,130	3,323 77	3,323 77	6,870	2,095 05	24,000	5,418 82	5,418 82	
Cumberland.	Parrashoro'.....	18,305	5,304 88	.....	10,640	2,500 00	28 915	7,804 68	.....
	Wallace.....	50,885	9,908 28	15,212 96	.....	.....	50,885	9,908 28	17,712 96
Guysboro.	Guysboro'.....	5,400	1,413 53	.....	.....	.....	5,400	1,413 53	.....
	Larry's River.....	26, 30	6,518 70	.....	.....	.....	26,230	6,546 70	.....
	Port Mulgrave.....	2,160	783 00	8,742 23	.....	.....	2,160	783 00	.....
	Sherbrooke.....	.....	.....	.....	810	354 10	810	354 10	9,096 33
Halifax.....	Chezetcook.....	3,920	2,593 71	.....	.....	.....	3,920	2,593 71	.....
	Halifax.....	6,177	2,063 38	.....	.....	.....	6,177	2,063 38	.....
	Herring Cove.....	12,111	8,015 05	.....	.....	.....	12,111	8,015 05	.....
	Ketch Harbor.....	2 989	985 59	.....	.....	.....	2,989	985 59	.....
	Roche's Wharf.....	1,760	629 28	14,278 01	.....	.....	1,760	629 28	14,278 01
Inverness.....	Cheticamp.....	54,135	11,731 08	.....	.....	.....	54,135	11,731 08	.....
	Mabou.....	1,168	468 50	12,199 58	12,724	8,765 19	13,892	9,233 69	20,964 77	
Lunenburg.	Lunenburg.....	29,070	10,849 86	.....	.....	.....	29,070	10,849 86	.....
	Mahone Bay.....	21,844	6,968 65	16,808 31	.....	.....	21,844	6,968 65	.....
	Voglers Cove.....	.....	.....	.....	11,610	5,075 53	11,610	5,075 53	21,883 84
Pictou.....	Acadia Coal Co. Wharf.....	7,000	2,535 00	.....	.....	.....	7,000	2,535 00	.....
	Albion Mines.....	9,475	2,181 25	.....	.....	.....	9,475	2,181 25	.....

East River.....	86,670	19,669 53					19,669 53	
Halifax Coal Co. Wharf.....	1,660	359 90					359 90	
Pictou Public Wharf.....	7,020	1,726 72					1,726 72	
do Railway Wharf.....	29,889	9,264 29					9,264 29	
do Landing.....	2,970	1,366 92					1,366 92	
Vale Colliery Wharf.....	1,365	682 15					682 15	
River John, ship yard.....	59,707	12,932 70		18,630	5,681 32		18,614 02	
do Bar.....	3,330	986 39					986 39	
Middle River Coal Wharf.....	20,900	4,055 29		5,410	1,649 80		5,705 09	62,991 26
New Glasgow.....	12,940	4,762 38					4,762 38	4,762 38
Queens.....								
Richmond.....	7,000	2,535 20					2,535 20	
St. Peter's Canal.....	72,616	22,164 76					22,164 76	24,699 96
Shelburne.....	20,825	6,334 85					6,334 85	6,331 85
Yarmouth.....	42,517	13,687 25					13,687 25	13,687 25
Hants.....	5,450	1,477 60			150 00		1,627 60	1,627 60
	747,755½	207,428 07		100,206½	36,013 71		847,962	243,441 78

EXPENDITURE for dredging in New Brunswick for the Ten Years ended 30th June, 1882.

County.	Locality.	Total for the Nine Years ended 30th June, 1881.		For the Year 1881-82.		Total Quantity.	Total Cost.	Cost for each County.
		Quantity.	Cost.	Quantity.	Cost.			
		C. yds.	\$ cts.	C. yds.	\$ cts.			
Gloucester	Bathurst, Seal Bar..... } do Ballast Bar..... }	72,607½	20,629 52	.....	.....	72,607½	20,629 52	20,629 52
Kent.....	Richibucto.....	47,735	14,299 54	.....	.....	47,735	14,299 54	.....
	Buctouche.....	5,445	1,629 24	.....	.....	5,445	1,629 24	.....
	Buctouche Bar.....	.....	.....	7,560	3,205 00	7,560	3,205 00	.....
	Cocagne.....	.....	.....	1,800	786 90	1,800	786 90	20,020 88
Northumberland ...	Horse Shoe Shoal, Miramichi...	136,967½	37,410 14	16,800	4,884 09	153,767½	42,294 23	42,294 23
Queens.....	Grand Lake.....	34,160	6,375 44	.....	.....	34,160	6,375 44	.....
	Jamseg.....	45,720	10,256 88	.....	.....	47,520	10,256 88	.....
	Washademoak.....	46,975	6,340 83	.....	.....	46,975	6,340 83	.....
St. John.....	St. John, I. C. R. terminus.....	139,810	37,130 01	.....	.....	139,810	37,130 01	.....
	do Navy Island.....	.....	.....	6,300	2,754 17	6,300	2,754 17	.....
	Marble Cove.....	.....	.....	29,925	4,374 40	29,925	4,374 40	.....
	Barnhill and Murray .....	.....	.....	9,310	1,360 93	9,310	1,360 93	45,619 51
Sunbury.....	Oromocto.....	99,088	21,509 74	7,945	1,161 38	107,003	22,671 12	22,671 12
Westmoreland	Pointe du Chêne.....	3,240	796 94	.....	.....	3,240	796 94	796 94
York.....	Fredericton.....	39,395	7,699 15	.....	.....	39,395	7,699 15	7,699 15
•Dredge "New Dominion" .....	.....	.....	777 84	.....	.....	.....	777 84	777 84
	.....	673,113	164,855 27	79,640	18,626 87	753,753	183,482 14	183,482 14

• Dredge not in commission 1880-81; the above expenses for caretaking and repairs.

DETAILS of Dredging in Quebec and Ontario, during the Year ended 30th June, 1893.

[1882]

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Dredge.	Locality.	County.	Province.	Quantity.	Total Quantity.	Total Cost.	Cost per Cubic yard.
					C. yds.	\$ cts.	Cents.
" Nipissing "	Berthier en haut.....	Berthier.....	Quebec.....	225	} 28,237	} 8,338 84	} 29½
	St. Ours.....	Richelieu.....	do	9,360			
	Charlemagne.....	L'Assomption.....	do	15,675			
	St. Placide.....	Two Mountains.....	do	3,037			
" Queen of Canada "	Beauharnois.....	Beauharnois.....	Quebec.....	3,650	} 24,475	} 7,668 13	} 33½
	Rigaud.....	Vaudreuil.....	do	15,400			
	Gatineau.....	Ottawa.....	do	3,700			
	Laprairie.....	Laprairie.....	do	1,725			
" Challenge "	Port Albert.....	Huron.....	Ontario.....	3,422	} 53,342	} 9,170 23	} 17½
	Bruce Mines.....	Algoma.....	do	22,368			
	Goderich.....	Bruce.....	do	27,552			

DETAILS of Dredging in the Maritime Provinces

Dredge.	Locality.	County.	NEW BRUNSWICK.		
			Quantity.	Cost.	Total Cost.
			C. yds.	\$ cts.	\$ cts.
" New Dominion "	Marble Cove.....	St. John.....	27,925	4,374 40	.....
	Barnhill and Murrays.....	do.....	9,310	1,380 93	.....
	Oromocto Shoals.....	Sunbury.....	7,945	1,161 38	6,896 71
" Canada "	Buctouche Bar.....	Kent.....	7,560	3,365 00	.....
	Cocagne.....	do.....	1,800	788 90	.....
	Voglers Cove.....	Lunenburg.....	.....	.....	.....
	Navy Island, St. John.....	St. John.....	6,300	2,754 17	6,846 07
	Sherbrooke.....	Guysboro'.....	.....	.....	.....
" Cape Breton "	New Glasgow.....	Pictou.....	.....	.....	.....
	River John.....	do.....	.....	.....	.....
	Tatamagouche.....	Colchester.....	.....	.....	.....
" Prince Edward "	Crapaud.....	Queens.....	.....	.....	.....
	Nine Mile Creek.....	do.....	.....	.....	.....
	Pinette.....	do.....	.....	.....	.....
	Fort Augustus, East River ...	do.....	.....	.....	.....
	Murray Harbor, South Kings.	Kings.....	.....	.....	.....
" St. Lawrence "	Horse Shoe Shoal.....	Northumberland ...	16,800	4,884 09	4,884 09
	Port Caledonia.....	Cape Breton.....	.....	.....	.....
	Sydney, C.B.....	do.....	.....	.....	.....
	Little Glace Bay.....	do.....	.....	.....	.....
" Geo. McKenzie "	Mabou.....	Inverness, C.B.....	.....	.....	.....
By hand.....	Partridge Island River.....	Cumberland.....	.....	.....	.....
do.....	Windsor.....	Hants.....	.....	.....	.....
			79,640	.....	18,626 87

Dredge.	NEW BRUNSWICK.		NOVA SCOTIA.	
	Quantity.	Cost.	Quantity.	Cost.
	C. yds.	\$ cts.	C. yds.	\$ cts.
" New Dominion "	47,180	6,896 71	.....	.....
" Canada "	15,660	6,846 07	12,420	5,429 63
" Cape Breton "	.....	.....	30,910	9,426 17
" Prince Edward "	.....	.....	.....	.....
" St. Lawrence "	16,800	4,884 09	33,512½	9,742 72
" Geo. McKenzie "	.....	.....	12,724	8,765 19
	79,640	18,626 87	89,666½	33,363 71

for the Year ended 30th June, 1882.

NOVA SCOTIA.			PRINCE EDWARD ISLAND.			Quantity by each Dredge.	Total Cost.
Quantity.	Cost.	Total Cost.	Quantity.	Cost.	Total Cost.		
C. yds.	\$ cts.	\$ cts.	C. yds.	\$ cts.	\$ cts.	C. yds.	\$ cts.
						47,180	6,896 71
11,610	5,075 63						
810	354 10	5,429 63				28,080	12,275 70
5,410	1,649 80						
18,630	5,681 32						
6,870	2,095 05	9,426 17				30,910	9,426 17
			12,990	2,568 23			
			21,900	4,329 83			
			3,825	756 24			
			3,195	631 68			
			5,415	1,070 69	9,356 57	47,325	9,356 57
4,637½	1,348 20						
24,500	7,122 63						
4,375	1,271 89	9,742 72				50,312½	14,626 81
12,724	8,765 19	8,765 19				12,724	8,765 19
10,640	2,500 00					10,640	2,500 00
	150 00	2,650 00					150 00
100,206½		36,013 71	47,325		9,356 57	227,171½	63,997 15

PRINCE EDWARD ISLAND.		Total Quantity.	Expenditure Dredging.	Superintendence.	Total Expenditure.	Cost per Cubic yard.
Quantity.	Cost.					
C. yds.	\$ cts.	C. yds.	\$ cts.	\$ cts.	\$ cts.	Cents.
		47,180	6,553 28	343 43	6,896 71	14·6178
		28,080	11,664 42	611 28	12,275 70	43·7169
		30,910	8,956 79	469 38	9,426 17	30·4955
		47,325	8,890 65	465 92	9,356 57	19·7706
		50,312½	13,898 45	728 36	14,626 81	29·0719
		12,724	8,328 73	436 46	8,765 19	68·8870
47,325	9,356 57	216,531½	58,292 32	3,054 83	61,347 15	28·3317

STATEMENT of Dredging in the Maritime Provinces, showing quantities removed by and expenditure of each Dredge for the Ten Years ended 30th June, 1882.

Dredge.	Total quantities and cost for the Nine Years from 1872-3 to 1880-81.			1881-82.			Total for Ten Years ended 30th June, 1882.		
	Total Quantity.	Total Cost.	Per cubic yard.	Quantity.	Cost.	Per cubic yard.	Quantity.	Cost.	Cost per cubic yard.
	C. yds.	\$ cts	Cents.	C. yds.	\$ cts.	Cents.	C. yds.	\$ cts.	Cents.
" New Dominion "	347,318	71,200 19	0-20 500	47,180	6,896 71	0-14 6178	394,498	78,096 90	0-19 7965
" Canada "	279,674	91,455 12	0-32 700	28,680	12,275 70	0-43 7169	307,754	103,730 82	0-33 7057
" Cape Breton "	335,278	77,619 86	0-23 121	30,910	9,428 17	0-30 4855	366,188	87,046 03	0-23 7708
" Prince Edward "	363,473	76,691 72	0-21 099	47,325	9,356 57	0-19 7706	410,798	86,048 29	0-20 9466
" St. Lawrence "	319,879	92,559 18	0-28 935	50,312½	14,626 81	0-29 0719	370,191½	107,185 99	0-28 9545
" Geo. McKenzie "	124,847	36,124 20	0-28 934	12,724	8,765 19	0-68 8870	137,571	44,869 39	0-32 6399
	1,770,469	445,650 27	0-25 171	216,531½	61,317 15	0-28 3317.	1,987,000½	506,997 42	0-25 5157

PERCÉ.

REPORT ON PROPOSED BREAKWATER.

CHIEF ENGINEER'S OFFICE

Ref. No. 3558.

OTTAWA, 7th February, 1882.

SIR,—At the last session of Parliament the sum of \$500 was appropriated for an examination and survey at Percé, Gaspé. I have now to report that this duty was performed by Mr. Charles F. Roy, C.E., and herewith, for the information of the Hon. the Minister, I transmit his report thereon, together with a copy of the plan prepared by him.

Mr. Roy proposes the construction of three isolated breakwaters having a collective length of 1600 ft. so placed as to permit a free entrance to boats and vessels, and at the same time to shelter them from all easterly winds, and he places the cost of the works so proposed at \$60,900. He, however, states that sections Nos. 1 and 2 might prove to be sufficient without the construction of No. 3, and if so that the sum of \$39,000 would be required to defray their cost.

On examining the details of the estimate furnished by Mr. Roy, I find that he has omitted the iron required for these works, which of itself is no inconsiderable item.

The designs for the works proposed show breakwaters composed of cribwork filled with stone with a deposit or *talus* of stone around the seaward sides and ends of each, placed at a slope of 2 to 1.

From the experience gained at the breakwater at Negro Point, St. John Harbor, it was found that the stone placed at this slope on its seaward side did not stand the effects of the sea, but was washed down to from 4 to 6 to 1, and to maintain a slope at Percé where the seas are as heavy, if not heavier than at St. John, it will be necessary to place at least three times the quantity of stone calculated as sufficient by Mr. Roy.

With these additions I make the cost of the proposed works at Percé as follows :

Section No. 1.....	\$38,300
“ “ 2.....	15,650
“ “ 3.....	34,850
Add for superintendence.....	8,200
Total.....	\$97,000

I have the honor to be, Sir,
Your obedient servant.

HENRY F. PERLEY,
Chief Engineer.

F. H. ENNIS, Esq.,
Secretary, Department Public Works.

(Translation.)

ST. ANNE, 20th December, 1881.

SIR,—For your information and for that of the Hon. the Minister, I have the honor to enclose my report upon the construction of a breakwater in Percé Bay applied for, for the protection of fishing boats.

I have the honor to be, Sir,
Your obedient servant,

CHAS. F. ROY.

HENRY F. PERLEY, Esq., Ottawa.

REPORT.

BREAKWATER IN PERCÉ BAY, QUE.

The construction of a breakwater in Percé Bay is a matter which has been under consideration for some years. The extent of the damage of every description caused by storms which are frequent in this region, have been repeatedly pointed out to the authorities.

Percé Bay presents an opening of 125° to winds blowing from the N. N. E. and veering east and south. Easterly winds are the most common and are those of which the effects are most dreaded.

The object sought to be attained is the creation in the Bay of Percé of an adequate and secure shelter by means of sea works for the protection of fishing boats, their power of resistance to be sufficient and the cost to be moderate. The unfavorable aspect of the coast, the inequalities of the bottom and the great depth of water in certain parts of the bay greatly increase the difficulty of the problem to be solved.

In October last I received instructions to proceed to the spot and continue the work begun in 1879, make further examinations and prepare a final report on the subject. During my journey I paid special attention to availing myself to the utmost of the information which I drew from the most reliable sources and to taking advantage of the knowledge and experience of practical residents of the locality.

From all the examinations made and all the information acquired it appears the construction of a breakwater in Percé Bay, to be practically useful and sufficiently solid will entail a relatively large expenditure. The plan now submitted for that your consideration is with that view.

This plan comprises the construction of three distinct piers or blocks, having an aggregate length of 1600 feet, placed as shewn thereon. The area sheltered by the breakwater so constructed would be easy of access at all times, and would provide complete shelter for more than 300 boats, for which there would be room at the same time.

The piers might be constructed in succession, from year to year and in the order shewn by the distinguishing numbers. The necessary timber can be obtained in great part from the adjacent forests, and stone for ballast and for the protection of the wood-work is obtainable close by.

There is reason to hope that the shelter afforded by the construction of the first two piers or blocks would so far suffice as to make the construction of the third (No. 3) not indispensable. Confined to these bounds the cost of the work would probably amount to \$38,824.50.

Otherwise the entire outlay to be incurred for the completion of the three piers or blocks, which form part of the plan submitted, as shewn, and for the protection of the woodwork and cribwork from the action of the waves by adequate stone work on the outside, cannot be estimated at less than \$60,900.00.

CHAS F. ROY,
Civil Engineer.

St. Anne, 20th December, 1881.

 REPORT ON TORONTO HARBOUR, ONTARIO,

 BY JAMES B. EADS, C.E.

SIR,—I have the honor to submit the following Report upon the Harbour of Toronto.

Before making a personal inspection of the harbour, I expressed the wish that I should be furnished with such information relating to it as would be useful in a study of the questions upon which my advice was required. In response to this request I have received a compilation of the available records touching the harbour, entitled: "Memorandum with accompanying plans and documents relating to the past and present state of the Harbour of Toronto," and at the same time I received the following letter:

No. 6532, Subj. 13.

" DEPARTMENT OF PUBLIC WORKS, CANADA,
OTTAWA, 19th April, 1881.

" SIR,—The preparation of the information you desired to have relative to the Harbour of Toronto prior to the examination you are to make having been completed, I now enclose the same in pamphlet form, and am directed by the Honorable the Minister to request you to proceed with such examination at your earliest convenience.

" There are two points which will demand your serious consideration:—

" 1st. The western entrance—its proper width and depth, and the means to be adopted to maintain both, as well as to restrain or prevent the growth of the island shoal northwardly and westwardly either by works erected at the entrance or from the island, or both.

" 2d. The eastern entrance,—whether it is desirable that it should remain open; if so, the means to be adopted for its maintenance to an ample width and to a depth equal to that of the western entrance. If it should be closed, the manner in which this should be accomplished and its future maintenance provided for.

" You will be kind enough to report fully on these points, as well as on all others having a bearing on the preservation or improvement of the harbour which may be brought to your notice during your examination, such report to be accompanied by plans and estimates of the cost, and such suggestions as you may be pleased to make.

" Although your attention is called to certain points for investigation, it is the wish of the Minister that your report shall be full and comprehensive and embrace every thing which may have a bearing on the object of your enquiry.

" You will please notify the Chief Engineer when you propose visiting Toronto.

" I have the honor to be, Sir, your obedient servant,

(Signed)

" F. H. ENNIS, Secretary."

The Memorandum and its appendices contain a mass of important information upon the subject in hand, which will be found very useful in forming a correct judgment as to the merits of any system of works which has been or which may be suggested for the benefit of the harbour. But as the careful examination of these facts *in extenso* may be inconvenient when this report is under consideration, and as they constitute a part of the evidence by which I have been guided, I think it proper to append to this report a copy of the Memorandum, as it contains in a compact form the gist of the information which is embodied in the entire volume.

During the latter part of last June, I visited the City of Toronto and met the Chief Engineer, Mr. Henry F. Perley, there by appointment. Through his courtesy, I was provided with every facility necessary to enable me to make such an inspection of the harbour and its vicinity, as I desired. During my examination I

was accompanied by the Chief Engineer, and by Mr. Kivas Tully, Engineer of the Harbour, and from these gentlemen I obtained, verbally, much useful information. Mr. Tully's knowledge of the harbour is the result of many years of close and intelligent observation of its phenomena, while residing in Toronto. During my visit I made as thorough an inspection of the harbour as I desired, and fully informed myself as to the causes which in my opinion have produced its deterioration.

As no instrumental survey of the harbour had been made since 1879, and as an accurate knowledge of the most recent changes in it was important, not only in arriving at a correct solution of the problem, but also in making an accurate estimate of the cost of the works needed for its improvement, I requested that another survey should be made with especial reference to the changes which had occurred in its two entrances, where works of improvement would probably be located. This survey the Chief Engineer caused to be made during last July and August, and I have been furnished with the results. I am therefore in possession of all of the information requisite for an intelligent and thorough study of the subject. This study I have made and I trust that I shall succeed in presenting to the Dominion Government, in as convincing a light as they are presented to my own mind, the several reasons that have induced me to make the recommendations herewith submitted. To aid me in this part of my task, I desire to impress on the memory of the reader, each one of the three facts presently named, which appear to me to be the most important phenomena in the consideration of the very novel problem presented by the Harbour of Toronto.

First. There has been for nearly a century a constant growth of the northern end of the peninsula in the direction of the Queen's Wharf.

Second. Although this extension has diminished the *width* and *depth* through the entrance or throat of the harbor, it has not materially altered the *distance* which existed sixty-three years ago between the water immediately inside of the harbour and that near the entrance on the outside of it.

Third. While the crest of the extremity of the peninsula has advanced about 1,700 feet to the west in the last sixty-three years, its submerged face on that side has greatly receded, and the deep water of the lake along its western shore has proportionately moved to the east, thereby resulting in a much steeper slope on this side of the peninsula, to the depth of at least 18 feet, than it had in 1818.

These three facts are so important that the proof of each one in order, is herewith submitted.

In proof of the *first*, we learn that in 1788, Mr. J. Collins, Deputy Surveyor-General, reported the navigable channel for vessels to be 1,500 feet wide and from 18 to 20 feet deep. The waters of the lake at the time were as he says very high. The survey of Bouchette, 5 years later, shows only 15 feet as the maximum depth and a channel 480 yards wide. Much of this difference in the maximum depth and width and that reported by Collins, was doubtless due to the different level to which Bouchette referred his measurements.

In the very interesting and instructive competitive report of Mr. Sandford Fleming, C. E., (page 64 of the appendix to Memorandum) we find the following statement:

"On comparing the charts of Bouchette, Bayfield, and Bonnycastle, with my own from a recent survey (in 1850) showing the state of the peninsula at the present time, we obtain results as follows:

"First—That the channel between ten (10) feet water lines was, in

- " 1796, about 480 yards wide,
- " 1828, about 310 yards wide,
- " 1835, about 260 yards wide,
- " 1850, about 120 yards wide."

This comparison is entitled to much confidence, for the reason that it was evidently made by a careful and intelligent engineer, who had within reach at

Toronto at that time, the necessary data to determine the difference in the lake levels to which these several surveys were referred, and without which information no very accurate comparison of these surveys could have been made.

From these comparisons, and from his estimates, Mr. Fleming arrived at the conclusion, that the northward growth of the peninsula reduced the width of the channel at the rate of from seven to ten yards annually, and that this required a deposit of about 11,000 cubic yards each year. The annual growth during the years embraced by this comparison is shown to be remarkably constant and regular.

On the 11th of April of this year, as appears by the chart of comparative surveys from 1875 to 1879, inclusive, the width between the Queen's wharf and the ten-foot contour line on the peninsula was only about 225 feet, and much of this width is, no doubt, due to dredging.

The *second fact* is shown by a comparison of Mr. Fleming's survey of 1850, with the most recent one made this year. The 15 feet inside and outside contour-lines on the latest survey, measured across the end of the peninsula where they approached each other most nearly, are about 2,400 feet apart.

In comparing the latest contours with the 15-foot contours of Mr. Fleming, it should be observed that there are two 15-foot soundings on his chart in the bight of the outer curve which are not embraced by it. If the curve were drawn through the outer one of these, which it might be with equal propriety, the line would be moved out about 420 feet. The distance would then be about 2,200 feet between the two 15-foot contours on Mr. Fleming's chart, if measured over the line of least distance between the same contours on the survey of 1881. This line crosses the end of the peninsula about 1,350 feet from the end of the Queen's wharf. On a line nearer to the Queen's wharf the distance between them on Mr. Fleming's chart is only about 1,800 feet. The lesser distances between these contours on Mr. Fleming's survey are owing to the higher datum plane from which the depths were measured. He says (p. 69, Memorandum and Appendix) that his report was "chiefly founded on a very laborious and expensive survey between August, 1849, and the spring of 1850." With regard to the datum level, he says:

"These soundings amount to between two and three thousand, and are reduced to an approximate mean level of Lake Ontario, ascertained in conjunction with Captain Lefroy from a series of lake levels taken by his direction during several years."

This level is, I believe, about one foot and a half higher than the present datum established by the late Captain Hugh Richardson in 1850. The hydrographic diagram of Mr. Kivas Tully shows the mean level of the lake during twenty-five years ending in 1879 to have been 18.20 inches above the present datum plane.

No material difference is observable between the last survey and that made by Mr. Fleming thirty years ago in the width of the shoal between the 15-foot contours at the locality named, when the discrepancies I have alluded to are duly considered. That this distance has not appreciably altered in the last six years admits of no question, when the survey of 1875 is compared with that of 1881.

In still further proof, it is proper to quote the following from the report of Mr. William Kingsford, engineer in charge, dated July 7th, 1875, who seems to have been a close observer of the changes in the harbor and its entrances. He says (page 110, Memorandum and Appendix): "The eastern spit of land which protects the harbor is formed of sand, much of which is frequently in motion. It has been asserted that, carried away from the original place of deposit, it finds its way into the harbour. The examination of last year proves that such is not the case. There is no less depth of water to-day in the inner harbour than is shown on the map of the first survey made by Bouchette in 1785."

The proof of the *third fact* referred to, will appear by making the following comparison of Bayfield's survey with the survey of 1881. Draw a line upon each from the light-house to the centre of the Queen's wharf, and from points on this line

measure, perpendicularly to it, the distance to the 2, 4, 10, 15, and 18-foot soundings shown on Bayfield's chart near the central part of the western face of the peninsula; and compare those depths with the depths at the same places on the chart of 1881.

First. At a point on the line 4,500 feet from the light-house we find it is about 1,900 feet to the most southerly one of the two-foot soundings. At this place on the survey of 1881, the depth is now 13 feet greater.

Second. At a point on the line 5,600 feet from the light-house it is 1,500 feet to the next two-foot sounding on the Bayfield chart. At this place the depth is now 6 feet greater.*

Third. At a point on the line on the Bayfield survey 4,000 feet from the light-house it is 1,400 feet to the southern four-foot sounding. The depth here is now 2·7 feet greater.

Fourth. At a point on the line 4,300 feet from the light-house it is 1,200 feet to the other four-foot sounding. The depth at this place is now $1\frac{1}{2}$ feet greater.

Fifth. At a point 4,750 feet from the light-house it is 2,000 feet to the ten-foot sounding on Bayfield's chart. At this place the depth is now 9 feet greater. The ten-foot contour here has receded 400 feet.

Sixth. At a point on the line 5,000 feet from the light-house it is 2,000 feet to the fifteen-foot sounding of Captain Bayfield. At the same place the present depth is 4 feet greater. The fifteen-foot contour has receded here about 200 feet.

Seventh. At a point on the line 5,200 feet from the light-house it is 2,050 feet to the eighteen-foot sounding on Bayfield's chart. The present depth here is about 2 feet greater.

These comparisons are sufficient to show that the five-foot contour line about the middle of the western face of the peninsula is at very nearly the same place now that it was sixty-three years ago, while the contours between five feet and eighteen feet have greatly receded.

A further comparison of Captain Bayfield's survey with that of 1881, will prove by similar measurements that the dry crest of the northern end of the peninsula has not only advanced to the north, but has likewise advanced to the westward about 1,700 feet from the end of the sand spit shown on Capt. Bayfield's chart, by which the western face of the peninsula above the five-foot contour line has been much steepened by a movement precisely the converse of that which has steepened it below that depth. The sand which constituted the bottom beyond the present five-foot contour line in 1818 out to the depth of eighteen feet, has evidently been transported by the action of the waves up to the northward and on to that part of the western face of the peninsula which is now above the present five-foot contour. This process has greatly steepened the western face of the peninsula without really advancing it lakeward.

If comparisons be made further southward on the face of the peninsula, the change wrought by wave action in this direction will be still more marked. For instance at a point on the line from the Queen's wharf to the light-house, 2,600 feet from the latter, the Bayfield chart shows a depth of but 3 feet on the outer face of the shoal at the distance of 2,600 feet. The depth here must now be about nineteen feet, as the spot is about 100 feet outside of the outermost sounding on the chart of 1881, where a depth of 18·5 feet is recorded. The depth of three feet is now 1,600 feet eastward on the survey of 1881. If we assume that the plane to which Captain Bayfield reduced his soundings was eighteen inches higher than the present datum, it would still show that the three-foot contour at this locality is 1,550 feet further landward than it was in 1818.

From this and other comparisons which may be made between these two surveys it will appear that while the top or dry part of the peninsula at its northern end has apparently swung out towards the lake about 1,700 feet westwardly, the submerged

* Note.—This latter two-foot sounding and others on the same shoal are shown more distinctly on an engraved chart of Bayfield's survey published "with corrections" in 1863. They are scarcely discernible on the photo-lithograph published with the memorandum.

portion of it at the southern end of this face, has, to the depth of eighteen feet, swung in towards the light-house about the same distance eastwardly. The common centre about which these changes seem to have vibrated from east to west, is located near the central portion of the western face of the peninsula. The centre about which the vertical movement has occurred by which the entire face of the peninsula has been steepened, seems to have been at the depth of about five feet, and at a point also near the central part of the western face of the peninsula. In this movement the eighteen-foot contour at the northern end has not materially changed its location, while the zero margin of the lake at the other end, immediately west of the light-house has been almost if not quite as stable.

The prolongation of the isthmus northwardly and the alteration of its western face, are unquestionably due to wave action, and as a proper understanding of the phenomena produced by waves is absolutely necessary to enable the reader to form an intelligent judgment of the merits of the conclusions arrived at, in regard to the causes of the changes which have occurred at the harbour of Toronto, and of the probable results of the remedial works herein proposed, I will be pardoned for explaining the manner in which the waves affect the sand and other materials composing the bottom of seas, lakes, etc.

A simple illustration of the action of waves on the surface of *very deep water* can be made by tightly stretching a long cord between two points and then striking it near one end. The wave produced by the blow travels rapidly back and forth along the cord from end to end, but the material of which the cord is made simply rises and falls without advancing with the wave. So it is with the *water* where the lake is deep. The wave may pass ever so rapidly, but it cannot of itself set up any continuous horizontal motion in the water. A bird or a buoy afloat upon it would simply rise and fall as the waves passed under it. At the same time it would have a slight motion to and fro in the direction the waves are travelling but unless impelled by the wind or a current in the lake, it would remain in the same locality. The case is quite different, however, when the wave reaches water so shoal that the bottom resists the sinking of its crest. When this resistance is felt, the water which at that moment constitutes the wave, has, as a result of this resistance and of its own momentum, a horizontal motion imparted to it. This horizontal impulse becomes still greater as the depth lessens. Hence, although the velocity of the wave itself is diminished as it reaches shoaler depths, the water through which it passes has a constantly increasing velocity imparted to it in the direction of the shore, and in the case of big waves it becomes so swift that it is driven with great force out upon the beach.

This translatory motion gives to the waves the power to take up from the sea bottom, or to set in motion, the sands, shells and other materials of which it is composed, and to transport them shoreward with more or less force. The quantities thus transported depend upon the size of the waves, the formation of the shore upon which they exert their force, and the size, gravity and abundance of the material acted upon.

The direction of these translatory currents is determined by the shape of the sea bottom. If the shore be precipitous, very little or no such current will be created; but where the bottom is sloping to the sea, the waves will be constantly directed shorewards, no matter how obliquely they may approach it. Hence waves on such shores are continually piling up reefs and beaches, and through some of these every river must struggle to reach the sea, unless it enters it between bold headlands, and is incapable of transporting enough detritus to form a delta at its mouth; or unless some sea current exist sufficiently strong to sweep away the sedimentary matter brought down by it. Of course the height of the wave determines the depth at which the resistance of the bottom is felt, and at which the horizontal motion of the water is first induced. This depth will therefore be the extreme limit at which the material of the bottom can be set in motion by the wave. A study of the surveys which have been made on the western shore of the isthmus at Toronto satisfies me that the waves which roll in upon it are not large enough to move the sand when the water is over 18 feet deep. I can discover no evidence that the bottom has been

disturbed at a greater depth there during sixty-three years; and the area within which the waves are formed that break upon it forbids the belief that they are large enough to affect the bottom at a greater depth. The magnitude of a wave does not depend so much upon the force of the wind as upon the "fetch" or distance through which it can travel without interruption, and the depth of the water on which it moves.

Waves travel much more rapidly in deep than in shallow water. This is the cause of the phenomenon called "breakers." As each wave approaches still shallower water, its speed becomes still more retarded, hence the wave behind is always moving more rapidly than the one in advance. As it gains upon its predecessor it gets the benefit of the deeper water of that wave. The result of this is that at regularly recurring intervals or rhythmic periods, one of the waves completely overtakes the one in front of it, by which it secures for itself a still greater depth and maintains the velocity due to that depth. This enables it to travel so rapidly over the one it has surmounted, that it outstrips it in the race and consequently falls over in front of it, or, as it is termed, "breaks."

The wave has more ability to carry the sand up on to the beach than it has to bring it down again notwithstanding the slope of the shore. This is because the ratio of frictional resistance of the shore increases as the depth of the water passing over it is diminished, and also because the material carried up on to the beach, is almost wholly suspended in the water. The interval of time required for the shoreward current to come to rest and for the return current to be started, is sufficient to permit the sand to fall to the shore, from which the less rapid current seaward is unable to move it.

A very important part of the study of our problem is involved in the inquiry as to whether the portion of the isthmus now constituting an island is undergoing any serious alteration in its size. Is it being added to? or is it diminishing? We know that its form has been altered to the serious injury of the channel, by the extension of the peninsula northward. It is a matter of great importance to know whether the material which has been added to the end of the peninsula in the last 63 years has been brought from Humber Bay, Scarborough Heights or elsewhere, or whether it has been transported from the southwestern portion of the peninsula itself.

If it has been brought from the eastern shore of the Lake, from Humber Bay or Niagara, we must look for an annual contribution of the same kind indefinitely, from such foreign source, and this fact would thrust into any plan for the improvement of the Western entrance, a very embarrassing element. This material would accumulate about the entrance to our works, to such an extent as to need annual dredging and probably an extension of the necessary piers from time to time. With such a prospect I should not hesitate to advise that the western entrance be abandoned and that the remedial treatment, although much more expensive, be at once applied to the eastern gap. It is, however, only necessary to make an approximate estimate of the amount of material which has been removed from the western face of the peninsula, near Gibraltar Point, northward and within a distance of about 2,000 feet westward from its present margin, to know that the immense quantity of sand which covered the lake bottom over this area in 1818, and which has now been removed by wave action, was quite sufficient to have transferred the crest of the peninsula, 1700 feet westward in the shallow depths then existing, and to have added to its length all of the material which it has received during the last 63 years, without any contribution from foreign sources.

I have made some approximate estimates of the quantity of sand which has been removed from this area during the last sixty-three years. On the large chart accompanying this report, which is a copy of the survey made by Mr. F. M. Hamel in 1881, will be found a line drawn from the light-house to the Queen's wharf, with four lines at right angles to it. These are designated as "A.B." "C.D." "E.F." and "G.H." In comparing the sections, as nearly as possible with those similarly located on Bayfield's chart, I find that south of line "A.B." in the last 63 years there have been removed about six million cubic feet. Between lines "A.B." and "C.D.,"

sixteen million two hundred and fifty thousand feet. Between "C. D." and "E. F." eighteen million, seven hundred and fifty thousand feet. Between "E. F." and "G. H." five million one hundred thousand feet, and north of line "G. H." one million, four hundred thousand cubic feet, making in all, forty-seven million, five hundred thousand cubic feet; or, one million, seven hundred and sixty thousand cubic yards. This is at the rate of about twenty-eight thousand cubic yards per annum; an amount amply sufficient to account for the northward growth of the peninsula and likewise for the westward advance of the crest of it. The data are not sufficient to enable me to determine what amount of it has been deposited to the eastward of the line between the Queen's wharf and the light-house, but it is evident from the foregoing that no addition from any foreign source has been made to the northern and western face of the peninsula since Bayfield's survey. The changes which have occurred on the western face of it, give substantial assurance of the permanency of the western entrance to the harbour, if it be located in accordance with the recommendations hereinafter made.

No grain of sand rests upon any part of the shores of the peninsula, or in the channel, that was not brought to its present resting place by a current of water which left it there because it was not able to move it farther. The slope of the shore is therefore the result of an equilibrium between the force of the currents which sweep over it, and of the opposing force of gravity in the sand. The slope which the shore assumes under these different forces is termed in technical parlance, its "angle of repose." Owing to the greater mobility of the sand when saturated, this angle is flatter or lower on the submerged part of the shore than on the dry reefs or beaches. When a broad channel is exposed to storms and is swept by violent waves in different directions, the bottom becomes still flatter. Hence the angle of repose assumed, is so low that any natural channel through such deposits on the sea coast, must possess great width if it have any considerable depth in its central part. This will be better seen when it is remembered that it is about 1,200 feet from the shore line on the western face of the peninsula out to 16 feet of water, although this shore is under the influence of wave action which is quite favorable for the maintenance of a steep angle of repose. A natural channel therefore, if formed of the same materials which I assume to be almost wholly of sand, would, if it were possible to have its opposite shores swept by similar waves, require to be 2,400 feet wide to maintain a central depth of 16 feet. In a narrow and sheltered channel the sand would maintain an angle of from four to six horizontal, to one vertical, or about eleven degrees. The perimeter of the cross section of a channel swept only by currents moving in direction parallel to its axis, conforms very nearly to the arc of a circle.

The ability of a river to carry the detritus with which its water is charged, is due to the velocity of the current. When it reaches the sea the current subsides, and the sediment, before held in suspension, is deposited. The sea waves leach out by continual agitation the argillaceous and other lighter portions of these deposits, while the sand, gravel and heavier materials are left to dam back the river and form the foundations upon which it in turn builds up its bank still further out. Their low slopes defy the fury of the waves, and if any littoral (or shore) current prevails in the sea where the river is thus extending its banks, this current carries the river deposits to the leeward, builds up that bank more rapidly than the other and compels the discharge finally to flow in almost direct opposition to the prevailing sea current. In this way a river will extend its banks out many miles into the sea, its direction being determined by the littoral current or by the prevailing winds. The Mississippi has thus extended its length about sixty miles out into the Gulf of Mexico beyond the present shore lines of the gulf, and its course has been almost directly *against* the direction of the prevailing winds. As the river extends itself into the sea, its banks on the mainland are continually being raised by the annual overflows. These deposit the heavier materials carried by the current close to the river, while the lighter portion, which takes longer to settle, is carried back to the swamp lands. In this way many silt-bearing streams, the Mississippi, the Rhine, and the Po, for ins-

tance, have, as they approach the sea, build up their banks many feet higher than the lands on each side of the river.

The direction which rivers take when their channels are built out in the sea, is frequently such as to almost completely enclose extensive bays. After such process has been carried out to a greater or less distance in the sea, the height of the river on the main land becomes so great that a breach finally occurs in the seaward bank during some extraordinary flood, and the river then takes the shorter way through it to the sea. In such case the channel which it had constructed below the breach is abandoned. Being no longer a conduit for the fluvial current, it is filled up by the action of the waves, and at the same time the height of its banks is reduced to the sea level or below it, and what the river constructed finally becomes the foundation of a peninsula, on which every evidence of the fluvial channel above the surface of the sea, is completely obliterated. The Vistula, Adour, and Senegal, are among the numerous examples of rivers forming such new outlets to the sea, many miles above their former mouths. The long, narrow peninsulas which separate the Frisches Haff and the Curisches Haff in Eastern Prussia from the Baltic, no doubt had their origin in the extensions of the Vistula and Pregel into that sea.

A peninsula thus formed, having its axis parallel to the prevailing winds, receives constant additions by wave action upon its extremity, which continues to extend it, generally, though not always, against the wind. If a constant current of the sea sweep along its side in the direction of the end of the peninsula, the accretions thrown up by the waves in storms on the side of it, are gradually transported along in calmer weather, toward its extremity. The side is thus kept steeper and prevented from widening, while the sands thus removed fall to the bottom again in the more sluggish current or eddy, which exists at the end of the peninsula. Here an extensive shoal forms during the calmer weather, to be afterwards thrown up on it by the force of the waves. The sandy breakwaters which enclose the long series of extensive sounds on the coast of Virginia, the Carolinas and Florida, are examples of this kind of peninsula formation. The same process is carried on in tideless seas, though not in such vast extent. The Baltic, Mediterranean, Black Sea and the Great Lakes present many examples of such phenomena.

The sea currents almost invariably carry more or less sand along the shores, and thus furnish the material for the waves to extend the peninsulas. If the source of supply of this material be from any cause exhausted, the growth of the peninsula becomes checked. In such case the long, low slope at the end of the peninsula, under the influence of the waves, may not only be thrown up against it and be greatly steepened, but the end of the peninsula may be made by such influences to change its direction under the oblique force of the waves, in the manner of the Toronto peninsula. An example of a peninsula built out from a headland many miles across a large bay, and stopped in its growth when only half way across, may be seen in the Gulf of Danzig in the Baltic.

The longitudinal growth of a peninsula is checked when it approaches a headland of the main shore, by the pulsations which occur in the basin or harbour enclosed by it. Where tidal action exists the basin is filled and emptied twice a day * through the channel between the end of the peninsula and the mainland, and the further encroachment of the peninsula upon this channel is arrested by the currents which sweep through it upon every ebb and flow of the tide. The higher the tide rises, and the bigger the basin which is filled and emptied, the greater will be the magnitude of the channel thus maintained. When the peninsula has reduced the width of the channel to the size absolutely required for the entrance and exit of the tidal water, the channel becomes permanent.

As the magnitude of a channel thus formed is wholly dependent upon the quantity of water which flows through it, it is evident that the quantity must be diminished if a breach occurs in the peninsula, as a portion of the water which would otherwise serve to maintain the channel and stop the growth of the peninsula is lost through the breach.

NOTE.—The Gulf of Mexico is an exception to this rule: the tide there rises but once a day.

I think it altogether likely that the Toronto peninsula had its origin in an extension of the River Don westwardly from the southwestern point of Ashbridge's marsh. It is not necessary to sustain such hypothesis, that its ancient channel should have extended through any considerable length of the peninsula. The root of the peninsula being thus formed throughout a distance of a few hundred feet, would be a sufficient nucleus upon which the waves and the current of the lake would concentrate a great part of the sand lying within a few miles of it in water less than eighteen feet deep. To do this the easterly gales doubtless contributed a large portion of the detritus from the ancient Scarborough Heights. The prevalence of the southwesterly gales will explain the cause of the change of direction which the peninsula has taken at Gibraltar Point without the Don having ever extended its channel through that part of the peninsula. To the wave action resulting from easterly storms must be attributed the constant growth of the eastern end of the island. This growth will be seen by a comparison of the last survey with those of older date.

It is not, however, necessary to penetrate the mystery which enfolds the creation of the peninsula. Its continual advancement to the northward conclusively demonstrates the fact that the filling and emptying of Toronto harbour under the influence of the winds, the rise and fall of the lake and the discharge of the Don, have not been sufficient to arrest the growth of the peninsula in this direction, and the breach at Privat's Hotel which occurred about thirty years ago has made the currents through the main channel since then, still more impotent to check its northward advance.

It is exceedingly difficult to declare with any certainty what is the greatest magnitude of channel that can be maintained permanently through the main entrance to the harbour without dredging, even if the eastern gap were closed. The annual rise and fall of the lake is a very slow process as well as a very irregular one and produces but little current through this channel. The rise and fall of the water in the harbour under the action of the winds and storms is the chief source to which we must look for the necessary force of current to maintain the channel.

With a tidal basin regularly filled and emptied every day, and a permanent cross-section of channel as a resultant to guide him, the engineer can calculate with great accuracy the increased depth which he can secure by the construction of parallel works to reduce its natural width; but at Toronto the facts prove that the dimensions of the main channel are not permanent, nor are they wholly the results of the currents passing through it but of the incomplete inclosure of the harbour by the peninsula. In other words, the western channel was originally an open roadstead. The peninsula has been, and is now, gradually converting it into a channel of permanent dimensions. If this natural process proceeds, it will reduce its dimensions to those which the tidal action or pulsations of the basin enclosed by it, absolutely require for the exit and entrance of the lake water. It will then preserve that size with comparative permanence. Such channel, uninfluenced by artificial causes, would be shallow and wide, owing to the low angle of repose which the sands that form its bed naturally assume. If this process were completed, the engineer would know by the natural cross-section of channel permanently established, what additional depth could be secured and maintained through the works he would build to contract it; because the tidal action *will* insure the maintenance of a cross-sectional area sufficient for its accommodation, and, if he contracts that area in width, the tidal force will recover a portion of it by increasing the depth through the works. Until such area of cross-section is made large enough to establish a new condition of equilibrium or permanence, between the force of the current and the resisting forces of friction of the bed and the gravity of the materials of which it is formed. Nothing short of some unusual convulsion of nature could close up the channel between the lake and a basin so large as the Toronto Harbour, if but one channel existed. If instead of one there were many into the harbour, they would each be shoaler, and in such case, a long continuance of a low lake level, would make them all unusually

shallow, and render them liable to be shut up by wave action which would thus convert the harbour into a lake.

We have, however, in the comparatively stable condition of the inferior channel through the breach a reliable basis for the belief that a channel of sufficient width and depth for the commercial wants of Toronto can be permanently maintained without dredging, simply by the currents resulting from the oscillations of the water in the harbour, if but one channel be permitted. The channel through this gap has now a central depth of about four and a half feet and a surface width of about nineteen hundred feet, when the level of the lake is at zero of the gauge. This is equivalent to a cross-sectional area of nearly four thousand feet or of a channel two hundred feet wide and twenty feet of central depth. This channel has been maintained wholly by the currents that pass through it. If the main entrance were completely closed it is safe to assert that it would have been much deeper and proportionately wider.

If it be supposed that the channel through the breach has been maintained by a current sweeping through it, and through the western entrance, at the same time and in the same direction, that is to say, in through one and out at the other, and not by currents induced by the pulsations of the harbour, it is to be answered that such a current would not have the velocity of those currents which result from maximum differences of level between the surface of the harbour and that of the lake. A wind blowing continuously from the southeast would have the effect of creating a current through the gap which would flow out of the western entrance, but the same wind would raise the level in Humber Bay at the same time and thus check, if it did not completely arrest such current. The strongest currents which would flow through the gap, without establishing a counter under-current would probably be induced by winds from the south or southwest. These would elevate the surface in Humber Bay to a greater degree than at the gap. Their effect upon the water on the south shore of the peninsula would be to create a current, towards Scarborough Heights, without materially affecting the level of the surface at the gap. Storms from the east undoubtedly have the effect of creating considerable current through the gap into the harbour. I am of opinion, however, that currents thus created through the gap cannot have the velocity and scouring power which the under-currents hereafter referred to would possess.

The currents which are induced by a rapid rise or fall of the lake, will have their velocities determined by the slope of surface through the channel, (or fall per mile,) and by the amount of frictional resistance of the bed of the channel. It is evident that when an alteration occurs between the surface levels of the lake and the harbour, the steepness of the slope through the channel will be increased in proportion as its length is diminished. The slope of the surface creates the current and the friction retards it; hence it is of prime importance that the channel be kept as short as possible. When the currents are the result of winds prevailing for several days in a direction to fill or empty the harbour an under-current must always exist through the channel in an opposite direction to that which is seen on its surface, provided all other openings from the lake into the harbour be closed.

It is impossible for an east wind to sweep over the harbour for an entire day without creating an outward surface current through the proposed channel, supposing the breach at Privat's Hotel and all communication with Ashbridge's bay to have been closed. This current will continue to exist so long as the friction of the air sets the surface water in the harbour and channel in motion, and it is impossible that the water should continue for any considerable length of time to flow out of the harbour in the direction of the wind, without lowering its surface level. A counter current of equal intensity will then be created below the surface current in the channel. This under-current will be the result of hydrostatic pressure induced by the greater height of surface outside of the harbour.

I should hesitate to advise the construction of a channel of greater dimensions than three hundred feet in width and a central depth of eighteen feet below the present datum plane, although I am not prepared to say that one of greater size cannot be maintained without dredging after it be once completed.

A channel of the dimensions named can be constructed either at the breach on the peninsula, or at the western entrance to the harbour, with nearly equal assurance of its permanence. The question therefore, as to which locality shall be selected for the channel, should be determined mainly by the relative advantages which each would possess for navigation, and the relative cost of each. These are both decidedly in favor of the western location.

So far as to the safety and ease with which vessels could enter either one of these channels during bad weather, there can be no doubt that the preference is most decidedly in favor of the western entrance. Owing to its peculiar position, this entrance is completely protected from storms from every quarter except the southwest. To connect the deep water on the two sides of the peninsula by the shortest route, requires the location of a channel nearly parallel to the direction of these storms; therefore vessels arriving in such weather, would be able to sail directly into the channel and proceed at once to the harbour.

I have laid down upon the general chart of the harbour, (No. 1), the lines upon which the works that would be required for the improvement of the eastern gap should be located, if such improvements were deemed more desirable than that of the western entrance. These are shown in dotted lines, and will be readily found on the map. Where these lines are double, the works would need to be equally as strong and costly as the breakwater required on the south side of the western entrance. In addition to the works at the gap, its improvement would necessitate the complete closure of the western entrance by a dyke from the Queen's wharf to the end of the peninsula, as shown also with dotted lines.

On comparing the length of these several lines of works with those hereinafter recommended, (the location of which is shown in solid lines on the map,) it will be seen that the improvement of the eastern gap would require 4,840 linear feet of heavy work, including 400 feet of the Queen's wharf dyke, and 6,220 linear feet of light work; while the western entrance will require only 2,745 linear feet of heavy work; and only 7,403 linear feet of light work.

In this comparison it is assumed that 800 feet of the landward end of the breakwater, and 1,040 feet of the Queen's wharf dyke, will be of light work. Therefore 2,095 feet less of heavy work, and 1,123 feet more of light work, will be required to improve the western entrance.

The amount of dredging required to make the eastern channel, would likewise be greater than that needed at the western entrance. With such an enormous difference in the extent of the works and because of the other decided advantages in favor of the western entrance, I have deemed it unnecessary to prepare detail plans for the improvement of the eastern gap. They would only be useful in determining accurately the difference in the cost of each entrance. Whereas, if the eastern one cost no more, I should be unwilling to give it the preference.

If the channel were located at the gap it would need to be about 700 feet longer than the western channel, and the currents through it would therefore be less rapid than through the western one under the same conditions of wind and tide. Hence they would not maintain a channel of as great a width and depth as the western one. I should not, however, expect to find much difference in them from the injurious effect of wave action at their lake entrances, because either one selected for improvement must first be dredged to the maximum depth required, and as this would be a depth at which there would be little or no disturbance of the bottom at the end of the channel by wave action, there need but little fear that either channel would require dredging as a result of wave action alone. The lake currents, however, carry more or less sand in suspension, and if this be carried into a channel of greater dimensions than the tidal action or pulsations of the harbour demand, they will be deposited in it and will gradually diminish its size to that which can be permanently maintained by the maximum currents through the channel.

To attempt to utilize the present western channel would involve the removal of a large amount of stone by blasting to obtain a sufficient depth, and would moreover require the channel to be crooked, in as much as the western end of it would neces-

sarily have to be curved to the south west to reach the deep water of the lake. Thus located it would require to be very considerably longer than a straight cut across the peninsula. This greater length, and its curvature would be very objectionable. The greater length would increase the friction of the currents flowing through the channel and therefore diminish their velocity. The curvature would diminish their velocity still more, by checking the momentum of the water.

I am confident that a channel 300 feet wide between parallel works, at the western end of the harbour, with a central depth of 18 feet below the present zero or datum plane, can, when once established by dredging, be afterwards maintained by the natural currents through it, if it be located across the northern end of the peninsula between the lines, shown in the accompanying chart (No. 1), provided all other communication between the lake and the harbour be completely closed.

I have the honor to submit the following

RECOMMENDATIONS.

1. The closure of the Eastern Gap with a dike of sheet piling, protected on the sea side against undermining, with brush and stone.

2. The construction of a breakwater and the necessary parallel works to protect and maintain a channel 300 feet wide and 18 feet deep across the northern end of the peninsula, to connect the deep water of the harbour with the deep water of the lake.

3. The excavation of the necessary depth and width of channel through the parallel works, after they shall have been constructed.

4. The closure of the present western channel, after the new shall have been sufficiently developed to afford equal facilities for commerce, by the construction of a dyke from the western end of the Queen's wharf to the northern jetty of the new channel.

5. The closure of all communication between the harbour and Ashbridge's Bay, with a dike of light sheet piling or one of earth, three feet above the present datum plane, or zero of the guage.

All of these works except those necessary to completely separate the harbour from Ashbridge's Bay, should be located and constructed in accordance with the plans and specifications herewith submitted. The closure of the Eastern Gap, and the construction of the breakwater and channel works, should be executed at the same time to secure the earliest benefit of the proposed improvement. If this be not done, I would then recommend the construction of the channel works and breakwater first, and the closure of the gap while the new channel is being dredged out. I do not think the diversion of the Don into Ashbridge's Bay necessary, except as a sanitary measure. So far as this would affect the channel and harbour, it is probable that the injury which may be done by the small quantity of sediment that the Don brings into the harbour, will be compensated for by the increased current it will give through the channel when in flood. Should it be found a few years after the proposed works are completed that its deposits are injuriously affecting the depth of the harbour, it can then be diverted into Ashbridge's Bay, if it shall not have been previously done for sanitary reasons. It is quite probable that the closure of the Eastern gap and the growth of the city will soon make such diversion of the Don imperative as a means of promoting the public health.

Plans are not submitted for the dyking to separate Ashbridge's Bay from the harbour, because this work will be of a simple character, and comparatively inexpensive. I would recommend that its construction be open to competition, with the understanding that each bidder submit with his proposal the plan by which he intends to execute it, leaving to the Chief Engineer the selection of the best and cheapest proposal. This work will be exposed to very little servitude if it be sufficiently distant from the shore line of the harbour to be safe from floating ice. The greater portion of the marsh near the harbour shore is probably already 3 feet above zero, thus leaving only the sloughs to be closed. In any event the cost of the necessary work here will not probably exceed five thousand dollars.

If the closure of the Eastern gap be executed in accordance with the specifications and plans herewith submitted, I am of opinion that a sand beach will be formed in front of the dyke before the parts of it exposed to decay will be destroyed, and that no expenditure for the maintenance of the dyke will be required. The total estimated cost of the works recommended is \$250,693.85.

I have the honor to be, Sir, with great respect,
Your obedient servant,

JAS. B. EADS.

St. Louis, Mo., March 4th, 1882.

Hon. Sir H. L. LANGEVIN, K.C.M.G., C.B.,
Minister of Public Works, Canada.

MEMORANDUM.

TORONTO HARBOUR, ONTARIO.

Toronto, formerly York, is situated on the northern shore of Lake Ontario, in lat. 43° 38' 10" N., and long. 79° 23' 45" W., 333 miles by rail south-west from Montreal, 161 miles from Kingston, and 39 miles north by east from Hamilton.

The harbour is formed inside of the Island, and has its principal entrance from the westward. An entrance known as the 'Eastern Gap' has existed for some years, but, owing to its shallowness, is not used by steamers or sailing craft of large dimensions. At the north-eastern corner the Don empties; and the eastern side is bounded by marshy lands of many acres in extent, which separate it from Ashbridge's Bay.

In 1788 this harbour was minutely described by J. Collins, Deputy Surveyor General, in a report presented to Lord Dorchester, Governor General, on the Military Posts and Harbours on Lakes Ontario, Erie and Huron. Mr. Collins stated it to be "near two miles in length from the entrance on the west to the isthmus between it and a large morass on the eastward. The breadth of the entrance is about half a mile, but the navigable channel for vessels is only about 500 yards, having from three to three and a half fathoms water. The north or main shore, the whole length of the harbour, is a clay bank from twelve to twenty feet high, and gradually rising behind, apparently good land and fit for settlement. The water is rather shoal near the shore, having but one fathom depth at one hundred yards distance, two fathoms at two hundred yards; and when I sounded here the waters of the lake were very high." ("Toronto of Old," by Dr. Scadding, p. 16.)

The first survey of the harbour was made by Bouchette in 1793, and a copy of his plan is attached hereto.

In his work on the "British Dominions in North America," published in 1832, Mr. Bouchette describes the harbour of Toronto as follows:—(Vol 1, p. 88.)

"The harbour of York is nearly circular, and formed by a very narrow peninsula stretching from the western extremity of the Township of Scarborough in an oblique direction for about six miles, and terminating in a curved point nearly opposite the garrison, thus enclosing a beautiful basin about a mile and a half in diameter, capable of containing a great number of vessels, and at the entrance of which ships may remain with safety during the winter. The formation of the peninsula itself is extraordinary, being a narrow slip of land, in several places not more than sixty yards in breadth, but widening towards its extremity to nearly a mile; it is principally a bank of sand, lightly overgrown with grass; the widest part is very curiously intersected by many large ponds that are the continual resorts of large quantities of wild fowl; a few trees scattered upon it greatly increase the singularity

of its appearance, it lies so low that the wide expanse of Lake Ontario is seen over it; the termination of the peninsula is called Gibraltar Point, where a block-house has been erected. A light-house at the western extremity of the beach has rendered the access to the harbour safely practicable by night. The eastern part of the harbour is bounded by an extensive marsh through which the River Don runs before it discharges itself into the basin."

"No place in either province has made so rapid a progress as York. In the year 1793 the spot on which it stands presented only one solitary Indian wigwam; in the ensuing spring it was selected by Governor Simcoe as the seat of Government for Upper Canada."

With the growth of the population and the clearing and cultivation of the surrounding lands, and notably the disappearance of the Scarborough Heights to the eastward, from whence was derived the materials forming the peninsula, changes were soon apparent in the state of the harbour, and the necessity for its preservation early engaged the attention of those who were interested in its maintenance and improvement. They viewed with alarm the changes which had taken place in the dimensions of the peninsula, and the encroachment of the shoal from Gibraltar Point northward, to the great detriment of the entrance, and so early as 1833, as appears by the journals, Upper Canada Legislature, 1833-34, a select Committee reported on certain reports submitted by Captain Richardson and Captain (afterwards Sir) R. H. Bonnycastle, Royal Engineers, on its preservation. (App p. 1, *et seq.*)

The Commissioners in their report recommended the construction of a work extending from the island along the top of the shoal to the buoy, in a manner to continue the island to the brink of the channel opposite the present pier (Queen's Wharf), contracting the channel to about 700 feet in width; and also to prevent the waters of the Don from entering the harbour. (App. p. 2.)

Captain Richardson's letter is but an amplification of the views of the Commissioners, of which he was one.

The opinions entertained by Captain (afterwards Sir Richard) Bonnycastle to make the harbour a secure and effectual one for large steamers and deep draught vessels were divided by him into three general propositions:—

- 1st. That of damming up the western estuaries of the Don;
- 2nd. The opening a passage through the eastern end of the peninsula; and
- 3rd. The construction of a breakwater from the shore at the western entrance with works over the whole length of the shoal from Gibraltar Point, to confine the western entrance.

Sir Richard proceeded to debate the first proposition and arrived at the conclusion that it did not signify whether the breaches which the Don had made into the harbour be closed or not, and believed that the river is useful in a very slight degree.

With respect to the second proposition he plainly stated that if an opening be made through the beach the harbour would be entirely destroyed, and if it be done extensive works must be run out into the lake, etc., to arrest and retain the shingle which is (was) brought by the wasting away of the Scarborough Heights from the eastward, and so to prevent a silting up of the channel so formed; but he feared that a navigable channel could not be kept clear, and that vessels would experience much difficulty during gales from the east around by the south to the west, in entering such a channel, and he summed up with the statement that there could not be any harm in making a small canal shut in by flood gates and protected by piers, and that under these restrictions no obstacle would be thrown in the way, and that it would be very useful for the purposes of trade.

The third proposition is discussed at length, and the conclusion arrived at was that the western entrance should be protected and maintained.

It appears that no action was in any way taken on this report, and though the matter engaged attention, little or no regard was paid to the state of the harbour, though a Mr. Roy, C.E., drew attention to its state in an article published in the

Monthly Review in June, 1841. Search and enquiry have failed to obtain a copy of this paper.

Under date 4th May, 1847, Mr. C. S. Gzowski, then an engineer in the service of the Department of Public Works, reported that the entrance had narrowed to 250 feet in width, the bar having increased 220 feet in a northerly direction in seven years. (App. p. 17.)

In 1850, Mr. Sandford Fleming, C.E., read a carefully prepared paper before the Canadian Institute, in which he entered fully and minutely into the theory of the formation of the peninsula, described the changes which it was constantly undergoing, and its great increase in area since Bouchette's survey in 1793, and he debated the propositions which had been made and concluded:

1. That the foundation of the peninsula in its early stages may be attributed to the debris of the country traversed by the Don, in conjunction with a drift from an ancient promontory at Scarborough.

2. That the more recent portions were formed by materials from the Scarborough Heights.

3. That the formation is due to the travelling of the sand and gravel, under certain action of the waves.

4. That the harbour was being impaired and its only entrance threatened with early destruction by the same cause.

5. That its preservation may be permanently affected by the construction of certain specified works, at well selected points.

6. That the waters of the Don should be permanently excluded.

7. That the opening of an eastern passage would be a great accommodation to shipping; might improve the purity of the water in the harbour; and, if the necessary works to preserve it were properly executed, would have a beneficial effect.

Early in 1852, Mr. Walter Shanly, C.E., at the request of the Harbour Master, submitted for the information of the Harbour Commissioners a report on the state of the channel and the improvements required. (App. p. 18.) In it he stated that from the observations and soundings recorded during twenty years by the Harbour Master it was ascertained that the bar had advanced northwardly across the entrance at the rate of 19 feet yearly, and that the available width of the channel was scarcely 200 feet.

Mr. Shanly's theory of the formation of the peninsula is that the materials forming it were brought from the westward, and that the Don assisted as well, and he states that were the operations of Nature left unmolested, future generations might walk dry shod across to the outer lighthouse.

The remedy he proposed was dredging and the construction of crib-work on the southern side of the channel to define and maintain its width; and to divert the Don into Ashbridge's Bay.

Mr. Kivas Tully, C.E., in a letter dated 10th February, 1853, discussed fully the need of permanently improving the harbour, alluded to the opening of a passage through the peninsula, now known as the Eastern Gap, and suggested its improvement from an economical point of view—

1. On account of the saving of time to vessels arriving from or departing to the eastward, and

2. The tendency of the current created to maintain an open harbour later in the fall and earlier in the spring.

In the appendix, page 22, will be found an able review from the journal of the Canadian Institute, vol. 1, p. 162, of the letters and reports by Messrs. Bonnycastle, Shanly, Fleming and Tully.

In 1850 the harbour was placed in commission, Captain Richardson being Harbour Master. This gentleman, in January, 1854, submitted to the Commissioners a report on the state and requirements of the harbour, and alluded to the many changes which had taken place over a period of 50 years, and of the necessity which then existed for steps being taken to ensure the preservation of the western entrance

in a navigable state, and to a depth of 14 feet and a width of 400 to 500 feet. He alluded to a breach through the peninsula to the eastward, near Privat's Hotel, which was then only 140 feet in width. Reference is made to an old chart of about 1800, on which the western entrance was shown to be about 1,455 feet in width from 12 feet inshore to 12 feet on the bar, and that the soundings in the channel were 3 and 3½ fathoms. (App. p. 27.)

This report bore fruit, for the Harbour Commissioners in March, 1854, offered premiums for the three best reports on the means to be adopted for the preservation and improvement of the harbour, the points to be discussed being:—

1. The effects, present or future, to be produced by the breach (Eastern Gap) through the peninsula on the harbour.

2. If prejudicial, the means to be taken to strengthen the coast against further encroachment.

3. If beneficial, the proper mode of making it useful, and the cost of doing so.

4. The advisability of opening a passage between the harbour and Ashbridge's Bay, or an opening from the last into the lake, with an estimate of cost.

These premiums were obtained by Messrs. Hind, Fleming and Tully, and an extra premium was awarded to Captain Richardson for a report submitted by him.

The reports were published at the expense of the Harbour Commissioners, and will be found in the Appendix, p. 30 *et seq.* They furnish a vast amount of information respecting the harbour, and discuss fully the questions submitted by the Commissioners. No attempt is made by the writer to condense the views and opinions expressed in these different reports, because to do so would necessitate the use of extended quotations, which is not within the province of this memorandum.

No action was taken on any of the suggestions made by the writers of these reports as regards the construction of works; but it is gathered from subsequent reports by the Harbour Master—Captain Richardson—that dredging plant was obtained and used to keep the western entrance from closing up.

In 1856 it appears that the available width of the western entrance for deep draught vessels was only 260 or 270 feet, although dredging had been carried on for some time. At that date 400 feet was considered to be the least width, and 12 feet the least depth, which should be obtained. (App. p. 94.)

In his report for 1857, the Harbour Master states that many changes had been observed in the shape of the island; and that the point bounding Blockhouse Bay on the western side had greatly increased northwardly. He alluded to damage done to the peninsula, that the embankment for its preservation was never finished, and did not advise its repair. (App. p. 95.)

From the report of 1858, it is gathered that a breach had been effected through the peninsula, and that the influx of water into the harbour from the eastward was deemed to be of great benefit. (App. p. 96.)

At the end of 1859 the neck of land at the peninsula had disappeared, and a navigable channel with from 7 to 8 feet of water had taken its place, and now formations of sand on either side appeared. (App. p. 98.)

In the report of 1860 it is stated that the western entrance having been dredged to 400 feet in width, and an average depth of 12 feet, both had been maintained; and that the island shoal had extended westwardly and threatened to encroach on the channel. The depth in the eastern channel was 6 feet. (App. p. 99.)

Capt. Richardson, in his report for 1861, refers to the opening at the eastern end of the harbour as having been the means of purifying the water in the harbour, and of contributing to the health of the city.

The island shoal had extended further to the westward, and beyond the influence of the current deflected and guided by the Queen's Wharf, and the channel had been maintained at its width of 400 feet. (App. p. 100.)

Mr. S. Keefer, then Deputy Commissioner of Public Works, in reporting on a petition of the Council of the Corporation of the City of Toronto, that a survey of the harbour be made "with a view to ascertaining the cause of the dilapidations which have already taken place, and of devising some means of arresting their progress,"

refers to the reports of the gentlemen who had in previous years examined the harbour, and stated the results of his own examination, and advised that a careful survey should be made under the direction of an able hydraulic engineer, as "the subject requires to be treated both theoretically and practically, with a view to the satisfactory delineation of the causes which have operated in the formation, but are now apparently directed to the destruction of the harbour; as well as devising some plan for directing them beneficially in future for its preservation and protection. The problem not being easy of solution should therefore be committed to the ablest hands."* (App. p. 101.)

No action was taken on this recommendation.

The Harbour Master, in his report for the year 1862, stated that a bar of sand had grown up inside of the eastern entrance over which the water was shoaler than in the entrance itself. The "gap" or entrance had increased to half a mile in width, and the line of beach had so far receded that a boiler of a wrecked steamer which formerly was high and dry, was then 100 yards out in the lake and in deep water.

At the western entrance the island shoal had extended to 300 feet west of the then west end of the Queen's Wharf, and had advanced northwardly 40 feet. (App. p. 103.)

During 1863, following the suggestions of the Harbour Master, the Queen's Wharf was extended westwardly 200 feet, and, up to the end of 1864, a channel 400 feet in width, with a depth of 13 feet, had been secured.

The bar inside of the Eastern Gap had been thrown farther into the harbour and had only 6 feet of water on it, thus limiting the passage to vessels of light draught, (App. p. 105.)

In his report for 1865, Captain Richardson stated that the Highlands of Scarborough, the source from which the materials composing the peninsula and island were derived, no longer existed, and therefore a wasting away of the latter was going on.

The western entrance maintained its width of 400 feet, and a depth varying from 11½ to 14½ feet, according to the height of the water in the lake. The island shoal still progressed westwardly, and during 34 years had increased in width 700 feet, or at the rate of 22 feet annually. (App. p. 107.)

Mr. Kivas Tully, Engineer to the Harbour Board, reported that during 1866, the western entrance remained at 400 feet in width, which was due to the extension of the Queen's Wharf westwardly (App. 108); and, in his report for 1867, again referred to the westerly increase of the island shoal, and stated that "the formation west of Lighthouse Point had increased during the last few years, and an additional tongue or arm" (now Hanlan's Point, see plan showing changes in the harbour during 1874, 1875 and 1879) "had formed, which trends in a northerly direction about 300 yards west of the island, making another bay; this formation no doubt will continue to increase." (App. p. 109.)

This tongue, or arm, now known as Hanlan's Point, has increased up to 1880 until it now extends northwardly beyond Gibraltar Point, and the shoal from it has been pushed forward yearly until in 1875 it had narrowed the western entrance to a width of 230 feet—see plan herewith.

In 1876 a report (App. p. 100 *et seq*) was submitted to the Secretary of the Department of Public Works, by Mr. Wm. Kingsford, engineer in charge, who entered fully into the state and requirements of the harbour, and advised that the Parliamentary grant of \$20,000 should be expended in dredging, as "the present approach to Toronto by deep water necessitates an abrupt turn to enter the "Queen's Wharf Channel." In the improvement contemplated, easy entrance and egress should be secured;" and that "the increased navigation of the canal system of the Dominion points out that the entrance should ultimately be 16 feet deep."

Between 1st July, 1874, and 30th June, 1880, the sum of \$49,120.90 had been

*The date of this report should be 1862, instead of 1873, as printed.

expended, principally in increasing the width and depth of the "Queen's Wharf Channel." Shortly after dredging was commenced it was found that, to obtain a depth of 16 feet at low water, it would be necessary to blast in solid ledge, and to a certain extent this was done. No attempt was made to straighten the abrupt turn, or to render the channel any easier for entrance or exit, the object being the opening of a channel 300 feet in width with 16 feet of water on the old course.

On the plan of the western entrance herewith will be seen the encroachment of the point of the shoal northwardly, and the width of the navigable channel in 1863, 1875, 1879 and 1880.

A plan of the harbour is attached, showing its state in 1841 (?), and it may be compared with that showing the changes observed in the eastern and western entrances in the years 1874, 1875 and 1879.

At the Session of Parliament of 1880, the sum of \$12,500 was appropriated for expenditure in this harbour, part of that amount to be expended in dredging the western entrance, which in the spring of 1880, had been narrowed to 280 feet by the growth of the island shoal northward.

As the present entrance has been pronounced to be abrupt, and it is known that to obtain a depth of 16 feet at low water would necessitate the removal of a large quantity of solid rock at a very great expense, it was judged that—as in former years the entrance was some 500 yards in width with deep water, a comparatively straight cut might be made through the point of the shoal, and a depth of 16 feet obtained without touching the rock. A line of easy entrance from 18 feet outside to the same depth inside was laid out, and a series of borings made showed that a depth of 17 feet below zero of the gauge on the Queen's Wharf could be had without the removal of any rock. This line is about 700 feet to the southward of the Queen's Wharf, and dredging operations have been commenced in the removal of the point of the shoal northward of this line. The material to be removed is fine sand.—

It has been deemed desirable to include in the Appendix a letter by Mr. J. G. Worts, the Chairman of the Harbour Board (p. 115), and also the petitions to His Excellency the Governor General from the Mayor and Corporation of the City of Toronto, and the Harbour Commissioners, praying that steps be taken by the Federal Government to protect the harbour and preserve it for the future (p. 117, *et seq.*)

As, throughout the whole of the reports published in the Appendix, constant reference is made to the height of water in Lake Ontario, and the effects its variation periodically has had upon the changes which have taken place in the peninsula, now island, bounding the harbour on the south, and in the harbour itself, there has been attached an article from the "Canadian Journal," vol. 2, entitled "Variations in the Level of the Lakes," which may not be out of place in connection with the object of this memorandum. Through the courtesy of Mr. Kivas Tully, C.E., who as Harbour Engineer has an intimate acquaintance with the harbour, and the many changes which have taken place during very many years, permission has been given to attach a copy of his paper on "The Fluctuations of Lake Ontario from the year 1854 to 1878," and of the chart prepared to accompany it. (App. p. 132).

The writer believes that he has touched upon the salient points of the reports and documents which have been gathered and printed herewith. That it has been shown that in early days, nearly 100 years ago, the width of the western entrance was nearly 500 yards; that on each successive examination this width was found to be gradually lessening; that through natural causes an opening was made through the peninsula at the eastern end of the harbour, and that a wide and comparatively shallow entrance now exists; and that for nearly half a century it has been the desire of those interested in the welfare of the harbour that steps should be taken to ensure its preservation for the future; that though many reports have been made and suggestions and estimates of cost submitted, none have been adopted nor acted upon, even in part; and the same forces of Nature which have acted through past years are still acting unchecked to the detriment and possible destruction of the finest harbour on Lake Ontario.

It may not be amiss here to state that the waters of the Don and the sewage from the city still empty into the harbour.

The questions have therefore arisen what course is to be pursued, what is to be done to preserve this harbour; and further is it necessary or desirable so to improve the eastern entrance as to maintain always a navigable depth of 16 feet; and to construct such works as may be required to restrain the encroachment of the Island shoal, and preserve the western entrance at such a width and depth as will give easy access and exit? On the proper solution of these questions depends the preservation of Toronto Harbour.

The writer has to acknowledge the assistance he has received from Mr. M. Baldwin, the Harbour Master, and Mr. Helliwell, the Deputy Harbour Master, in obtaining many of the reports published herewith; and his thanks are due to Mr. K. Tally, C. E., for his reports and paper on the lake levels.

Respectfully submitted,

HENRY F. PERLEY,
Chief Engineer.

**CHIEF ENGINEER'S OFFICE,
DEPARTMENT OF PUBLIC WORKS,
April 11th, 1881.**

NOTE.—The Appendix referred to in this Memorandum is not published.

REPORT ON LAKE MANITOBA OVERFLOW.

Ref. No. 10,247.

CHIEF ENGINEER'S OFFICE,
OTTAWA, 22nd December, 1880.

SIR,—There is not any information in the Department relative to Lake Manitoba.

I note in the letter from the Deputy Minister of the Interior (No. 9,961) that during the past few years the water of this lake have been gradually rising, and are now 4 or 5 ft. higher than ever before known. I learn also that a survey was made in order to ascertain the nature and extent of the obstacles in the Fairford River, the outlet into Lake Winnipeg, copies of the plan and section there obtained accompanying the letter.

Enclosed in this letter is a note that I shall furnish an estimate of the probable cost of the dredging required for the improvement of this river.

Lake Manitoba is about 120 miles in length and of an average width of 18 miles, and I have learned from the Deputy Minister of the Interior that in no part of it can a greater depth than 25 feet be found. It is an extremely shallow lake having sandy shores, and advantage has to be taken of the rivers and streams emptying into it to affect a landing.

The Fairford—or, as it is termed on the plan and section "Partridge Crop" River—has an average width for some distance from its mouth of 400 feet, with banks from 7 to 10 feet in height above the present level of the water. According to the soundings given on the plan, it appears that a shoal exists in Lake Manitoba across its mouth, having 5 feet depth in its shoalest part; and in a distance of a mile from the mouth two shoals are found and a third at $1\frac{1}{2}$ miles still further on.

As marked on the section these shoals are composed of gravel and boulders. I note that the fall in the surface of the river is at the rate of $2\frac{1}{2}$ feet per mile, and this is sufficient to cause the very rapid current which exists, a current strong enough to scour out any obstruction if composed of a comparatively soft or friable nature. As the obstructions which exist are said to be composed of gravel and boulders, I am inclined to believe that these materials must be compacted together, and will prove to be hard dredging.

It appears that at the time (10th Nov. 1880) the survey was made, Lake Manitoba was 4 or 5 ft. above its normal level, and the water in its outlet correspondingly high. As these soundings show depths of $4\frac{1}{2}$ and 6 ft. on the obstructions complained of, it follows that when the lake is at its normal level, the water in the Fairford river can only be a foot or more in depth.

The average width of so much of the Fairford as is shown on the plan is 400 feet, and if the deepening proposed is to be of any benefit, a channel of that width must be cut through the obstructions to give vent to the greatest volume of water such a narrow channel will convey. It must be borne in mind that the problem to solve is the lowering of an area of at least 1900 square miles a depth of 4 feet, and maintaining that reduced level for the future; to do this the widest and deepest channel possible to obtain, must be provided.

The following is a statement of the quantity of dredging to be done in the removal of the shoals colored *red* in the section herewith, based on a width of 400 feet :

Channel in Lake Manitoba.....	93,000
“ “ River 4 to 32.....	117,600
“ “ “ 34 to 52.....	18,000
“ “ “ 115 to 124.....	18,900

Total..... 247,500 cub. yds.

To determine the cost of dredging the quantity thus given, I have assumed that the Department will place a dredge with scows and attendant tug on Lake Manitoba, and will continue working for four (4) years, being at the rate of 62,500 cubic yards, measured in the solid, per 5 or 6 working months, per year.

I place expenses as follows :

Machinery for spoon dredge.....	\$8,000 00
Delivery at Lake Manitoba.....	3,000 00
Hull and fitting up.....	6,000 00
Ropes, chains, tools, spare gear.....	4,000 00
Three (3) 50 yard scows.....	3,000 00
Steam tug complete....	10,000 00
<hr/>	
Dredging plant.....	34,000 00
Working expenses, dredge and tug 4 years @ \$8,000.....	32,000 00
Contingencies, repairs and renewals, &c.....	6,000 00
Superintendence. 4 years @ \$2,000.....	8,000 00
<hr/>	
Total.....	<u>\$80,000 00</u>

and ~~111111~~ = 32 cents per cubic yard, which must be considered a reasonable price, but not one which a contractor would accept for the work in question, as not any allowance has been made for profit.

I have the honor to be, Sir,
Your obedient servant,

(Signed) HENRY F. PERLEY.
Chief Engineer.

F. H. ENNIS, Esq., Secretary,
Dept. of Public Works.

CHIEF ENGINEER'S OFFICE,

Ref. No. 21253.

OTTAWA, 15th February, 1882.

SIR,—Under date 22nd December, 1880, I submitted a report, No. 10247, on the probable cost of dredging the outlet of Lake Manitoba with a view of deepening it to such an extent that it would carry off the abnormal quantity of water in the lake and maintain the normal level in the future.

As the Department did not possess any information relative to this lake, or of the country surrounding it, and as the information relative to its outlet, the Fairford River, contained in No. 9961, was both incomplete and very unsatisfactory, an appropriation was made at the last Session of Parliament to defray the cost of an examination, not only of the lake and its outlet, but to ascertain, if possible, the cause or causes why the lake has risen and remains above its normal level, and to determine the means to be taken to carry off the surplus water and prevent its rising in the future ; and the probable extent and cost of the works required.

In accordance with the instructions contained in your letter, No. 7478, instructions were given to Mr. Thomas Guerin, C.E., to make the examination, &c., required.

This he has done in a most satisfactory manner, and I herewith transmit for the information of the Hon. the Minister, the report he has submitted,

From this report it is gathered that Mr. Guerin saw for himself the effects of the rising of the lake, in the flooded condition of the village of Totogan, situated at the junction of the White Mud and Rat Rivers, six miles from the southern extremity of the lake, and heard the opinions of those who, in dismay at the rising of the waters, were threatening to abandon their farms.

It will be noted that Mr. Guerin, at the outset, assumed that this overflow was due to one of the following causes:—

1. The silting up of the lake by the materials held in suspension and brought by the rivers emptying into it;
2. The "barring" of the outlet, by the movement towards it, of the materials composing the bottom of the lake;
3. The gradual sinking of the lands surrounding the lake;
4. That the outlet is unable to carry off the water brought by the rivers which flow into the lake.

During his journey to the outlet, Mr. Guerin became convinced from the soundings taken that the lake was not being filled up by any sedimentary deposit, (1), nor that the adjacent land was sinking (3), for if either of these phenomena had occurred, instead of deeper soundings which were found, the reverse would have been the case; and I may mention that the mouth of the outlet is solid rock and does not show any signs of an accumulation from the bed of the lake (2).

For the determination of cause 4, the inflow of water from the White Mud, and its branch the Rat River, at the southern end of the lake, and the Water Hen, at the northern extremity, the only rivers emptying into Lake Manitoba, was ascertained to be 20,796 cubic feet per second.

The off-take capacity of the Fairford River was found to be 14,833 cubic feet per second, and, therefore, during the time of high water a quantity of 5,963 cubic feet per second is left to accumulate in the lake to overflow its borders, or be carried off by evaporation.

Here, as Mr. Guerin states, an anomalous state of affairs exists; the outlet of this lake, instead of being, as is the rule, larger than the united capacities of the streams emptying into it, is smaller than that of one of them, and the consequence must be that so long as the "Water Hen" continues to bring down equal quantities of water yearly, so long will the lake continue to rise, and it can only become reduced in depth when the rain and snowfall of any season on the area drained by the "Water Hen" are below their usual quantities.

The Fairford River empties into Lake St. Martin from which flows the Little Saskatchewan, which is described by Mr. Guerin as overflowing its banks, expanding and contracting alternately, sometimes rapid, sometimes still; and that its bottom, so far as it has been examined, consisted of rock or boulders, and hard packed gravel, and after a devious course of thirty miles it terminates in Lake Winnipeg.

Lake St. Martin is surrounded by a low flat country which is overflowed in a similar manner to the shores of Lake Manitoba, and the cause was found in the fact that the off-take capacity of the Little Saskatchewan is 2,347 cubic feet less than the discharge through the Fairford, and that this quantity per second of time, less the amount carried off by evaporation, remains to flow over the land.

Mr. Guerin, assuming that the areas of Lakes Manitoba and St. Martin, as given by Professor Hind, viz: 1,902 and 316 square miles respectively, are the normal conditions of these lakes, has determined that the height to which the water has risen above its proper height in each is six feet; and further, from the data obtained, has calculated that the area of land submerged in Lake Manitoba is 323 square miles, and in Lake St. Martin 765 square miles, or 696,320 acres.

The remedy for this state of affairs is simply to provide additional outlets from Lakes Manitoba and St. Martin, and transfer the surplus water to Lake Winnipeg, which from its great size would not be raised over two inches in the year; or as Mr. Guerin states, the rising of the surface of a lake always increases the discharge

through its outlet, it may be concluded that the level of Lake Winnipeg will not be sensibly affected.

In my report of December, 1880, No. 10247, I suggested the deepening of the Fairford River by dredging, to increase the discharge from the lake, and stated that the material of which the bed of the river was composed must be firm, because it had not scoured out under the action of the strong current flowing over it. This bottom, as before stated, Mr. Guerin found to be rock, and therefore, abandoning the idea of deepening the river, he proposes the opening of a new channel from the lake 10,500 feet in length, joining the Fairford River at that distance from its head, where it is $9\frac{1}{2}$ feet lower than the lake. It will be noted that Mr. Guerin proposes the lowering of Lake Manitoba $4\frac{1}{2}$ feet, and maintaining it at $1\frac{1}{2}$ feet above its normal level for the purpose of facilitating navigation.

The character of the Little Saskatchewan has been already described, and is of such nature as not to admit of being improved. To relieve Lake St. Martin Mr. Guerin suggests the opening of a cut to Lake Winnipeg, a distance of $12\frac{1}{10}$ miles of such dimensions as will effectually carry off all surplus water and prevent its accumulation in the future.

The cost of these works is placed as follows :

From Lake Manitoba to the Fairford River.....	\$36,000
From Lake St. Martin to Lake Winnipeg.....	245,000
Total.....	<u>\$281,000</u>

By the opening of these channels, not only would the waters of these lakes be reduced in a few years to their normal level, but they would remain so, and the many acres of land now submerged and valueless, would be recovered and become of value and fitted for settlement, and not only that, for so long as the Fairford and the Little Saskatchewan remain unchanged, the probabilities are that the waters of Manitoba and St. Martin will continue to rise, and the area of submerged land to increase in proportion.

Mr. Guerin has calculated that 696,320 acres of land are to-day flooded, and that, estimating their average value at \$2.00 per acre, their total value will amount to \$1,392,640, a handsome return for the expenditure of the amount estimated as above.

I cannot conclude this summary of Mr. Guerin's report without bearing testimony to the able manner in which he has performed the duty assigned to him, and for the solution of the problem set before him ; and, although the remedy proposed may appear to involve the expenditure of a large amount of money, yet the result to be obtained will prove to be of immense and lasting benefit.

I have the honor to be,
Sir,
Your obedient Servant,

HENRY F. PERLEY,
Chief Engineer

F. H. ENNIS, Esq., Secretary,
Dept. of Public Works.

MR. GUERIN'S REPORT.

OTTAWA, 29th January, 1882.

SIR.—It has been already stated in the remarks concerning the River Assiniboine, that in consequence of the flood on that river, last summer, attention was directed without delay to Lake Manitoba.

The party was accordingly transferred to Totogan, a village situated at the junction of White Mud and Rat rivers, and within about 6 miles of the southern extremity of the lake.

This village was at that time flooded to so great an extent that it was with difficulty camping ground could be found in its vicinity.

The appearance of the country all round this place was uninviting. All parties who were consulted on the subject agreed that the lake had been rising every year for five years. The lake had now spread its waters over the land as far as Totogan Village and flooded the houses there. The farmers in the vicinity appeared dismayed and were threatening to abandon their farms. Seeing a lake of over 1,900 square miles in extent rising more and more every year, and spreading over the land, they naturally asked what reason had they for believing that their farms were not going to be irrevocably lost and themselves ruined if they continued to remain in the district. Such were the sentiments then expressed by the people.

To remedy those evils there must be means devised to confine the lake within its legitimate boundaries and prevent it from exceeding those boundaries in future. This is the problem involved whose solution is here submitted.

Before seeking a solution to this question the cause of the overflow must be first discovered; and in searching for this there are four possible causes which prominently suggest themselves:—

1. The lake may rise and overflow its banks in consequence of being filled up by the materials held in suspension in the rivers flowing into it.
2. The lake may rise in consequence of its outlet getting barred by the movement towards its entrance of the materials composing the bottom.
3. The land surrounding the lake may be sinking in consequence of some unknown phenomenon thus causing the water to overflow.
4. The water of the lake may be raised in consequence of an unusually great fall of rain or snow occurring at the heads of those rivers which flow into it; and the outflow at the same time being unable to meet the increased demand on its capacity.

All or any one at those causes could produce the results observable about the lake, and it was therefore necessary to find which of them existed.

In order to ascertain this information it was necessary to examine the rivers flowing into the lake as well as those flowing from it, and likewise to ascertain the quantity of water taken away from it by evaporation. It was also necessary to find whether the water of the lake was rising or falling for it seemed to rise or fall every day several inches in obedience to the direction of the wind.

Lake Manitoba, according to Professor Hind, has an area of 1,902 square miles. It is surrounded by a low flat country and consists of two parts which are united by a strait called "The Narrows": the greater portion of the Lake being south of "The Narrows." The only supply to it, besides the rain and snow which fall on its surface are Water Hen River which flows into it near its northern extremity, and White Mud, and Rat Rivers which flow into it at its southern extremity.

The outlets from the lake are Fairford River and Dog Hung Creek. This latter is too insignificant to be further noticed, but the former issues from the lake at a place north of "The Narrows" and for the first three miles of its length is a large and rapid river with a rocky bottom. It then expands and covers the surrounding country for many square miles, giving rise to a dense growth of bullrushes. In this extent of country is included Partridge Crop Lake, a small body of water clear of

weeds of any kind although a few years ago it was only a morass. Emerging from this lake, the river contracts into its normal dimensions for a short distance and finally terminates in Lake St. Martin.

Lake St. Martin, like lake Manitoba has flooded the surrounding country. It had, a few years ago, an area of 316 square miles according to Professor Hind; but it has lately swollen into much larger dimensions. The only feeder to this lake is Fairford River and its outlet is the Little Saskatchewan. This latter river overflows its banks expanding and contracting alternately; sometimes rapid, sometimes still. Its bottom as far as it has been surveyed consist for the most part of rock or boulders and hard packed gravel. After a devious course of some 30 miles it terminates in Lake Winnipeg.

DISCHARGES OF RIVERS CONNECTED WITH LAKE MANITOBA.

While encamped at Totogan, White Mud and Rat Rivers were examined. The discharge of the former was ascertained about three miles above the village. Here there was no visible mark to show that the water of this river had been higher during the previous spring. At the time of examination there was passing in it 1,425 cubic feet per second. It had a width of 185 feet and a maximum depth of 16 feet.

Rat River which unites with White Mud River at Totogan was examined about 5 miles above the junction. The water of this river seemed to have fallen much since the spring—at the time of examination it was only 40 feet wide and there was passing in it only 35 cubic feet per second; although its high water mark showed that during the previous spring it was 250 feet wide and was discharging 729 cubic feet per second.

Having placed some gauges at Totogan, camp was removed to the head of Fairford River which constitutes the outlet of the lake. During this journey soundings were taken in the lake, which showed a depth varying from 9 feet near shore to 15 feet, sometimes 20 feet further outward.

These soundings convinced those who were accustomed to navigate the lake that it was then much deeper than it had been during previous years; a fact which was ample proof that the lake was not being filled by any sedimentary deposit nor was the adjacent land sinking; for if either had been the case the tendency would be to diminish the depth of the lake instead of increasing it.

The discharge through Fairford River was measured at a suitable place about $\frac{1}{2}$ of a mile from the lake. It had a width of 359 feet and a maximum depth of $10\frac{1}{2}$ feet. There were 14,833 cubic feet of water passing in it per second. There was no water mark visible which was higher than the surface of the water then passing in the river, and it seemed to be charged to its full capacity; for in the distance between this locality and the lake it was in places overflowing its banks.

Having inaugurated the work of surveying and sounding this river as well as adjacent portion of the lake, some of the party were transferred to the Head of the Lake for the purpose of examining Water Hen River.

At the mouth of this river there is a large tract of country covered with water and much of it is now producing a dense crop of bullrushes and other weeds; the river having three open channels through these weeds.

About 5 miles above its junction with the lake a suitable place was found for examining it. Here the river was 444 feet wide; its maximum depth was 12 feet and the quantity of water passing in it was 13,930 cubic feet per second. From a water mark visible on its banks it was ascertained that the river had fallen $1\frac{5}{16}$ feet from its highest state during the previous spring. When it was at that stage, the quantity of water passing in it amounted to 18,642 cubic feet per second.

DISCHARGES FROM AND INTO THE LAKE.

When the examinations of those rivers were made Water Hen contributed 13,930 cubic feet per second, White Mud and Rat Rivers contributed 1,460 cubic feet.

per second, thus making the entire discharge into the lake amount to 15,390 cubic feet per second; while the only discharge from it was that through Fairford river or 14,833 cubic feet per second, thus leaving 557 cubic feet per second to accumulate in the lake. From these facts it follows that at the time the investigation was made the lake had to depend entirely on evaporation to reduce its level.

In time of highest flood, Water Hen River discharges 18,642 cubic feet per second into the lake, White Mud and Rat Rivers discharge 2,154 cubic feet per second into the lake, thus making a total of 20,796 cubic feet per second; while the discharge from the lake could only have been 14,833 cubic feet per second, this being the capacity of Fairford river. It follows therefore that during the time of high water a quantity equal to 5,963 cubic feet per second is left to accumulate in the lake and spread over the adjacent land, or be carried off by evaporation.

Those measurements show an anomalous state of things in connection with Lake Manitoba. It has been a generally understood maxim throughout North America (I believe) that the capacity of the river which forms the outlet of a lake is greater than the united capacities of all the rivers contributing to the lake. The River St. Lawrence is an eminent example of this fact.

In the case of Lake Manitoba, however, the capacity of Water Hen alone exceeds that of Fairford River which forms the outlet of the lake by upwards of 25 per cent. The consequence must be, that whenever Water Hen river gets flooded, the water of Lake Manitoba must rise, and as the capacity of Fairford river aided by evaporation is not sufficient to carry off the surplus water during the time that elapses after Water Hen has passed the point of maximum height, until its next rising, the lake will continue to rise more and more every year until a succession of seasons occur when the rain and snow fall at the water shed forming the source shall be comparatively light.

EVAPORATION.

As it appears that evaporation is one of the principal factors in reducing the level of the lake, a contrivance was resorted to at the camp at Fairford for ascertaining the amount of water evaporated each day.

This contrivance consisted of a cylindrical tin vessel about 3 inches deep and as many inches in diameter. It was filled with water and imbedded in another vessel containing a mixture of sand and gravel. The depth of the water was taken by a scale every morning and evening and registered in a book kept for that purpose. A copy of this register will be found at the end of this report where also will be found a copy of the gauge register.

On looking to the first mentioned register, it will be seen that the loss of water each 24 hours gives a mean of 2.10 of an inch, while the loss during the night time alone is only 2.100 of an inch.

In winter time the evaporation of water is inappreciable while the thermometer registers below 32°.

If a piece of ice is measured and weighed and left exposed, it does not diminish to any appreciable extent in bulk or weight while the mercury is below 32°. Scientists assert that evaporation of water goes on in winter, but I have never known or read of any one who has stated what the amount of such evaporation is during freezing weather or during a Canadian winter. The register at Lake Manitoba during the latter part of the summer shows the mean evaporation to be as low as 2.100 of an inch during each night, or while the water was not exposed to the sun's rays; and during some nights it appeared to be nothing. Now as the evaporation during a winter day cannot be greater than that during a summer night it follows that the mean daily loss from evaporation during the cold months cannot exceed 2.100 of an inch in the vicinity of Lake Manitoba. Taking a mean between the three warmer months and nine colder months there will result .065 inches.

 COEFFICIENT OF EVAPORATION.

It must be borne in mind that the vessel used in computing the loss from evaporation was only three inches deep, and as it is well known that the loss from evaporation is greater in a shallow vessel than in a deep one, it follows that the mean daily evaporation of Lake Manitoba is not greater than .065 inches or .005416 feet throughout the year. This is the coefficient which shall be used for evaporation in the present report.

LAKE ST. MARTIN AND ITS RIVERS.

Lake St. Martin is surrounded by a low flat country, and it could be seen in every case during the journey to Little Saskatchewan river where the shore was approached, that the old shore line was obliterated by the water overflowing the land.

It has been already stated that the only supply to Lake St. Martin is Fairford River, while its outlet is the Little Saskatchewan River. This latter river on leaving the lake is very irregular as may be seen on the accompanying plan; expanding and dividing into branches for the first five miles of its length. At this distance from the lake it contracts for a short space into what appears to be its normal dimensions and here its discharge was ascertained. Its width was 309 feet, its greatest depth was 16 feet and the quantity of water passing in it was 12,486 cubic feet per second.

Seeing that the discharge into the lake through Fairford River is 14,833 cubic feet per second, it follows that a quantity equal to 2,347 cubic feet per second is left in the lake to flow over the land or be carried off by evaporation.

HEIGHT OF THE SURFACES OF LAKES MANITOBA AND ST. MARTIN ABOVE THEIR NORMAL STATE.

It appears from Professor Hind's report that at the time he made his examination, 1853, Lake Manitoba was confined within boundaries which gave it an area of 1902 square miles, and Lake St. Martin had boundaries limiting its area to 316 square miles. Those areas shall be accepted here as the normal condition of these lakes.

In Professor Hind's report the difference of level between Lake Manitoba and Lake St. Martin is stated to be 15 feet approximately. On this subject it is necessary to remark that unless the weather was calm and had been calm for some time previously, it was difficult to obtain the levels of these lakes otherwise than approximately: for their surfaces rise and fall at the shore several inches each day in obedience to the direction of the wind. The difference of level between these lakes was obtained last autumn and the result varied by about one foot from that obtained by Professor Hind.

This near coincidence goes to show, that although both lakes have risen several feet since the first examination was made by Professor Hind over twenty years ago, yet they have risen equally and the surfaces of both lakes are now at equal elevations above their normal conditions. These elevations are investigated in Note A at the end of this report where it is shown that the height to which the water has risen above its normal state in Lake Manitoba or Lake St. Martin is 6 feet.

DEPTH OF WATER OVER SUBMERGED LANDS.

Adjacent to the channels of Fairford and White Mud rivers where the former descends to nearly the level of Lake St. Martin and the latter to the level of Lake Manitoba, the depth of water varies from 2 to about 4 feet in some places—some two

hundred feet removed from the channel the depth seldom exceeds 2 feet. Adjacent to the lake where it overflows the land the same depth of 2 feet is found and then of course diminishes to zero. So that one foot may be considered the mean depth of water over the submerged land.

QUANTITY OF LAND FLOODED.

The results obtained from the investigation continued up to this point, can now be applied to the determination of the area of land flooded by the overflow of Lake Manitoba and Lake St. Martin. The investigation determining those areas is given in Note B at the end. It will be there seen that the area of land flooded by Lake Manitoba is 323 square miles and by Lake St. Martin 765 square miles, or in other words, in consequence of the capacity of Fairford River not being sufficient to accommodate the increased demand on it when White Mud and Water Hen rivers are flooded, Lake Manitoba has overflowed its banks and flooded 323 square miles of territory; and in consequence of the capacity of the Little Saskatchewan river not being able to accommodate the increased demand on it when Fairford river is at high water, Lake St. Martin has overflowed its banks and submerged 765 square miles of territory: thus giving a total of 1088 square miles of land under water.

NATURE OF REMEDY PROPOSED.

The extent of land damaged by the overflow of those lakes being now ascertained and the prime cause being known, the question is reduced to the determination of means by which to redeem those lands as quickly as possible: the work to be as little expensive as possible and to be of such a nature as to debar for ever a recurrence of the present state of things.

On examining the general map of the country it will appear at once that in reducing Lake Manitoba to its original state, there is no other way but to increase the discharge from that Lake into Lake Winnipeg. The discharge from Lake Manitoba to Lake St. Martin must therefore be increased to a certain determinate extent and also that from Lake St. Martin to Lake Winnipeg.

The channels of the rivers Fairford and the Little Saskatchewan as they appear on the plan, forbid the idea of meddling with them to render them suitable for the conveyance of any fixed determinate quantity: although the positions of those rivers point out the most desirable localities where works to increase the discharge should be built.

When the flood of Water Hen river was at 1 $\frac{9}{10}$ feet above its level of the 5th August (that having been the day on which the examination was made) the quantity of land flooded by Lake Manitoba was found to be 323 square miles and as the area

of the lake is 1902 square miles then $\frac{(1902 + 323) 5280}{86,400} \times .005416$ is the amount of water evaporated per second.

If to this be added the amount carried off by Fairford river, 14,833 cubic feet per second, the sum will be the total amount of water carried off per second from the lake.

Now, as Water Hen, White Mud and Rat rivers when high give a united discharge into the lake of 20,796 cubic feet per second there will result

$$20796 - \frac{(1902 + 323) \times 5280}{86400} \times .005416 - 14833 = 2075$$

the quantity by which the water accumulates per second and spreads over the land, while Water Hen river remains at its maximum height. It would therefore seem that besides the discharge through Fairford river an additional discharge of 2,075 cubic feet per second should be obtained from Lake Manitoba:

It is not necessary, however, to build works giving so large a discharge, for this

state of things exists only during the short interval of high water. At the time the examination was made, this quantity did not exist, the river having fallen $1\frac{5}{8}$ feet as has been already shown, and it appears that the time the river occupied in rising to high water mark and falling again to the level it had on the 5th-August was about three months.

The extra quantity poured into the lake during this rising and falling of Water Hen River would be $\frac{2}{3}$ the quantity which would be poured into it, if the river during the three months had remained at its high level (See note C at end); hence if a denote the number of seconds in a month, then $2,075 \times 3 a \times \frac{2}{3} = 2490a$ represents the entire quantity poured into the lake during the three months in which the flood was rising and falling. This would therefore be the yearly contribution towards raising the lake above its level of the 5th August, if the contributing rivers should continue to rise to the same heights during succeeding years.

If works are built which will carry off 1,480 cubic feet per second, then the quantity carried off during a year will be $1,480 \times 12 a$, and the lake will be diminished by a quantity equivalent to $17,760 a - 2,490 a = 15,270a$ and its level will be lowered by a depth equal to $8\frac{1}{2}$ inches.

According to this arrangement, and allowing the rain and snow fall to continue as great in the future as they have been in the last five years, and that Lake St. Martin be left in its present condition, the flooded land around Lake Manitoba would be freed from water in less than three years and the lake would be reduced to its normal state in less than five years. But, if Lake St. Martin be also relieved by an increased discharge from it, the land will be redeemed and Lake Manitoba lowered much sooner as will be seen further on.

It may be supposed that the equivalent water of the winter snow which falls on the lake itself and remains there until spring forms another source of supply and must be added to the contributions of the rivers supplying the lake, in order to obtain all the accumulation whose removal must be provided for. But the winter snow on the lake does not enter as a factor, for the reason that the snow water has time to flow off through the outlet before the rivers rise to their full heights, and therefore these two sources of supply cannot occur at the same time.

LAKE ST. MARTIN.

The only supply to Lake St. Martin is Fairford River, which furnishes 14,833 cubic feet per second, and its outlet is the Little Saskatchewan, which carries off 12,486 cubic feet, thus leaving 2,347 cubic feet per second to raise the lake and flood the land. As Fairford River was charged to its full capacity when the examination was made, there can be no higher flood in it than that which then existed; it follows that there must exist an equality between the contribution from this river on the one side and the amounts carried off by the Little Saskatchewan and evaporation on the other side. In this case then, there is no extra amount arising from a high water level going to increase the lake as in the case of Water Hen River. To redeem all the flooded land in one year would require a work competent to carry off 1,162 cubic feet per second. This would lower the lake $2\frac{1}{8}$ feet in a year. It would, moreover, reduce the lake to its normal state within three years, if the increased discharge from Lake Manitoba were not in operation.

If however the works on Lake Manitoba were finished at the same time, or before those of Lake St. Martin, then the desired effect on the latter lake would be retarded while that on the former lake would not be augmented; but, if the works on Lake St. Martin were completed one year before the completion of those of Lake Manitoba, the effect on both would be augmented. Thus, if Lake St. Martin were reduced $2\frac{1}{8}$ feet, the discharge from Lake Manitoba through the work which otherwise would produce 1,480 cubic feet per second, would be now increased to 1,637 cubic feet per second, by this means reducing its level by eleven inches in one year and bringing it within its original boundaries in proportionally less time.

Here a question arises as to the desirability of lowering these lakes to their

former levels. If this be done, it can be seen on reference to the soundings given on the accompanying plan, that at the entrance to Fairford River there will be only about two feet of water and at the narrows of Lake St. Martin there will be only the about same depth.

Such a depth is not sufficient to accommodate craft of any respectable size to pass from Lake Winnipeg to Lake Manitoba. It is therefore proposed to lower these lakes to the amount of $4\frac{1}{2}$ feet, thus leaving $3\frac{1}{2}$ feet as the minimum depth of water for navigation.

PROPOSED CUT FROM LAKE MANITOBA.

With this end in view a cut is here proposed to be made from Lake Manitoba to Station 62 on Fairford River (vide plan). This cut is to be 10,500 feet long and 50 feet wide at bottom with slopes of one in two. The sill at entrance is to be 54 inches below the present level of the lake.

As the water of the lake is to be prevented from descending below the proposed level, it becomes necessary to guard against any undue increase to the discharge through this cut from damage to its entrance. With this view the entrance is to be protected with a double row of sheet piling and to be paved with masonry for 150 feet of its length.

It will be capable of discharging 1,480 cubic feet of water per second, and although discharging into Fairford River, it cannot much affect the discharge through that river from Lake Manitoba. It will raise the water $9\frac{1}{2}$ inches at the point of concurrence; but this locality being below the rapids, and $9\frac{1}{4}$ feet below the level of Lake Manitoba, the discharge from the lake will not be influenced to any serious extent.

The cost of this cut is estimated at \$36,000.

PROPOSED CUT FROM LAKE ST. MARTIN.

Another cut is proposed to be made from Lake St. Martin, commencing about $2\frac{1}{2}$ miles south of the head of the Little Saskatchewan River and going direct to Lake Winnipeg, as depicted on the plan of reference.

It will be capable of discharging 1,162 cubic feet per second. It will be $12\frac{1}{4}$ miles long and 60 feet wide at bottom; being protected at its entrance similarly to that from Lake Manitoba.

The estimated cost of this work is \$245,000. If to this sum be added the cost of the work at Lake Manitoba, \$36,000, there will result, as the estimated cost of all the improvements, the sum of \$281,000.

In consequence of the lateness of the season when the survey was made, there was not an opportunity to take a section along either of those projected lines; the estimate of the cost is, therefore, approximate; but, the country is a plane along both routes, a fact which gives an opportunity for obtaining a close approximation on that account.

It is impossible for me to state, with certainty, what the character of all the land is, which is flooded. There is very little of it occupied by settlers except at the southern extremity of Lake Manitoba and a small patch occupied by Indians at Fairford village. In each of these cases the land is unexceptionally good. I may state that I have sailed in a skiff over unoccupied meadow land, which was covered with some two feet of water in the vicinity of Lake St. Martin where the hay was standing $2\frac{1}{2}$ feet above the surface; the boat making a channel through it.

Estimating all the flooded land to be worth an average price of \$2 per acre, the total value would reach the sum of \$1,392,640.

It has already been shown that while the supply at the water shed, which forms the source of the contributing rivers, shall continue to be as great as it has been for the last five years, Lake Manitoba must continue to rise for some time to come. Under such circumstances the area of the flooded land would continue to increase;

and, as there are no means of ascertaining whether the supply of water shall commence to decline or continue to increase, so there are no means of ascertaining when or where the flood shall stop if matters are left in their present condition.

It may be supposed that the conducting of such an amount of water as the proposed cut conveys into Lake Winnipeg will be the cause of raising the level of the water of that lake, and thus creating in its vicinity all the hardships which are now complained of in the vicinity of Lake Manitoba.

If the proposed cut were made to Lake Winnipeg, then, although all the water discharged through it were to remain in that lake, it would not raise its surface two inches in the year; but, when the fact is considered that the raising of the surface of a lake will always increase the discharge through its outlet, then it may be concluded that the level of Lake Winnipeg will not be sensibly affected by the proposed improvements.

Those ditches which are here recommended to be cut from Lake Manitoba and Lake St. Martin will never require to be repaired; for the sole object in each case being to convey away a certain amount of water, it follows that after this required amount shall have passed the sill of entrance, it matters not afterwards how it acts; whether it excavates for itself a deeper channel by its action on the bottom, or a wider channel by wearing away the sides, the result in either case would only tend to aid in accomplishing the object in view.

NOTE A.

LAKE MANITOBA.

On referring to the soundings taken in Lake Manitoba, it will be seen that the line A, No. 4, at the head of Fairford River, may be considered the place from which the river starts. The section along that line will be, as in the annexed Figure No. 1, where A, No. 4, represents the surface of the water and is 874 feet long. The numbers along this line represent the soundings that were taken, and are 46 feet apart.

It can be easily ascertained that the area of this section is $S=7107$ square feet. The wetted perimeter is $C=874.84$ feet. The Hydraulic depth is $H=8.1238$, and the square root of the inclination as the river leaves this line is $\sqrt{P}=.0077096$.

LAKE ST. MARTIN.

Similarly, the first line of soundings taken at the entrance of the Little Saskatchewan River, as given on plan, may be considered as the line of departure of that river from Lake St. Martin, and is represented in the annexed figure No. 2. The length is 1,080 feet and the soundings are as represented by the figures along this line, being $67\frac{1}{2}$ feet apart.

The area of this Section is $S=8235$ square feet. The wetted perimeter is $C'=1080.54$. The Hydraulic depth is $H'=7.6212$ and the square root of inclination is $\sqrt{P'}=.005781$.

Let X denote the height of water in each of these lakes above its normal state, or the depth below the surface lines of these sections at which the level of the normal state exists. Then, looking at the Fairford section (Figure No. 1), it appears that at the left end the average inclination, for a short distance, of the bed is 8 feet in 92 feet, and at the right end it is 5 feet in 69 feet. Hence the following proportions:—

$8 : 92 :: x : \frac{8}{92}x$ and $5 : 69 :: x : \frac{5}{69}x$. Wherefore $874 - \frac{8}{92}x - \frac{5}{69}x =$ length of Section at depth $x = 874 - \frac{121}{116}x$ and the area for the depth x will be $(874 - \frac{121}{116}x)^2 x$, and the area of the Section below the depth x will be $7107 - (874 - \frac{121}{116}x)^2 x$.

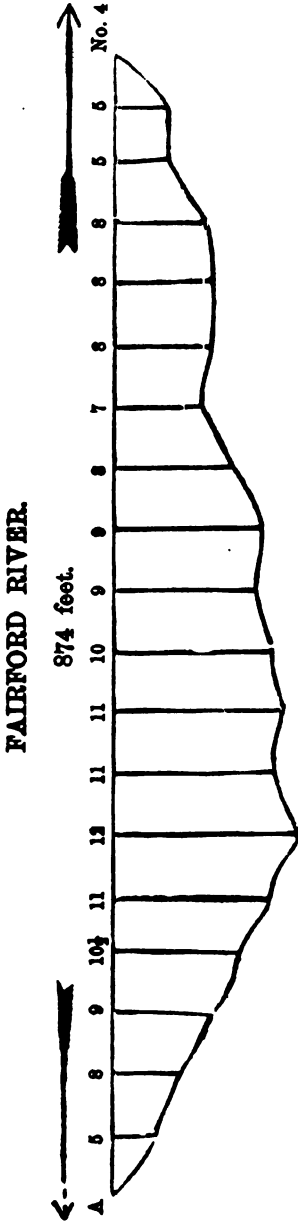


Fig. No. 1.

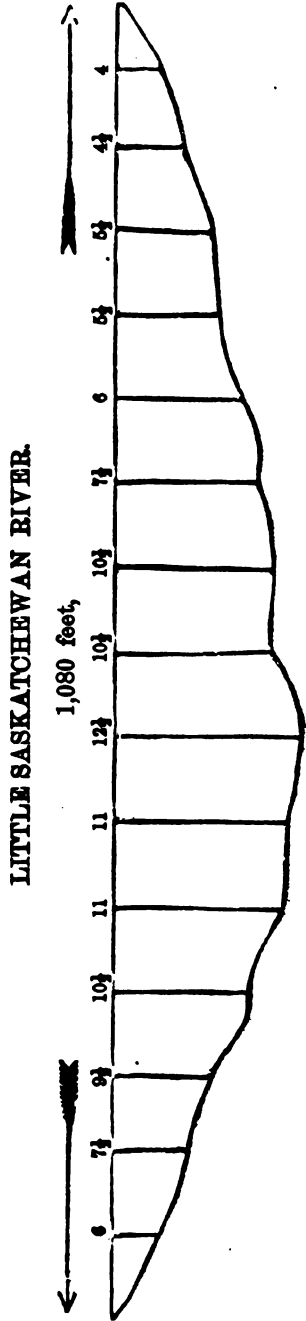


Fig. No. 2.

The wetted perimeter being diminished at the ends by about $\frac{1}{10}$ ft. will be

$$C = 874.30 - \frac{1012x}{40}$$

$$\text{The Hydraulic depth is } H = \frac{7107 - (874 - \frac{506x}{40})x}{874.30 - \frac{1012x}{40}}$$

Hence, if Q represent the discharge through Fairford River, the value of Q when the lake is reduced to its normal condition will be

$$Q = 95 \times .0077096 (7107 - 874 - \frac{506x}{40})x \sqrt{\frac{7107 - (874 - \frac{506x}{40})x}{874.30 - \frac{1012x}{40}}}$$

On referring to the Section (fig. No. 2), the average inclination of the bottom for a short distance at the left end of this Section is $7\frac{1}{2}$ feet in 135 feet, and at the right end it is $4\frac{1}{2}$ feet in 135 feet. Hence the following proportions:—

$$7\frac{1}{2} : 135 :: x : \frac{135x}{7\frac{1}{2}} \text{ and } 4\frac{1}{2} : 135 :: x : \frac{135x}{4\frac{1}{2}}$$

The length of this Section at the depth x will therefore be

$$1080 - \frac{135x}{7\frac{1}{2}} - \frac{135x}{4\frac{1}{2}} = 1080 - 48x$$

and the wetted perimeter is $1080 - 48x$ almost exactly.

The area of the Section for the depth x will be $(1080 - 24x)x$ and the area below the depth x , or when the lake is in its normal state, will be

$$S^1 = 8235 - (1080 - 24x)x. \text{ The Hydraulic depth will be } \frac{8235 - (1080 - 24x)x}{1080 - 48x}$$

Therefore, the discharge through the Little Saskatchewan, when Lake St. Martin is in its normal state, will be

$$Q^1 = 95 \times .005781 [8235 - (1080 - 24x)x] \sqrt{\frac{8235 - (1080 - 24x)x}{1080 - 48x}}$$

When Lakes Manitoba and St. Martin are in their normal state, the discharge through the Little Saskatchewan, together with the evaporation from Lake St. Martin must counterbalance the discharge through Fairford River. The evaporation of Lake St. Martin, whose area is 316 square miles, is 552 feet per second. If this quantity be added to the value of Q^1 there will result $Q = Q^1 + 552$, or the following equation will exist:—

$$[7107 - (874 - \frac{506x}{40})x] \left[\frac{7107 - (874 - \frac{506x}{40})x}{874.30 - \frac{1012x}{40}} \right]^{\frac{1}{2}} =$$

$$.005781 \times [8235 - (1080 - 24x)x] \left(\frac{8235 - [1080 - 24x]x}{1080 - 48x} \right)^{\frac{1}{2}} + 552$$

The value of x found from this equation is 6 feet; whence it follows that when the examination was made last autumn the waters of Lakes Manitoba and St. Martin were 6 feet above the legitimate levels of those lakes.

NOTE B.

THE AREA OF LAND FLOODED.

LAKE MANITOBA.

Water Hen River, when at high water, furnishes.	18,642	cubic feet.
White Mud and Rat Rivers.....	2,154	"
Total amount poured into the lake.....	20,796	"
Fairford River carries off.....	14,833	"
Amount remaining in lake.....	5,963	"

This amount of 5,963 cubic feet per second remains to raise the lake and flow over the land or be carried off by evaporation.

Let z sq. feet denote the area of land flooded. Then $z \times 1 =$ cubical contents of all the water over this land. $1902 \times 5280 \}^2 \times 6$ is the cubical contents of all the water in the lake over its normal state, and as it occupied 5 years in increasing to this amount, there will result, $\frac{z + 1902 + 5280 \}^2 \times 6}{5 \times 365} =$ the increase per day, and $(z + 1902 + 5280 \}^2) \times .005416 =$ the amount carried off by evaporation. Hence the following equation : $\frac{z + 1902 \times 5280 \}^2 \times 6}{5 \times 365} + (z + 1902 \times 5280 \}^2) 005416 = 5963 \times 86400$ —the number of seconds in a day being 86400.

The resolution of this equation will give $z = 323$ square miles.

LAKE ST. MARTIN.

Fairford River furnishes.	14,833	cubic feet per second.
Little Saskatchewan.....	12,486	" "
Amount remaining in lake....	2,347	" "

This amount of 2,347 cubic feet per second remains to raise the lake and flood the adjacent land, and is partly carried off by evaporation.

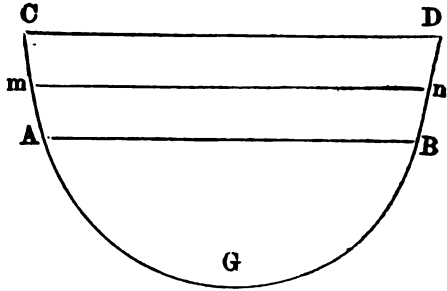
Let Z^1 denote the area of land which is flooded by this lake ; then, by pursuing the same mode of reasoning as in the case of Lake Manitoba, there will result the following equation :—

$$\frac{Z^1 + 316 \times 5280 \}^2 \times 6}{5 \times 365} + (Z^1 + 316 \times 5280 \}^2) .005416 = 2347 \times 86400$$

The resolution of this Equation gives $Z^1 = 765$ Square Miles.

NOTE C.

Let C A G B D be a section of Water Hen River ; A B the level of water surface on the 5th August and C D its level when at high water—Let Q=discharge per second at high water,



T = Time the river took to rise during spring to the level of C D.

y = Any intermediate time as when level is at m n.

λ = Difference of level between A B & C D = $1\frac{4}{5}$ feet.

λ' = Difference of level between A B & m n.

Now as λ is supposed to be described uniformly, it follows that the height λ' of m n above A B varies as y. It is also evident that the section A B m n varies as the height λ' and consequently as y.

Taking into account the flow through the Section A B C D the discharge must vary as the Section $\times \sqrt{\text{Hydraulic depth}}$, and as h and h¹ may without sensible error be considered the hydraulic depths at the levels C D and m n, it follows that the discharges at C D and m n will vary as T T^{1/2} and y y^{1/2}.

Hence if q represent the discharge at level m n.

$$Q : q :: T^{\frac{3}{2}} : y^{\frac{3}{2}} \text{ and } q = \frac{Qy^{\frac{3}{2}}}{T^{\frac{3}{2}}}$$

The entire discharge during the time d y will be $\frac{Qy^{\frac{3}{2}} d y}{T^{\frac{3}{2}}}$ and during the time y

it will be $\int \frac{Qy^{\frac{3}{2}} d y}{T^{\frac{3}{2}}}$. This is $\frac{Qy^{\frac{3}{2}}}{T^{\frac{3}{2}}} \times \frac{2}{3}$ and when y becomes T this becomes $Q T \times \frac{2}{3}$.

By following the same mode of reasoning, if T¹=the time of falling from high water to the level A B, we would get T Q¹ $\times \frac{2}{3}$ =the discharge during the time T¹; hence Q $\times (T+T^1) \times \frac{2}{3}$ =the entire discharge, and as T+T¹ = 3 months; Q $\times 3\text{mos.} \times \frac{2}{3}$ is the quantity.



EVAPORATION OF THE WATER of Lake Manitoba in a Tin vessel placed in the centre of another Tin vessel containing a mixture of sand and gravel.

Day of month.	Time of day.	Depth of water in inches.
	h.m.	
July 29th	6.30 A M	2.15
	6.30 P M	1.90
30th	6.35 A M	1.85
	7.15 P M	1.68
31st	9.05 A M	1.63
	6.40 P M	1.30
August 1st	7.30 A M	1.25
	7.00 P M	1.05
2nd	7.00 A M	1.05
	7.00 P M	0.85
3rd	7.15 A M	0.80
	7.00 P M	0.75
4th	7.00 A M	0.70
	7.00 P M	0.50
5th	6.45 A M	0.45
	7.05 P M	0.25
	7.30 P M	1.95
6th	7.15 A M	1.90
	7.45 P M	1.65
7th	8.45 A M	1.60
	7.20 P M	1.30
8th	7.00 A M	1.25
	6.05 P M	1.15
9th	6.15 A M	1.12
	6.45 P M	0.82
10th	6.30 A M	0.80
	6.30 P M	0.50
11th	8.00 P M	2.80
12th	7.00 A M	2.75
	7.00 P M	2.52
13th	6.30 A M	2.50
	7.00 P M	2.30
14th	8.00 A M	2.28
	6.30 P M	2.15
15th	7.00 A M	2.18
	6.00 P M	2.80
16th	6.30 A M	2.78
	6.30 P M	2.65
17th	6.30 A M	2.62
	7.00 P M	2.45
18 h	6.30 A M	2.45
	7.00 P M	2.20
19t	6.30 A M	2.15
	7.00 P M	1.95
20th	6.30 A M	1.92
	7.00 P M	1.75
21st	8.30 A M	1.74
	7.00 P M	1.56

Replenished.

Replenished.

Replenished.

Evaporation of the Water.—(Continued.)

Day of Month.	Time of Day.	Depth of Water in Inches.
		Removed to Little Saskatchewan.
22nd	7.00 A M	1.54 Replenished.
	7.30 P M	1.35
26th	7.30 A M	2.68
	6.00 P M	2.48
27th	7.00 A M	2.48
	6.30 P M	2.35
28th	7.15 A M	2.34
	6.00 P M	2.20
29th	7.00 A M	2.20
	7.00 P M	2.03
30th	8.00 A M	2.04
	5.45 P M	1.95
31st	7.30 A M	1.95
	6.00 P M	1.78
September 1st	8.30 A M	1.78
	7.00 P M	1.60
2nd	7.30 A M	1.61
	6.45 P M	1.50
3rd	8.00 A M	1.52
	5.30 P M	1.35
4th	9.00 A M	1.35
	5.00 P M	1.40
5th	8.00 A M	1.43
	6.00 P M	1.42
6th	6.30 A M	1.42
	7.00 P M	1.25
7th	7.00 A M	1.25
	7.00 P M	1.05
8th	8.00 A M	1.06
	8.00 P M	0.90
9th	7.30 A M	0.92
	5.30 P M	0.92
10th	8.00 A M	0.92
	4.30 P M	2.50 Replenished.
11th	7.45 A M	2.50
	6.00 P M	2.30
12th	8.00 A M	2.30
	6.30 P M	2.15

REGISTER OF GAUGE at Entrance of Fairford River—Fig. 5 on Gauge having been at the surface of the water when gauge was placed in position.

Day of Month.	Height of Water.	Weather.
July 28th A M	5.00	S. W. Wind.
29th "	4.95	North "
30th "	4.85	North, nearly calm.
31st "	4.90	Calm.
August 1st "	5.15	South wind.
2nd "	5.05	West "
3rd "	4.60	North and cloudy.
4th "	4.60	West wind and clear.
5th "	4.30	North West wind.
6th "	4.50	South "
7th "	5.00	South "
8th "	4.65	North-West "
	P M	North-West "
	4.60	West "
9th A M	4.63	North wind and clear.
	P M	S. W. "
	4.50	South "
10th A M	4.58	West "
	P M	West "
	4.70	North "
11th A M	4.70	North "
	P M	West "
	4.70	S. W. "
12th A M	4.60	South "
	P M	" "
	4.10	South "
13th A M	4.30	" "
	P M	Cloudy.
	4.40	"
14th A M	4.55	Clear.
	P M	"
	4.60	
15th A M	4.80	South wind.
	P M	Cloudy.
	4.80	North wind.
16th A M	4.80	
	P M	
	4.80	
17th A M	4.60	
	P M	
	4.50	
18th A M	4.40	
	P M	
	4.40	
19th A M	4.50	South wind.
	P M	Cloudy.
	4.50	North wind.
20th A M	4.40	
	P M	
	4.30	
August 21st A M	4.30	South wind.
	P M	
	4.50	
22nd A M	4.70	
	P M	
	4.50	
23rd A M	5.00	South-West wind.
	P M	Cloudy.
	4.80	Clear and calm.
24th A M	4.60	
	P M	
	4.00	
25th A M	4.60	Clear and West wind.
	P M	
	4.50	

Register of Gauge—Continued.)

DAY OF MONTH.	HEIGHT OF WATER.	WEATHER.
26th A M	4.40	North wind.
P M	4.30	Calm.
27th A M	4.30	North wind.
P M	4.20	" "
28th A M	4.40	Cloudy with rain.
P M	4.40	Clear.
29th A M	4.40	West wind.
P M	4.30	Very calm.
30th A M	4.20	North wind and clear.
P M	4.10	North wind.
31st A M	4.10	North. Cloudy
P M	4.10	" "
September 1st A M	4.10	" "
P M	4.10	" "
2nd A M	4.10	North wind.
P M	4.30	West wind and clear.
3rd A M	4.40	South wind.
P M	4.40	West "
4th A M	4.50	" "
P M	4.40	North "
5th A M	4.50	West "
P M	4.40	Very clear.
6th A M	4.40	Calm and clear.
P M	4.30	South wind.
7th A M	4.40	N. W. "
P M	4.40	West "
8th A M	4.40	Very calm.
P M	4.50	West wind.
9th A M	4.60	N. W. "
P M	4.60	West and cloudy.
10th A M	4.60	Very clear.
P M	4.50	South wind; cloudy.
11th A M	4.30	West wind; cloudy.
P M	4.30	North "
12th A M	4.30	Very calm.
P M	4.30	South wind.
13th A M	4.40	" "
P M	4.50	" "
14th A M	5.50 ?	North "
P M	4.10	Very calm.
15th A M	4.10	Very calm.
P M	4.10	North wind.
16th A M	4.10	Cloudy.
P M	4.10	"
17th A M	4.10	West wind.
P M	4.20	North "
18th A M	4.20	West " (Cloudy.)
P M	4.10	Calm; cloudy,

Register of Gauge—*Continued.*)

DAY OF MONTH:	HEIGHT OF	WEATER.
19th A M	4.10	North wind.
P M	4.10	" "
20th A M	4.30	North; raining.
P M	4.30	West wind.
21st A M	4.30	S.W. wind.
P M	4.60	
22nd P M	4.70	

The whole respectfully submitted.

THOS. GUERIN,
Engineer in charge of Surveys.

HENRY F. PERLEY, Esq.,
Chief Engineer of Public Works.

APPENDIX No. 6.

REPORT ON PUBLIC WORKS IN BRITISH COLUMBIA, BY HON. J. W. TRUTCH, C.M.G.

Ref. No. 29,433.

VICTORIA, B.C., 1st November, 1882.

SIR,—I beg to submit for your information the following report upon the Public Works carried on under my supervision during the fiscal year ended 30th June last, accompanied by a tabular statement thereof.

1. BEAVER ROCK.

This important work was brought to a conclusion on the 22nd August, 1881 and after a careful survey had been made by which it was determined that there were no projecting points of rock within 12 feet 6 inches of low water, level spring tides. The barges, caisson and other plant were removed and stored. There is now a depth of 12 feet 6 inches of water at low water, spring tides, over the whole site of the rock. I had the honor of addressing you more fully on this matter in my letters dated 28th of June* and 16th September, 1881, * in which I asked your instructions as to the depth of water to be obtained, and as to the disposition to be made of the balance of the contract price as well as of the barges, caisson and other plant employed on the work, but have not received your directions on the latter point.

2. BULKHEAD AND REPAIRS TO MARINE HOSPITAL.

This work consisting of a bulkhead along the foreshore of Victoria Harbour in front of the Marine Hospital, with landing stage and steps, together with an extension of the verandah, a new brick tank and sundry minor repairs, was performed by Messrs. Smith & Clark, Contractors of this place, for the sum of \$1,163 in a satisfactory manner.

3. REPAIRS AND ALTERATIONS TO VICTORIA POST OFFICE.

The work done on this building has, I believe, put it in as efficient and stable condition as practicable. This work consisted in altering the internal arrangements to accommodate the Savings Bank and Telegraph Office, building new vaults, water-closets and vestibules, and in lengthening the stairway, painting and kalsomining the inside walls, and rendering with Portland cement mortar the rear and side walls of the main building and vaults, and paving the backyard. This work was performed satisfactorily under contracts—for the greater part—by Messrs. Charles Hayward, & Smith & Clark, Contractors of this place, the expenditure amounting in the aggregate to \$4,279.25.

* In Annual Report 1881, Appendix No. 6, pages 70 and 72.

4 DREDGING AND REPAIRS TO DREDGE VESSELS.

Operations with the object of improving Victoria Harbor by dredging were commenced on the 19th of January last, after the dredge and other vessels had been put in thorough repair—under the direct superintendence of Mr. Robert Dexter.

Acting on representations made to me by the Board of Trade of this City, that the harbor along the front of the wharves had to some extent filled in, as to which I reported to you by letters of 19th and 25th January * last, I directed the Superintendent to dredge from a point south of the proposed site of the Custom House wharf to Johnson Street, for a width of 50 feet and to a depth giving 14 feet at low water spring tides. After dredging in this locality until the end of April, I became fully satisfied from personal observation, and from the reports of the Superintendent, that the harbor had not filled in to any appreciable extent from tidal effects or from sewage or street scourings, but only from the result of carelessness of persons unloading coal. In consideration of this fact and of the high rate of the cost of the work, and that it was found impossible to obtain the desired depth of water throughout this portion of the harbor on account of rock cropping up in several places, causing frequent injury to the dredge and consequent expense, I decided to discontinue operations here and send the dredge to resume works on the spit off Shoal Point, at the entrance to the harbor, which was accordingly done on the 1st of May, and this work continued until the close of the fiscal year 1881-82.

On resuming operations at Shoal Point, the Superintendent was directed to turn his attention principally to cutting a channel, to a depth of 14 ft. at ordinary low water spring tides, through the spit which extends about 450 feet from the point. Rock having been struck in several places in the line of this proposed channel before the required depth was reached, it was thought advisable to dredge outside, that is, to the northward, of these rocks, and inside of the former site of the old Beacon or Buoy No. 2, thus affording to large vessels a better sweep when approaching "Dredger Rock."

I stated more fully my views with reference to the dredging operations, both in the Inner Harbor and at Shoal Point in reports to you dated 19th and 25th January and 9th February * last, to which I beg to draw your attention.

I enclose a statement prepared by Mr F. C. Gramble, Assistant Engineer in my office, showing the work performed by the dredge between the 19th January and 30th June and the cost thereof. This statement shows (firstly) the total quantity of material dredged along the wharf front, to be about 11,808 cubic yards of stiff blue clay, mud, sand and coal at an expenditure of \$4,988.88 or at a cost per cubic yard of about 42½cts not including repairs; and (secondly) the total quantity removed at Shoal Point from 1st May to 30th June to be 10,548 cubic yards at an expenditure of \$2,470.84, or at a cost per cubic yard of about 23½cts not including repairs. Since the 30th June operations have been continued at Shoal Point with still more satisfactory results.

From the foregoing it will appear that from the 19th January to the 30th of June the amount expended on dredging was \$7,459.72 which, together with the amount expended on "Repairs to Dredge vessels" viz. \$3,372.96 makes a grand total expenditure on this service of \$10,832.70.

In compliance with your instructions, conveyed to me in Departmental letter dated 3rd May last—acknowledged 25th May.—I caused a survey to be made of Shoal Point showing the site of dredging operations. This survey was accordingly made in June and therefore does not show the full result of last year's work. It will consequently be necessary in order that the full results of dredging at Shoal Point during 1882 may be exhibited that further soundings may be taken on discontinuance of dredging operations in January next, by which time the appropriation for dredging will have been expended. I propose to send you then a further report on this subject with a plan of the locality and chart of the soundings.

* See notes following this report.

5 Post Office Building, New-Westminster.

Mr. Charles Hayward signed the contract for the erection of this building on the 6th December last, but owing to the unfavorable season, he was not able to commence building until May when he was further delayed pending your decision upon some proposed alterations. The progress has therefore not been as rapid as could be desired, partly owing to the above circumstances and partly to certain difficulties which have arisen between Mr. James Kennedy, Superintending Architect (appointed in accordance with instructions contained in the Chief Architect's letter dated 16th August, 1881, and telegrams of 9th, 13th and 22nd March, 1882) and the contractor; but as these difficulties arose subsequently to the close of the last fiscal year, they need not be detailed in this report. I shall, however, have the honor of addressing you further on this subject in a separate report at an early date.

6. PENITENTIARY WORKSHOPS, NEW WESTMINSTER.

The contract for this work was awarded to Messrs. Elliot and Levy of New Westminster, for the sum of \$3,359, and was carried out under the supervision of Mr. James Kennedy and completed on the 11th March last. Extra work costing \$31.75 brought the amount expended up to \$3,390.75.

7. PENITENTIARY FENCE.

A double fir board fence 12 feet high with cedar posts throughout, enclosing about 27 acres of the Penitentiary Reserve, has been erected. This work was executed by convict labor under the direction of the Warden in a satisfactory manner. The expenditure amounted to \$2,300.

8. IMPROVEMENT COURTNEY RIVER.

I addressed you fully on the 14th November, 1881, * on the attempt made to remove snags from this river.

9. REPAIRS TO VICTORIA BATTERIES.

The work of repairing two of the Victoria Batteries, viz. those at Finlayson and Macaulay Points, was performed by day's labor after consultation with the Acting Deputy Adjutant General, Captain Dupont, who has expressed his satisfaction with the works done. I have addressed you more fully on this subject in a separate report of 31st October last.*

10. REPAIRS TO PUBLIC BUILDINGS.

Various necessary repairs have been effected on the several Public Buildings in this Province at an aggregate cost of \$486.74; but do not seem to call for special mention.

11. PENITENTIARY, NEW WESTMINSTER.

This account includes certain repairs to and supplies furnished the Penitentiary Building amounting to the aggregate sum of \$369.50

* See notes following this report.

12 & 13. NAAS AND SKEENA RIVERS IMPROVEMENTS.

Upon the authorization conveyed by letter No. 11,839 of 28th March, and No. 13,749 of 28th July last and by telegram of 24th April last, Mr. Croasdaile and Mr. Turner were instructed by me to expend \$500 and \$1,500, respectively, in removing snags from the channels of the Naas and Skeena Rivers as reported by my letters to you of 17th April * and letter from my Secretary, Mr. Roebuck to Mr. Secretary Ennis of 15th August last.* I have, however, not received any reports from either Mr. Croasdaile or Mr. Turner as to expenditures on these works and consequently no payments have been made by me on these accounts.

14. TELEGRAPH SERVICE.

A report on this service from Mr. J. Wilson, District Superintendent, has been forwarded by me, with covering letter of this day's date, to Mr. F. N. Gisborne, Chief Superintendent, who will doubtless embody the same in his annual report to you.

I have the honor to be, Sir,
You obedient servant,

JOSEPH W. TRUTCH.

The Honorable

Sir **HECTOR L. LANGEVIN, K.C.M.G., C.B.,**
Minister of Public Works,
Ottawa.

BRITISH COLUMBIA.—PUBLIC WORKS DEPARTMENT, 1881-82.

STATEMENT of Public Works carried on in the Province of British Columbia, during fiscal year ended 30th June, 1882.

Name of Work.	Province, District or County.	Number and Date of Letter authorizing Expenditure.	Expenditure authorized.	Expenditure or liability incurred from 1st July, 1881, to 30th June, 1882.	Letters from Dominion Government Agent to the Honourable the Minister of Public Works.
No. 1.—Beaver Rock.....	Victoria, B.C.	No. 8991, Sept. 16, 1881....	\$ 6,500 00	\$ 1,783 66	18th November, 1881, 26th February, 1882 and 17th April, 1882.
No. 2.—Marine Hospital.....	do	23rd April, 1881, from Thos. Scott, Chief Architect.....	1,163 00	1,163 00	3rd August, 1882.
No. 3.—Repairs and alterations to Victoria Post Office.	do	Telegrams 25th April, and 16th August, 1881.....	2,950 00	.....	Telegram, 18th April, 1881. 14th May, 1881. Letter, 14th May, 1881.
No. 4.—Dredging Victoria Harbour. Repairs to Dredge vessels...	do	No. 9830, Nov. 9, 1881....	660 00	4,279 25	Telegram, 26th October, 1881.
	do	No. 7453, June 22, 1881....	7,500 00	7,469 72	19th August, 1881. 19th January, 1882.
	do	do	3,400 00	3,372 98	25th January, 1882. 9th February, 1882.
	do	Telegrams 16th and 24th September, 1881.....	.....	.....	10th March, 1882. 26th May, 1882.
No. 5.—New Westminster Post Office Building	New Westminster, B.C.....	Contract dated 6th Dec. 1881, enclosed in Letter from Chief Architect 27th January, 1882....	15,474 00	.....	Telegrams, 15th September, 1881. 22nd September, 1881. 28th September, 1881. Letters 22nd April, 1882. 27th May, 1882.
	do	Telegram Chief Architect, 15th August, 1881.	742 00	No. 1 750 00	1st June, 1882. 13th June, 1882. 21st June, 1882. 17th July, 1882. 11th August, 1882. 25th September, 1882.
	do	Telegram Chief Architect.....	135 00	No. 2 500 90	Telegram to Chief Architect, 11th August, 1882.
No. 6.—Penitentiary workshop.....	do	Telegram, 26th Oct. 1881, authorizing. Contract dated 17th Nov., 1881.	3,359 00	No. 3 1,068 00	.....
No. 7.—Penitentiary Fence.....	do	No. 7080, 21st May, 1881.	1,900 00	No. 4 2,288 98	Letter 6th June, 1881. 25th June, 1881. Telegram, 6th September, 1882.
No. 8.—Courtney River Improvement.....	British Columbia...	No. 8601, 21st Sept., 1881, and No. 7463, 22nd June, 1881.....	500 00	470 65	Letter 17th August, 1881 and 14th November, 1881.
No. 9.—Repairs to Batteries.....	Victoria, B.C.	No. 11557, 27th May, 1882.	600 00	612 13	Letter 31st October, 1882.

BRITISH COLUMBIA,—PUBLIC WORKS DEPARTMENT, 1881-82—Continued.
 STATEMENT of Public Works carried on in the Province of British Columbia, during fiscal year ended 30th June, 1882.

Name of Work.	Province, District or County.	Number and Date of Letter authorizing Expenditure.	Expenditure authorized.	Expenditure or liability incurred from 1st July, 1881, to 30th June, 1882.	Letters from Dominion Government Agent to the Honourable the Minister or Public Works.
			\$ cts.	\$ cts.	
No. 10.—Repairs to Public Buildings	do	General authority by No. 4564, 15th Nov., 1880.....			
No. 11.—Repairs to Public Buildings	New Westminster, B.C.....	do do	486 74	Nil.	
No. 12.—Naas River Improvement...	British Columbia...	No. 11839, 28th March, 1882, and No. 13749, 28th July, 1882	500 00	369 50	Nil.
No. 13.—Skeena River Improvement.	do ...	No. 1374, 28th July, 1882.	2,000 00	Nil.	Letters 18th November, 1881. 25th February, 1882. 17th April, 1882. Secretary's letter 15th August, 1882.
No. 14.—Telegraph Service.....	.....	.....		43,411 88	Letters 29th November, 1881. 18th Jan., 1882. 15th August, 1882. Letter 1st November, 1882.

JOSEPH W. TRUTCH.

1st November, 1882.

NOTES.

DREDGING AND REPAIRS TO DREDGE VESSELS.

Ref. No. 20894.

VICTORIA, B.C., 19th January, 1882.

SIR,—Adverting to my letter to you of 27th October last, I have the honour to report that pursuant to your instructions to me by Departmental letter No. 9087 of 30th September last, the government dredge vessels and tug steamer "Georgia" have been brought to Victoria and the repairs necessary to place them in effective condition duly carried out, and that dredging operations in Victoria Harbor were commenced this morning.

It was found on inspection that the tug steamer "Georgia" was in so leaky a state that she had to be hauled out, a new sternpost put on to her and other extensive repairs made to her hull.

It is estimated that these repairs will render her efficient for the service she is now employed in for about two years longer, but after that period of work, she will probably become unfit for further service and will certainly not be worth further repairing.

The whole cost of repairing the tug and dredge which as far as was practicable has been done by contract with the lowest tenderers, will however not exceed the prescribed amount (\$3,400) appropriated for this purpose, including the wages of the crew of the dredger who have been engaged since the beginning of November in cleaning and repairing the machinery of that vessel.

Before coming to a conclusion as to the most beneficial manner of employing the services of the dredger, I thought it desirable to obtain the opinions on this matter of the Board of Trade, the Harbour Master, and the Agent of the Marine and Fisheries Department here.

These authorities concur in recommending and urging that the dredge should in the first place be set at work in the inner harbor to remove the accumulation of deposit which is supposed to have resulted from the sewage of the town, and to deepen the channel along the wharf frontage.

I have accordingly directed that dredging operations should be commenced in front of the site of the proposed Dominion Government wharf, opposite the Custom House, and continued along the city front as far as may be found advisable.

I have, however, serious apprehension that in consequence of the distance of the locality so proposed to be dredged from the mouth of the harbor, outside of which the dredged material has to be dumped and the consequent loss of time to the dredge in awaiting the return of the punts and tug, the cost per cubic yard of such dredging will be found to be excessive, as compared with that of continuing the dredging of the spit off Shoal Point at the mouth of the harbor where the length of towage would be diminished more than one half.

It is on this latter work that the dredge has been principally employed hitherto, and as it is clearly most essential to the improvement of the harbour that its entrance should be straightened and deepened by the removal of this spit, I propose that the dredge shall return to this work as soon at all events as that in the inner harbor commenced on this morning has been completed, which should not occupy her more than two or three months at most; and should this latter operation, after working on

it long enough to afford a practical test, prove too costly to be continued, as I fear may result, I propose to desist from it, and to set to work at Shoal Point spit forthwith.

Trusting this may receive your approval,

I have the honour to be, Sir,
Your obedient servant,

JOSEPH W. TRUTCH.

The Honourable

Sir HECTOR L. LANGEVIN, K. C. M. G., C. B.,
Minister of Public Works,
Ottawa.

Ref. No. 21112.

VICTORIA, B. C., 25th January, 1882.

SIR,—With reference to my letter to you of the 19th instant, reporting that the dredge after having undergone thorough repair had been set to work to deepen the inner harbor and wharf frontage at Victoria, with the ultimate intention, after this has been accomplished, of resuming the operation, on which she was formerly engaged, of removing the bar at Shoal Point which impedes the entrance of vessels of any considerable draught into the harbor, I have the honour to represent, that in order to execute economically this latter work, which would probably take two years to complete, it is obviously necessary, as has been pointed out by Mr. Pearse in his successive annual reports, that provision should be made for carrying it on continuously throughout the year.

The unsatisfactory results of the contrary course, which has prevailed for the most part, in former years, is so sufficiently shown by the statements accompanying Mr. Pearse Report of the 12th January, 1880, as to render further remark superfluous.

I beg therefore to recommend that, if it be determined to continue dredging improvements in Victoria Harbour, provision for such continuous work be made by an appropriation of a sum of not less than \$18,000 per annum, viz \$15,000 for running expenses of the dredge and tow steamer (being at the rate of \$1,250 per month) and \$3,000 to cover repair and renewal of machinery and plant.

In connection with the dredging of Shoal Point spit, and in order that the fullest benefit may be derived therefrom, it is very desirable that the rock in mid channel known as "Dredger Rock," should be removed. The cost of the removal of this rock has been estimated by Mr. Pearse at \$16,625; but sufficient data to base a close estimate of the work upon does not appear to have been obtained by him, and in order to procure this information more fully, and also to determine the exact points at which dredging can be most advantageously carried on, it is very desirable that a hydrographical re-survey of this portion of the harbor should be made forthwith.

The cost of this survey would be probably not less than \$1,000 including the expense of boring through the superincumbent clay down to the surface of the "Dredger" rock so as to ascertain the cubic contents of the portion of that rock which would have to be removed to give 14 feet ordinary low water over it.

I should be glad to have this survey undertaken this spring, and beg to ask your authority for such work within the limit of expenditure above stated, in addition to the salary of Mr. Gamble whose services I propose to employ in charge of it.

I have also to advise that four more punts be built to take the place of those now in use which are fast becoming worn out. Two of these punts should be supplied at once so as to prevent delay of the work in case of accident to those now in use. I propose to build these punts of a somewhat different model to the present ones, and estimate that they would cost \$750.00 a piece.

I beg to ask your authority to have two such punts built forthwith, and two more this summer, and that for the purpose of meeting the cost of these latter two, the sum of \$1,500 be added to the appropriation for next year's service in the improvement of Victoria Harbor.

The estimate for this service for the year 1882-83 would thus stand as follows :

Dredging in Victoria Harbor.

Running expenses of dredge and dredge vessels at \$1,250.00 per month	\$15,000 00
Repairs of dredge and dredge vessels	3,000 00
Two new punts	1,500 00
Total dredging	\$19,500 00
Removal of "Dredger Rock." Mr. Pearse's estimate.....	\$16,625 00

I have the honour to be, Sir,
Your obedient servant,

JOSEPH W. TRUTCH.

The Honorable Sir HECTOR L. LANGEVIN, K.C.M.G., C.B.,
Minister of Public Works, Ottawa, Canada.

Ref. No. 21651.

VICTORIA, B.C., 9th February, 1882.

SIR,—In reference to the estimate submitted in my letter to you of the 25th ultimo of the amount that will be required to meet the expense of continuing dredging operations in Victoria Harbor during the fiscal year 1882-83, I have the honour to enclose herewith a statement of the persons employed and wages paid, and showing in detail the present total monthly expenditure on this work, which amounts to \$1,198.90, a month, to which I have added in my estimate \$51.10 for contingencies, making \$1,250 a month and \$18,000 for the year's work.

I am unable to specify particulars as to the expenditure of the sum of \$3,000 proposed by me to be provided to meet necessary repairs and renewals of the plant and machinery.

Substantial repairs have just been effected, and it may be hoped that the expenditure of the whole of this sum may not be found requisite;—but in a work of this character the machinery is constantly liable to break down, and it is most desirable that a fund should be available to meet such contingencies.

I have added to the estimate a separate item of \$1,500 for two new punts to be built after the 30th June next, bringing up my estimate for dredging operations next year in Victoria Harbor to \$19,500.

In my letter above referred to of 25th ultimo, I have asked your authority to have two punts constructed immediately, making four new punts to be provided in all, to take the place of those now in use which are fast becoming worn out, and also to have a re-survey made of the harbor at an expense not to exceed \$1,000. As these contemplated expenditures would, however, be in excess of the amount appropriated

for dredging operations in British Columbia this year, I await your direction on the matter before incurring any expense on this account; but should you not consider it advisable to have these latter works undertaken immediately, I would beg to suggest that provision should be made for their execution after 30th June by the addition to the estimate for 1882-83 of the requisite amount to cover them, viz: \$2,500.

I have the honour to be, Sir,
Your obedient servant,

JOSEPH W. TRUTCH.

The Honorable

Sir HECTOR L. LANGEVIN, K.C.M.G., C.B.

VICTORIA HARBOUR IMPROVEMENTS.

ANALYTICAL STATEMENT of Work performed by the Dredge in Victoria Harbour, B.C., from the 19th of January, 1882, to the close of the Fiscal Year ended 30th June, 1882, of which 117 days were dredging days.

Month.	Dredged Material and Number of Punts.							Total Number of Punts.	Capacity of Punts in Cubic Yards.	Quantity dredged in Cubic Yards.	Cost.	Cost per Cub. Yard.	Remarks.	
	Hard Clay.	Sand.	Clay and Sand.	Gravel and Boulders.	Coal and Sand.	Coal and Shingle.	Sand and Shingle.							
January.....	78						78						Cost shown here does not include that of repairs. Taken from Harbour along front of wharves.	
February.....	120						120							
March.....	158	40	42				240							
April.....		20	54	48	68	28	218	18	11,808	4,988 88	42½			
May.....							294							Taken from spit off Shoal Point at Harbour entrance. Cost shown here does not include that of repairs.
June.....							292	18	10,548	2,470 84	23½			
	356	60	96	48	68	28	1,242		22,356	\$7,459 72				

Dredging..... \$7,459 72
 Repairs..... 3,372 98
 Grand total.....\$10,832 70

F. C. GAMBLE,
Assistant Engineer.

VICTORIA, 5th August, 1882.

STATEMENT showing present current Monthly Expenditure in connection with Dredging operations in Victoria Harbour, with estimate for twelve months work from 1st July, 1882, to 30th June, 1883.

Name.	Capacity.	Rate of Wages.	Amount.	Totals.
		\$ cts.	\$ cts.	\$ cts.
Upon Dredge :—				
Robt. Dexter.....	Superintendent.....	125 00	125 00	
William Steele.....	Engineer.....	100 00	100 00	
George Gardner.....	Fireman.....	50 00	50 00	
John Geider.....	Blacksmith.....	50 00	50 00	
Upon Tug "Georgia" :—				
William Scott.....	Captain.....	50 00	50 00	
Robt. Wickens.....	Engineer.....	70 00	70 00	
Upon Dredge :—				
Chas Repath.....	Carpenter and deck-hand..	50 00	50 00	
John Ramsay.....	do do	40 00	40 00	
Nicholas Sylvers.....	do do	40 00	40 00	
Wm. Saunders.....	Cook.....	40 00	40 00	
Jas. Griffiths.....	Deck-hand.....	40 00	40 00	
				655 00
Provisions (about) per month.....				200 00
Fuel—Coal, 30 tons, at \$5.25.....			157 50	
Wood, 26 cords, at \$3.90.....			101 40	
				258 90
Water supply, per month.....				10 00
Sundries—Lumber, nails, iron, rope, oil, tallow, cotton waste (about).....				75 00
Actual current monthly expenditure.....				1,198 90
Add—For contingencies (say).....				51 10
				1,250 00
Giving estimated expenses of working dredge in Victoria Harbour for 12 months from 1st July, 1882, to 30th June, 1883.....			15,000 00	
General repairs.....			3,000 00	
Two new mud punts.....			1,500 00	
Total Estimate for dredging and dredge repairs, Victoria Harbour Improvements for 1882-83.....				\$19,500 00

JOSEPH W. TRUTCH.

Victoria, B.C., 10th February, 1882.

IMPROVEMENT COURTNEY RIVER.

Ref. No. 19319.

VICTORIA, B.C., 14th November 1881.

SIR,—I have the honour to report to you that in accordance with your instructions to me by Department letter No. 8901 of 21st September last, I chartered the steamer "Maude" at \$40 a day for the purpose of undertaking the removal of the snags at the mouth of Courtney River, and proceeded in her himself (as I could not obtain the services of any other person acquainted with the locality on whom I felt reliance) on the 3rd instant to Nanaimo, and next day to Comox. The 5th and 7th instant were devoted to ascertaining the exact positions of the snags which offered the greatest hindrance to navigation, and in attaching to them at low tide chains and buoys so that the steamer might make fast to them at high water. On the 8th, the tide being favourable, the steamer entered the channel through the sands in Comox bay, and with much difficulty and after grounding frequently, reached the snags and attempted to tow them out to sea. Every effort to effect this, however, proved unavailing. The channel is so narrow, tortuous and shallow (not exceeding in depth 8 feet at high water according to observations made) and with so strong a current from the river setting across the sands, that it was found impracticable to drag the snags out to sea. After several renewed efforts during the 8th and 9th instant had proved unsuccessful, I concluded that further attempts would be futile, and therefore left for Victoria, which was reached on the 10th instant.

I have only to remark that though this attempt to remove the snags at the mouth of the Courtney River with a steamer of 6 feet draught proved unsuccessful, it established the fact that the entrance to and departure from this river, are impracticable, even for vessels of such light draught except at the top of exceptionally high tides, and in my judgment precludes all ground for renewing such an undertaking.

The expense of this service has been kept within the prescribed sum (\$500) appropriated for this purpose.

I have the honor to be, Sir,
Your obedient servant,

JOSEPH W. TRUTCH.

The Honorable

Sir HECTOR L. LANGRISSE K.C.M.G., C.B.,
Minister of Public Works, Ottawa, Canada.

REPAIRS TO VICTORIA BATTERIES.

Ref. No. 29247.

VICTORIA, B.C., 31st October, 1882.

SIR,—I have the honour to enclose a copy of a report to me from Mr. F. C. Gamble, Assistant Engineer in this office, upon the work recently carried out under his immediate superintendence in repairing and strengthening the Victoria Batteries, and representing that the sum authorized to be expended thereon, viz: \$600 did not suffice to complete all the requisite work, but that this might be accomplished by the expenditure of a further sum of \$150, which Mr. Gamble advises should be appropriated for this purpose.

I have communicated the substance of Mr. Gamble's report to Captain Dupont, Acting Deputy Adjutant General, who has informed me that he will address the Department of Militia and Defence in support of Mr. Gamble's recommendation, in which I also beg to express my concurrence.

I have the honor to be, Sir,
Your obedient servant,

JOSEPH W. TRUTCH.

The Honorable

Sir HECTOR L. LANGEVIN, K.C.M.G., C.B.,
Minister of Public Works, Ottawa, Canada.

VICTORIA, B. C.

SIR,—I have the honour to make the following report upon certain repairs to Finlayson and Macaulay Points Batteries, carried out in accordance with your verbal instructions.

Public tenders were invited for the work but all were found to exceed the amount appropriated, namely, \$600, in consequence of which you directed me to do the work by day's labor.

The repairs to Finlayson's Point Battery consisted in revetting or stockading in front of the guns with sawn cedar and around the traverse and along the side and rear parapets with split cedar, cleaning out the drains and putting in a log culvert. These repairs placed this Battery in as serviceable a condition as it was possible to do without exceeding the sum I had set apart for the purpose out of the appropriation, viz: \$235.00.

The expenditure of this sum on Finlayson's Point Battery left a balance of three hundred and sixty-five dollars to be expended on Macaulay Point Battery. I was in hopes that with this sum I would be able to place this Battery in as efficient a state as the other, but, in consequence of the limited time at my disposal, the great demand for labor, consequent upon the expected arrival of the Governor General, and the exorbitant wages demanded, I was only able to stockade in front of the guns, around the traverses and along the side parapets, leaving undone the rear parapets and shelter trenches to the magazine.

To do this latter very necessary work the further sum of \$150.00 will be required, which, together with the material we have on the ground, will put the Battery in a thoroughly serviceable state.

I have the honor, etc.,

F. C. GAMBLE,
Asst. Engineer

The Hon. J. W. TRUTCH, C. M. G.,
Dominion Government Agent,
Victoria.

NAAS RIVER IMPROVEMENT.

Ref. No. 23478.

VICTORIA, B. C., 17th April, 1882.

SIR,

I have the honor to acknowledge the receipt of your instructions by Departmental letter No. 11839 of the 28th ultimo, relative to improving the channel of Naas River, and to inform you that in accordance therewith, I have made arrangements with Mr. Croasdaile to-day to have the requisite work carried out under his personal direction within the limit of expenditure prescribed in your instructions, viz: \$500.00 and with the proviso that no payments can be made, on this account, until after the 1st of July next.

I have the honor to be, Sir,
Your obedient servant,

JOSEPH W. TRUTCH.

The Honorable

Sir HECTOR I. LANGEVIN, K.C.M.G., O.B.,
Minister of Public Works, Ottawa, Canada.

SKEENA RIVER IMPROVEMENT.

Ref. No. 26775.

VICTORIA, B. C., 15th August, 1882.

SIR,—I am directed by Mr. Trutch to acknowledge the receipt of your letter No. 13749, of the 28th ultimo, and to state that instructions have already been given by Mr. Trutch as authorized by the Honorable the Minister by letter No. 11839 of the 28th March last, and by telegram of the 24th April, respectively, to Mr. Croasdaile to expend \$500.00 in continuing the removal of snags from Naas River, and to Mr. J. H. Turner, for the expenditure of \$1,500 00 in removing snags and placing buoys, Skena River, under his superintendence.

I am also to state that Mr. Trutch is about to invite tenders for the removal of snags, Fraser River, and hopes to have this work carried out this autumn within the limit of expenditure authorized in your letter.

I have the honor to be, Sir,
Your obedient servant,

H. S. ROEBUCK,
Secretary.

F. H. ENNIS, Esq.,
Secretary,
Dept. Public Works, Ottawa, Canada.

 APPENDIX No. 7.

 SLIDE, BOOMS, ETC.—SAGUENAY DISTRICT.

CHIEF ENGINEER'S OFFICE,

OTTAWA, 5th December, 1882.

Ref. No. 29915.

SIR,—Herewith I transmit a report by Mr. Assistant Engineer Rosa on the works, etc., executed in connexion with the slide and booms at Lake St. John, River Saguenay, during the fiscal year ended 30th June, 1882.

I have the honor to be, Sir,
Your obedient servant,

HENRY F. PERLEY,
Chief Engineer.

F. H. ENNIS, Esq., Secretary,
Public Works Department.

QUEBEC, 18th November, 1882.

SIR,—I have the honor to report as follows on the works executed during the last fiscal year in connection with the slide and booms at Lake St. John, River Saguenay.

The bulkhead of the slide has been reconstructed as well as dam No. 7 which is 231 feet in length, 28 feet in height, and a mean width of 30 feet on the slope. These two works cost \$3,500.00.

A length of 669 feet of slide has been rebuilt, and temporary repairs made on a length of 2,000 feet of the old portion, at an outlay of \$3,000.00.

At the close of the year there remained 1,260 feet of slide to be reconstructed, and probably of this length 900 or 1,000 feet will be finished during the current year.

No. 6 dam which was constructed in 1860 should be rebuilt before the rising of the lake next spring. It is about 128 feet in length, 18 feet in height, and of a mean width on the slope of 32 feet.

During 1881-82, 32,000 logs 12 to 14 feet in length and 6,000 pieces of timber from 28 to 30 feet in length, or a total of 38,000 pieces, passed down the slide.

I have the honor to be, Sir,
Your obedient servant,

JOSEPH ROSA,
Assistant Engineer.

HENRY F. PERLEY, Esq., Chief Engineer,
Public Works Department,
Ottawa.

APPENDIX No. 8.

SLIDES AND BOOMS—ST. MAURICE DISTRICT.

OFFICE OF THE SUPERINTENDENT,
ST. MAURICE WORKS,

Ref. No. 25922.

THREE RIVERS, 24th July, 1882.

SIR,—I have the honor of submitting to you, for the information of the Honorable the Minister of Public Works, my report in reference to the works placed under my superintendence, for the year expiring on the 30th of June last.

The height of the water in the St. Maurice and its tributaries has been very advantageous for the floating of timber, and over 500,000 logs have been placed, at an early date, inside the booms. The booms suffered no accidents in spite of the enormous pressure they had to bear.

The cost of carrying out the works amounts this year, to \$16,572.20. The increase on last year's expenditure, is due partly to the reason that the floating of timber lasted all the summer of 1881, bringing on heavy expenses at each station; the increase in the salaries and the buying of chains to the amount of several hundred dollars, can also account for it.

A sum of \$2,993.91 has been placed in my hands to make repairs. These repairs have been effected at the following stations :

MOUTH OF THE ST. MAURICE.

2,200 feet of boom planked with 3-inch deals.

CAPE CORNELLE.

Repaired pier No. 6.

“ “ of the bridge shed.

Made a wharf to protect the shed foundation.

GRES FALLS.

1,500 feet of boom planked with 3-inch deals.

Built a house 18 x 14 feet, for the use of the men.

SHAWENEGAN BAY.

634 feet of new boom 24 x 13 inches.

LES HÊTRES.

418 feet of new boom 24 x 13 inches.

I have in hand \$303.40, balance from the grant placed at my disposal for repairs.

Contracts have also been awarded to the amount of \$7,142.00 for the construction of two piers and the repair of seven others, at the mouth of the St. Maurice.

All those works have been executed.

I have the honor to be, Sir,
Your obedient servant,

CHARLES LAJOIE,
Superintendent. St. Maurice Works.

APPENDIX No. 9.

SLIDES AND BOOMS,—OTTAWA DISTRICT.

OTTAWA RIVER WORKS OFFICE,
OTTAWA, 31st July, 1882.

Ref. No. 27601.

SIR,—I have the honor to submit the following report on the works under my charge, on the Ottawa River and tributaries, for the fiscal year ended 30th June last.

During the season of 1881, a low pitch of water generally prevailed at all the stations, and after the spring floods had run off, the rafts of square timber and the saw log drives, in many cases, as the summer months advanced, had to be laid up or abandoned until the following spring.

After the business of the season had been completed, an examination of the foundations of the various slides and other river works was made, in the lowest stages of the water, and the work of repairs was begun, continued during the winter of 1881-82, and finished only last spring.

ON THE MAIN OTTAWA RIVER.

The boom piers at *Sault au Recollet* were repaired and the boom in its chain fastenings strengthened.

The foundations and side piers of the slide at *Hull* were thoroughly overhauled, and such repairs made to the bottom and slide planking as were required.

At the *Ottawa* or *South Chaudiere* Station, the bulkheads were re-modelled; the side piers and booms improved and strengthened; decayed timbers removed from the apron structures and sound material substituted—and a close inspection was made of the wires and cables of the *Union Suspension Bridge* and steps promptly taken to guard against corrosion.

At the *Chats* slide extensive repairs had to be executed on the curved side pier by way of facing up the same, and the bottom timbers of the slide were renewed at places where they had failed through exposure to the heavy tear and wear of the traffic at this important station; and the same may be said of the necessary repair works which had to be done at the *Cheneaux* boom and the *Portage du Fort*, *Mountain*, *Calumet*, *Joachim* and *Rocher Capitaine* slides, where the foundations of piers, bottom timbers and bulkheads of slides and the guide and retaining booms were materially strengthened.

The following repairs were carried out on

TRIBUTARIES OF THE OTTAWA.

Gatineau River.—The boom and piers near the mouth had decayed caps, pickets and timbers renewed and certain additional stone filling placed in crib-work. A clearance of rubbish was made from the gaps and the outlet channels and from Pond's creek, and the fences and a bridge across the canal repaired.

Madawaska River.—At *Ragged Chute*, the new channel for timber on the easterly side of the river was deepened and straightened by excavating and removing certain rocky obstructions, that had caused much delay and damage to passing timber, at this point; the side piers and booms were also overhauled and a safer, more extensive and reliable system of boomage provided at this place.

At *High Falls*, a short distance further down stream, certain renewals of covering plank had to be effected and the booms and piers strengthened, while at *Chutes* lower down the river, the wing dams were partially sheeted anew.

At *Springtown* the retaining boom and piers were prepared for the season's business, and at the *Arnprior* station the slide was patched, and some alterations were made in the position of the retaining boom and piers in the *Chats Lake*, at the mouth of the *Madawaska*, to meet the requirements of the lumbermen on that stream, as well as to present infringement on the riparian rights of the owners of a very extensive and newly erected saw-mill on a river frontage adjacent to the Government booms.

Coulouge River.—A serious break having occurred at the *High Falls* slide in *May*, 1880, the works, although then repaired, were so much shaken in the region of the high bents and crib foundations that constant bracing and strengthening had to be resorted to. A large portion of the worn out planking caused by the friction of the logs which are shot through the slide with great velocity, had to be removed and replaced by new planks.

Black River.—The slide at *High Falls* near the mouth was repaired and strengthened and as far as possible put in a state of efficiency; but with so abrupt a pitch at the lower end of the slide and so heavy a body of water thrown in at the head, taken in connection with the great jam of timber waiting for passage, it happened last spring that lumber under these conditions and not having a sufficient number of men to take charge of it, was fed without proper check and in a wedge-like mass, forced out a portion of the side of the slide and thus caused a few days' delay. The necessary repairs were, however, made with due diligence and the remainder of the drive passed in safety.

Petewawa River.—On this stream, the dams and slides were stanchd, as much leakage had existed, and on the lower reaches, where the works are in places showing symptoms of decay, after being in use twenty-four years, patching, to a greater extent than was necessary in the earlier history of the works, had to be done by the officers in charge.

Dumoine River.—The long slide on this river had its planking repaired; the side piers were underpinned and the series of dams at the upper "chûtes" had their timbers and planking made good, where the action of the ice and water had abraded and stripped the more exposed portions of these structures.

THE WORKS OF CONSTRUCTIONS CONSISTED OF :

The deepening of portions of the bed of the *River du Lièvre* by blasting a reef at *Little Rapids* about ten miles above *Buckingham Village*, and removing boulders from the channel at *Long Rapids*, a short distance below *High Falls*. These improvements, when certain arrangements shall have been made by the lumbermen to keep an open passage through their saw-log booms situated between the stations referred to,—will facilitate the navigation by small craft on that reach of the *Lièvre* between *Buckingham* and the foot of the *Portage* road past *High Falls*.

On the *Ottawa*, a short distance below the *Village of Portage du Fort* the work of removing a sand bar was commenced, but as this can only be done to advantage, with the appliances available, at the season of low water, action had to be deferred until a period of the year later than is covered by this report.

• Immediately below the *Union suspension bridge* a rocky island or reef impeded the flow of water from the foot of the *Great Chaudière Falls* and divided the swift current, throwing the northerly branch of it with great force against the line of

wharves on the Hull frontage; and that in the southerly channel with a like result along the lumber shipping docks forming part of the city of Ottawa. During a very considerable portion of the busy season of the year, at the time of high water, it was found impracticable to place boats and barges in position for the shipping of lumber, but since the reef was blasted off, last fall, there has been a marked improvement, the current being now directed to mid-channel and navigation for river craft uninterrupted, throughout the season, to mooring places further up stream than the site of the former obstruction.

On the South Nation River, near the village of Plantagenet, two wingdams were constructed one on each side, with the view of contracting the volume of water and rendering more easy of access the entrance between the booms at the head of the short slide recently constructed. These dams have had the desired effect on the descent of the various kinds of lumber, on that stream.

Last spring, the tributaries and main river attained flood height later than usual, but the pitch of water was most favorable for the raftsmen, as although an early start was not affected the gradual melting of the snow and ice, and the timely rain falls about the sources of the rivers yielded the steady flow of a heavy volume of water for a lengthened period and thus enabled the river drivers to make a "clean sweep" and reach the main Ottawa with the reasonable expectation that their timber and saw-logs would arrive at their destinations in one season.

Of course with such large bodies of timber moving at high stages of the water, certain breaks and detentions at the works were unavoidable. In addition to the accident at Black River, already referred to, a break of the foundation timbers, sills and planking at the Calumet slide took place in the month of June; the services of a large force of men were immediately brought into requisition to execute the repairs, so that the detention on that occasion did not exceed more than a day or two. Minor repairs were executed at other places during the progress of the drives, as occasion required.

The construction of a large dam across the Ottawa River at Carillon, to supply water to the new canal at that place, was the means of flooding out the pier dams which were built by the Government upwards of twenty years ago. These old works were placed in the line of the rapids for the purpose of confining the flow of water to navigable channels to admit of the passage of timber and have been wiped out under the present system. A crib slide through this new dam was constructed by the Government under the direction of the Department of Railways and Canals, and was opened for the passage of timber early in May; but as already reported in a former communication to your Department, although the running of timber was all that could be desired when it reached the slide proper, the approaches to it were so dangerous and difficult with the winds in certain directions, that a very considerable extension of the guide booms and support piers was imperatively required as a safe guard against the destruction of life and property. I understand this matter is now engaging the attention of the proper authorities, and that such additional works as are required for the expeditious and safe passage of timber at Carillon slide, will be constructed without unnecessary delay.

I may mention that at several stations on the Ottawa, such as *Calumet*, *Mountain*, *Portage du Fort* and *Chats*, escaped saw-logs from the drives, frequently lodge in the slide channels and on the aprons and besides battering the works, they are often the means of wrecking passing cribs of square timber. The break in the *Calumet* slide was largely due to this cause, and it seems as if more stringent measures will have to be adopted to confine the logs to their own proper channels, as the crib slides are not adapted for their passage, and they yield no revenue in the shape of tolls at such slides.

The slides and other works at *Calumet* and *Mountain* Stations, after between thirty and forty years' service, are much dilapidated and a renewal of their principal parts is urgently required, as well as a thorough overhauling of the *Black River*

slide. At the head of the *Chats* Rapids, at least three snubbing piers should be provided for the safe mooring of rafts preparatory to the timber being piloted to the head of the *Chats* slide. An estimate of the cost of these works will be transmitted in due time.

All of which is respectfully submitted,

GEO. P. BROPHY,
Supt. Eng., O. E. Works

F. H. ENNIS, Esq.,
Secretary of Public Works, Ottawa.

STATEMENT of Expenditure for Repairs and Construction of Works on the Ottawa River and tributaries, for the fiscal year ended 30th June, 1882.

Work.	Name of		Letter of Authority.		Expenditure authorized.	Expenditure or Liabilities incurred from 1st July, 1881, to 30th June, 1882.	Remarks.
	Province.	County.	No.	Date.			
Slides and Booms, Upper Petewawa.....	Ontario.....	Renfrew, N.R.....				\$ cts.	Repairs.
Hull Slide, Ottawa River.....	Quebec.....	Ottawa.....				142 83	do
Chats Slide, do.....	Ontario.....	Carleton.....				159 33	do
Chenaux Boom, do.....	do.....	Renfrew, S.R.....				333 75	do
Mountain Slide, do.....	Quebec.....	Pontiac.....	4,479	10th Nov. 1880.	12,540 00	150 45	do
Galumet Slide, do.....	do.....	do.....				268 19	do
Rocher Capitaine Slide, Ottawa River.....	do.....	do.....				362 25	do
Gatineau Boom.....	do.....	Ottawa.....				178 70	do
Coulonge Slide.....	do.....	Pontiac.....				118 30	do
Deepening River du Lièvre.....	do.....	Ottawa.....				125 24	do
Removal of reef from Ottawa River below Suspension Bridge.....	Ontario & Quebec. {	City of Ottawa (Carleton Co.).....	3,791	17th Sept., 1880	4,300 00	705 41	Instruction
Dams on South Nation River.....	Ontario.....	City of Hull (Ottawa Co) Prescott.....				4,927 59	do
Dredging bar in Ottawa River below Portage du Fort.....	Ontario.....	Renfrew, N.R., and Pontiac.....				528 66	do
Works at lower stations on Petewawa.....	Ontario.....	Renfrew, N.R.....				299 00	do
Chaudière Slide and Sault au Recollet Boom.	Ontario and Quebec.	City of Ottawa (Carleton), Laval, Hochelaga.....			3,795 00	847 70	Repairs.
Chaudière and Hull Slides.....	do do	City of Ottawa (Carleton) and City of Hull, (Ottawa).....				301 38	do
Mountain, Calumet and Chats Slides.....	Quebec and Ontario.	Pontiac and Carleton				338 39	do
Joachim Slide.....	Quebec.....	Pontiac.....				185 00	do
Chaudière Slide and Suspension Bridge	Ontario and Quebec.	City of Ottawa, (Carleton) City of Hull (Ottawa).....				639 82	do
Chaudière and Hull Slides.....	do do	City of Ottawa (Carleton) City of Hull (Ottawa).....				207 51	do
Calumet Slides.....	Quebec.....	City of Ottawa (Carleton) City of Hull (Ottawa).....				238 08	do
		Pontiac.....				623 40	do

APPENDIX No. 10.

SLIDES AND BOOMS—NEWCASTLE DISTRICT.

TRENT CANAL WORKS,
SLIDES AND BOOMS DIVISION,
ENGINEER'S OFFICE,
PETERBOROUGH, Nov. 30th, 1882.

Ref. No. 30041.

SIR,—I have the honor to submit my Annual Report on the Slides and Booms division of the Trent Navigation System for the fiscal year ended 30th June 1882.

The works embraced in this division are those connected with the descent of timber, and the improvements of the rivers leading to the several canals throughout the district.

The canals, locks, swing bridges and all works connected with the navigation are under the control of the Department of Railways and Canals.

The water on the upper reaches during the past year attained its greatest height on May 17th, and fell rapidly, reaching its lowest level on September 14th. The reading recorded, being the lowest during my experience. This seriously affected the steamboat navigation; but the "drives" reached their destinations without an exception.

The low water was in a great measure due to the manner in which it was regulated on the feeders.

The principal tributaries down which timber is brought to the main rivers and lakes are as follows:

Gull-River,
Burnt-River,
Squaw-River,
Massissaga-River,
Crow-River,

And as lumbering operations are now carried on so far up on these tributaries those operating on them have from time to time to build small dams and slides to get their timber down to the main stream.

The first two viz: Gull and Burnt Rivers, drain a vast area of country, and in their respective courses, there are a number of large reservoirs, some having an area of over seven square miles, at the foot of which dams have been constructed in order to hold the water in reserve for use in the dry season. Were it not for these reservoir dams the clearances effected by settlers and the more extended system of drainage, would have the effect of causing extremes in high and low water, whereas now, by proper and careful management of these higher levels, these levels on the main line should not vary more than from 2 feet to 2 feet 6 in.

The improvements and repairs executed under this Department, at the respective stations along the line were as follows, viz :—

FENELON FALLS.

The slide was found on executing temporary repairs to be in a very unsafe condition, all the floor timbers were decayed, and had to be replaced, and in order not to exceed the appropriation the planking could not be completed in such a manner as I would have desired; this however will be attended to this year and the side wall rebuilt. The following is the quantity of timber that passed through this slide, viz :—

Saw logs.....	161,309
Boom timber, pieces.....	2,047
Cedar.....	999

SOUGOG RIVER.

The improvements on this river consisted in removing the sunken logs and snags that obstructed navigation from the Town of Lindsay to its outlet into Sturgeon Lake, so as to get a depth of 5 feet water at low water. This was accomplished in a satisfactory manner to the great benefit of navigation. Previous to this improvement the propellers although of small tonnage were constantly meeting with mishaps to their screws, and barges laden with lumber frequently ran on snags and sunken logs.

BOBCAYGEON.

The works at this station consist of a canal, lock, dams, wharves and swing bridge. They are under the control of the Department of Railways and Canals.

Obstructions to navigation that occur in the river approaching the canal both above and below are being removed under the direction of this Department.

The quantity of timber that passed down the channel was as follows, viz :

Saw logs.....	239,158
Boom timber, pieces	2,203
Square " "	166

BUCKHORN.

The works connected with the descent of timber, and under the control of the Department, consist of a slide, booms and piers. The bulkhead of slide is being renewed, new stop logs were supplied and a new boom built.

Improvements to the navigation at this station are about being carried out by the Department of Railways and Canals, consisting of the construction of locks, which in all probability will necessitate the erection of several boom piers and booms, to divide the steamboat channel from the timber channel.

The quantity of timber passed through this slide consisted of :

Saw logs.....	249,158
Boom timber, pieces.....	2,703

BURLEIGH.

I have described the works at this station in previous reports, and stated that they were originally erected by a committee of lumbermen, which has now ceased to exist, and as this is another of the stations at which the Government are about

constructing works for the extension of inland navigation, for which the contract has been let, it will be necessary for the Department to assume control of the works connected with the descent of timber (which I respectfully suggest), and charge tolls similar to those on other works of a like description on timber, &c., &c., descending the river.—See Annual Report for year ended June 30th. 1881.

The quantity of timber that passed through the slide here was as follows, viz:—

Saw logs.....	249,158
Boom timber, pieces.....	2,703
Square “	166

LAKEFIELD.

There is a dam and slide at this station. The dam retains the level of Katchawanno Lake to a navigable height for steamers drawing 4' 6". It is badly in need of extensive repairs. The slide also requires attention.

The dam is private property, but negotiations are, I am informed, being carried on with a view of placing it under Departmental control which if carried out will be a public benefit.

The removal of the boulders that obstructed the steamboat channel was completed and gives general satisfaction.

The quantity of timber, &c., that passed through this slide, was as follows, viz:—

Saw logs.....	408,181
Square timber.....	2,407
Boom “	3,641

PETERBOROUGH.

The banks of sawdust and slabs in the river approaching the town and upon which I reported to the Chief Engineer, are being removed.

LITTLE LAKE.

The works erected here consisted in the construction of a boom pier at south end of boom.

This was necessary in order to diminish the strain on the snubbing posts and prevent the boom when filled with logs, from breaking loose.

The boom requires to be renewed, it is unsafe in its present condition, and it is necessary to take the precaution previous to permitting saw logs to enter it, to swing on a double boom outside, so as give security in case of any accident to the old boom.

Its storage capacity is about 80,000 saw logs.

WHITLAW'S RAPIDS.

The guide booms and flooring of slide were repaired and boulders removed from the channel approaching the lock.

The dams, canal and lock are under the control of the Department of Railways and Canals.

The quantity of timber, &c., that passed through the slide, was as follows:—

Saw logs.....	279,181
Boom timber, pieces.....	2,404
Square “ “	2,407

OTONABEE RIVER.

Accumulations of saw-dust and slabs have become so great at the mouth of the river, as to a great extent impede the passage of steamers.

It is necessary that they should be removed and active measures taken to prohibit parties from throwing slabs &c., into the river.

HASTINGS.

The slide received general repairs, and three boom piers, renewed from low water mark to top. The guide booms require renewal. The lock, dam, swing bridge, &c., are under the control of the Department of Railways and Canals.

The following is the quantity of timber, &c., that passed this station, viz :

Saw logs.....	153,590
Boom timber, pieces.....	781
Square " "	2,407

HEELEY'S FALLS.

The slide is undergoing extensive repairs, for which an appropriation was made at last session of Parliament, and the guide boom extended 200 feet.

During the past year, and previous to the running of logs, &c., on examining the slide it was found that the leakage through the platform above the stop logs was so great that it was absolutely necessary to shut the water off, and in order to do so a "cofferdam" had to be constructed across the throat, which was attended with a great deal of trouble, and the flooring repaired.

As there was no appropriation for this we had to use a portion of that granted for other stations.

The quantity of timber, &c., that passed through this slide, was as follows :

Saw logs.....	263,700
Boom timber, pieces.....	900
Square " "	2,407

MIDDLE FALLS.

No repairs were executed during the last year.

The slide and wing wall of basin are in a very unsafe condition, and if allowed to go much longer without receiving the necessary repairs, it will take a considerable amount to put them in proper order; whereas by a small expenditure now, it would keep them for many years to come in a safe working condition.

The quantity of timber, &c., that passed through this slide during the past season was as follows:—

Saw-logs.....	277,938
Square timber, pieces.....	3,731
Boom timber, "	1,417
R. R. ties "	22,380

OHISHOLM'S RAPIDS.

There are extensive works at this station; comprising a canal lock, dam, slide, waste weir, guide booms, &c.

The canal and lock are under the control of the Department of Railways and Canals.

The dam was repaired and the leakage stopped to a great extent, which is a great boon to the lumbermen, as it enables them to "flood" in low water.

The slide which is 100 feet long and 50 feet wide, requires repairs, and made narrower; there is no necessity for such a width, and it permits a great waste of water.

This I shall make a detailed report upon for the information of the Hon. the Minister.

The works at 'Middle Falls,' 'Heeley's Falls,' and Chisholm's Rapids connected with the descent of timber were many years ago transferred to a committee of lumbermen for their management, and I beg respectfully to draw the attention of the Hon. the Minister to that portion of my last annual report referring thereto, and also to the "Chief Engineer's" report on the same subject.

The quantity of timber, &c., that passed through this station during the past year was as follows, viz:—

Saw-logs	277,938
Boom timber, pieces	1,417
Square timber, "	3,731
R. R. ties "	22,380

In respectfully submitting the above,

I have the honor to be, Sir,

Your obedient servant,

THOMAS D. BELCHER,
Superintending Engineer.

F. H. ENNIS, Esq.,
Secretary, Department Public Works,
Ottawa.

APPENDIX No. II.

REPORT ON TELEGRAPH LINES AND SIGNAL SERVICE.

TELEGRAPH AND SIGNAL SERVICE.

No. 27805.

OTTAWA, 30th September, 1882.

SIR,—I have the honor to submit the following report upon the above service for the fiscal year terminating 30th June, 1882.

BRITISH COLUMBIA.

The expenditure upon this system has been \$38,702.37, about one fourth of such amount being upon construction account; and the revenue paid in to the credit of the Receiver General is \$18,414.24, *versus* \$10,544 for the previous year, and \$5,320 for 1879-80, when the expenditure was \$41,496.

The construction party, under the management of Mr. Hartley Gisborne, have cut down all dead and threatening timber and brushwood, and thoroughly repaired the line between Yale and Deep Creek, a distance of 277 miles.

Line interruptions from breakage have been much less frequent and more quickly repaired, and consequent despatch of business has commanded the confidence of the public, as exemplified by the large increase in tariff receipts.

GULF OF ST. LAWRENCE.

The Expenditure has been ;

Upon the Anticosti system	\$1,575.00	<i>versus</i>	Revenue	\$454.00
“ “ Magdalen Islands	4,069.00	“	“	835.00

Weather, shipping and fishery reports being transmitted free of charge.

All cables have remained in perfect working order excepting at the landing point of Bird Rock, since repaired, but not at present in operation, the new light house keeper there not being as yet conversant with the proper management of the transmitting instruments. Mr. District Superintendent LeBourdais awaits an opportunity of landing upon the rock to put the cable in operation again.

BAY OF FUNDY.

The Expenditure upon the above system has been \$1,308.00 *versus* Revenue \$665.00.

The Grand Manan and Campo-Bello Islands cable was damaged by a wreck pounding upon it: but it has been satisfactorily repaired.

ATLANTIC COAST.

The line between Canso and Halifax, (worked under an agreement with the late Dominion Telegraph Company, without cost to Government,) has been maintained in effective operation.

NORTH SHORE AND RIVER ST. LAWRENCE.

A heavy cable has been successfully laid across the Saguenay river, and the Chicoutimi and Mille Vaches land lines have been satisfactorily maintained and operated under contract with the Montreal Telegraph Co. at a cost to Government of \$1,200.

NEWFOUNDLAND.

The 14 mile land line between Port au Basque and Cape Ray lighthouse, is now in course of construction under contract with the Anglo-American Cable Co., and when completed will entail an annual cost to the Government for interest upon cost, repairs and operating, of \$250.00 per annum.

SIGNAL SERVICE.

23 stations have been established at the following points, at an annual outlay of \$700 at 14 stations not connected by Government telegraph lines.

L'Islet	Martin River Lighthouse	South Point Lighthouse.
River du Loup	Cape Magdalen "	Heath Point "
Brandy Pots	Fame Point "	Amherst Island "
Rimouski	Cape Rosier "	Grosse Isle "
Father Point Lighthouse	Cape Despair... "	Bird Rocks "
Little Metis "	Pointe Maquereau "	Meat Cove, C.B. "
Matane "	West Point Anticosti	Low Point Lighthouse.
Cape Chatte "	South West Point "	

MANITOBA AND NORTH WEST TERRITORIES.

Per Order in Council, the telegraph lines in the above District have been transferred to my superintendency since June 30th, 1882, and active measures are now being taken to reconstruct them and also to reorganize that service.

In conclusion I may add that the general revenue is improving upon a decreased expenditure.

I have the honor to be, Sir,
Your most obedient servant,

F. N. GISBORNE,
Superintendent.

F. H. ENNIS, Esq.,
Secretary, Department of Public Works.

APPENDIX No. 12

QUEBEC HARBOR IMPROVEMENTS.—RIVER ST. CHARLES AND
GRAVING DOCK AT LEVIS.

HARBOUR COMMISSIONERS' OFFICE,

Ref. No. 29870.

QUEBEC, 2nd December, 1882.

SIR,—I have the honor to transmit you herewith the Resident Engineer's Reports both on the Graving Dock and the Harbor Improvements for the fiscal year ended on the 30th June last.

I have the honor to be, Sir,
Your most obedient servant,

A. H. VERRET.
Secretary-Treasurer.

F. H. ENNIS, Esq.,
Secretary, Public Works Department,
Ottawa.

REPORT ON THE GRAVING DOCK WORKS AT ST. JOSEPH DE LÉVIS.

RESIDENT ENGINEER'S OFFICE,

QUEBEC HARBOUR WORKS,

24th November, 1882.

SIR,—I have the honor to report on the progress made with the graving dock works now on course of construction, at Point Levis, for the fiscal year ending June 30, 1882, in compliance with instructions received for the information of the Honorable the Minister of Public Works.

The total contract sum for works as yet incomplete but so far accepted for the graving dock fully equipped, including the builders' contract, machinery, caisson, etc., amounts to \$397,820.18; to this has to be added engineers' expenses and sundries, \$47,237.93, making a total of \$446,058.17, after allowing for a deduction of \$6,158.22, being the difference in cost according to the schedule of rates between the circular Head as now adopted and the second entrance at Head.

The sum authorized under the Act, 38 Victoria, chapter 56, was \$500,000, but a further sum will be required to pay certain incidental charges since accruing and not foreseen and estimated for at the date of the above appropriation.

The total expenditure to the 30th June, 1882, amounts to \$329,502.79, leaving a balance of \$170,497.21 at that date.

The works executed during the past fiscal year include an extension of the dock excavation to the rear of the intermediate dam across the main body of the dock and the placing of the arterial drains, bottoming up the concrete and laying dock floor a further distance of 100 feet, thereby extending this part of the structure to $\frac{3}{4}$ rds. of its lengths from the circular head.

On the outside of the entrance works, the filling up to the pile heads with clay according to instructions amounting to 1,500 cubic yards had been completed and the excavation for the piling and concrete for the proposed addition to the structural works proceeded with, and a commencement made with the pile driving in connection with it. These piles were driven to a depth of 55 feet below coping through 20 feet of sand, being work involving a considerable amount of patient labor.

Tenders for the boilers were called for in August, 1881, and the offer of three suitable ready-made boilers of the best quality was accepted from Messrs. Carrier, Lainé & Co., for the sum of \$4,500 fixed complete, whereby a great saving was effected over the cost of strictly new boilers in terms of the specification.

A second instalment on account of the contract for the pumping machinery was paid to Messrs. Carrier, Lainé & Co., of \$8,000, making a total so far of \$16,000 out of a gross sum of \$32,000 and an advance on the boilers of \$3,000, making a total payment of \$19,000 to this firm for these purposes.

The work already so far finished includes 300 feet of the dock with the wing walls, and entrance works, while the work remaining to be done includes the construction of the engine house and pump wells, with the fixing of the machinery, boilers, &c., the whole of the materials for which are either now on the ground or in the engine works of Messrs. Carrier, Lainé & Co. The caisson has to be put together and tested, this will probably take two months to effect and the work necessary should be let in advance by tender.

I have the honor to be, Sir,
Your obedient servant,

WOODFORD PILKINGTON, *M.I.C.E.*,
Resident Engineer.

A. H. VERRET, Esq.,
Sec. Treasurer.

QUEBEC HARBOR IMPROVEMENT WORKS.

PROGRESS REPORT ON THE "PRINCESS LOUISE EMBANKMENT AND DOCKS," RIVER ST. CHARLES, QUÉBEC.

RESIDENT ENGINEER'S OFFICE,
QUÉBEC, 24th November, 1882.

SIR,—Acting on instructions received, I have the honor to report on the progress made with the works above described connected with the harbor extension and improvements in the river St. Charles, Quebec, for the information of the Hon. the Minister of Public Works for the fiscal year ended June 30th, 1882.

The total amount of the original contract and extra works carried out in connection with this first section of these works, amounts to the sum of \$734,507.49 found as follows :

To block sum of original contract.....	\$529,296 31
“ “ “ “ allowed contingencies.....	25,000 00
“ “ “ “ supplementary dredging	62,500 00
“ “ “ “ stone face (boucharded).....	21,974 90
“ “ “ “ northern cribwork.....	58,059 53
“ stone and ballast for concrete at contract rates.....	37,676 75
“ additions made by award of arbitrators in excess of deductions	47 27
Placing the total amount of work done at.....	<u>\$734,565 76</u>
Total amount paid contractors.....	\$616,222 42
Leaving a balance due of.....	118,333 34

The entire works comprised in this first section of these designs for harbour improvements are complete so far as the materials from the dredgings would permit, but a considerable quantity of filling still remains to be put into the embankment. This dredging and filling work is included in the second section and has been contracted for by Messrs. Larkin, Connolly et Co., to be proceeded with and completed during the season of 1883, together with the closing of the end of the embankment at the foreshore near the Gas House Wharf.

During the latter part of this fiscal year, nothing was done beyond calling for tenders for dredging and for the closing of the incomplete space at the end of the Wet Dock Wall, contracts for which have since been signed.

The work still remaining to be done to complete these designs includes the execution of these contracts, together with the work involved in connection with the Cross Wall and Entrance Works for the future Wet Dock by the production of the line of Dalhousie street between two walls enclosing an embankment to a junction with the Quay Walls of the Wet Dock and Tidal Basin respectively as originally proposed, which will probably form the third and last section of these works.

I have the honor to be, Sir,
Your obedient servant,

WOODFORD PILKINGTON, M.I.C.E.,
Resident Engineer.

A. H. VERRET, Esq.,
Sec. Treasurer.

APPENDIX No. 13.

ANNUAL REPORT OF THE MONTREAL HARBOR COMMISSIONERS ON THE DEEPENING OF CHANNEL BETWEEN QUEBEC AND MONTREAL.

HARBOR COMMISSIONERS OF MONTREAL.

SECRETARY'S OFFICE.

Ref. No. 28839.

MONTREAL, 30th October, 1882.

SIR,—I have the honor, by direction of the Harbor Commissioners, to forward herewith, for the information of the Honorable the Minister of Public Works, copy of the Chief Engineer's Report on the dredging operations for deepening the ship channel between Montreal and Quebec, for the fiscal year ended the 30th June last.

As you have already been informed in previous communications under date of the 16th November and 17th December 1880—and the 18th October 1881, it is impossible to answer exactly the question asked.

I would, however, state as follows, viz :

Question (1). The grants made by statute and the Acts relating thereto since 1st July 1867.

Answer.—The works are carried on under the Acts 36 Victoria, Cap. 60 ; 44 Vic. Cap. 7, and 45 Vic., Cap. 44—whereby a total sum of \$1,780,000 was authorized to be advanced to the Commissioners, to bear interest at 4 per cent., for the purpose of dredging the channel to 25 feet, at low water.

Question (2). Number and date of letter authorizing any expenditure each fiscal year, up to the 1st July 1882.

Answer.—None.

Question (3). Expenditure authorized each year to same date.

Answer.—No special amount.

Question (4). Expenditure or liabilities incurred each year to same date.

Answer.—No liabilities, everything is paid for as the work proceeds.

Question (5). Amount available for completion 1st July, 1882.

Answer.—\$80,000.00.

Question (6). Probable amount repaired for completion 1st July, 1882.

Answer.—It is expected the above amount \$80,000 will practically complete the channel to 25 feet.

Question (7). Revenue each year.

Answer.—None.

The capital cost of the dredging plant included in above expenditure is \$534,809, exclusive of certain Harbor plant previously on hand and now employed in the work.

I have the honor to be, Sir,

Your most obedient servant,

H. D. WHITNEY,

Secretary.

F. H. ENNIS, Esq.,

Secretary, Department of Public Works,
Ottawa.

HARBOUR COMMISSIONERS OF MONTREAL.

**CHIEF ENGINEER'S OFFICE,
MONTREAL, 18th October, 1882.**

SIR,—In compliance with the request of the Secretary of Public Works, I beg to submit the following report upon the work of deepening the ship channel of the St. Lawrence between Montreal and Quebec, during the Government fiscal year ended 30th June, 1882.

The places at which the greatest quantities of work have been done are at Cap Charles and Cap La Roche, where the dredging is of rock, and in Lake St. Peter, the new Contrecoeur channel and Pointe aux Trembles where the dredging is of earth.

The following are the chief details of the year's work. The cost of the dredging at each place is generally taken as that of the previous summer, for the reason that the expenditure cannot well be sub-divided to the end of the Government fiscal year which occurs in the middle of the working season.

The costs given include all charges and outlay of every kind, except for interest and depreciation of plant.

CAP CHARLES.

The work of deepening the channel through the shale rock shoal was continued to the close of navigation of 1881 and resumed soon after the opening in 1882. By the end of the fiscal year the shoal had been practically cut through to 22 feet 3 inches deep, at low water, but there remained some boulders and loose rock to be removed. The quantity of rock and boulders lifted during the year is 17,695 cubic yards, at an average cost of about 85 cents per yard.

POUILLIER RAYER.

The channel has been somewhat straightened by the removal of 857 cubic yards of boulders from the south side of the shoal.

CAP LA ROCHE.

Dredging was continued in the rock during the working season by two dredges, with frequent assistance from a stone lifter, and by the end of the fiscal year nearly the whole shoal had been cut through to 22 feet deep, at low water. Quantity dredged, 45,295 cubic yards at an average cost of about 70 cents per cubic yard.

BECANCOUR UPPER TRAVERSE.

A new line of traverse, further to the north at its upper end and in deeper water than the old one, was determined upon, and some boulders and the tops of small stoney shoals have been removed to make it available to 25 feet at low water. Quantity of stones and boulders lifted, 368 cubic yards.

PORT ST. FRANCIS.

In the spring of this year the Iron and Force shoals were cut through to 25 feet deep at low water. Quantity dredged, 2,040 cubic yards, hard pan and boulders, costing \$1.14 per cubic yard.

LAKE ST. PETER.

Dredging was continued throughout the working season, and by the close of the fiscal year the whole lake channel had been finished to 25 feet depth, except about a mile of partial cutting at No. 3 light ship. Total quantity dredged during the fiscal year, 1,056,655 cubic yards, costing $3\frac{1}{4}$ cents per cubic yard.

ILE DE GRACE.

A shoal about half a mile in breadth, consisting chiefly of coarse sand has been put through. Quantity dredged, 33,600 cubic yards costing 25 cents per cubic yard.

CONTRECOEUR CHANNEL.

Dredging was rapidly prosecuted in the fall of 1881, and continued at a slower rate in 1882, until the middle of June, when the 25 feet depth was practically completed. Quantity dredged, 227,760 cubic yards, costing $12\frac{1}{2}$ cents per cubic yard.

CAP ST. MICHEL AND VARENNES.

In the latter half of the summer of 1881 and spring of this year a number of small points and shallow places were cleaned off. Quantity dredged, 32,850 cubic yards at an average cost of about 24 cents per cubic yard.

POINTE AUX TREMBLES.

Dredging was continued last fall and this summer up to the close of the fiscal year. Quantity dredged, 88,100 cubic yards, costing $15\frac{1}{2}$ cents per cubic yard.

MONTREAL.

The ship channel leading into the harbour proper has been deepened at a number of places. Quantity dredged, 98,382 cubic yards, costing $23\frac{1}{8}$ c. per cubic yard.

The aggregate quantity of dredging done at all points during the government fiscal year ended 30th June was 1,603,612 cubic yards, as against 1,229,937 cubic yards in the preceding year.

The expenditure on working account, which is made up only at the end of each Harbour Commissioners' year at 31st December, was for the year ended 31st December 1881, \$167,301 with an aggregate of 1,453,788 cubic yards dredged, as against \$147,038 for 1880 with 1,219,231 cubic yards dredged.

The floating plant in the work was substantially the same as before and consisted of two large and three ordinary elevator dredges for working in earth; three elevator dredges for working in rock; three spoon dredges part of the time; two steam stone lifters, seven screw tugs, one paddle wheel tug; five barges used as coal tenders and smith's shops; nineteen hopper bottom scows and three flat scows.

Yours respectfully,

JOHN KENNEDY,
Chief Engineer.

H. D. WHITNEY, Esq.,
Secretary, Montreal Harbour Commissioners.

APPENDIX No. 14.

STATEMENT of Property purchased or sold by the Department of Public Works, during the Fiscal Year ended 30th June, 1882.

Date of Sale.	Vendors.	Purchasers.	Property Purchased or Sold, &c.	For what purpose used.	Area, &c.	Price of Sale.
July 4, 1881.....	P. Cullen.....	Her Majesty.....	Part of town lots Nos. 1, 55, 54 and 100, at Charlottetown, P. E. I.	Construction of a Marine Hospital.	.....	\$ cts. 1,800 00
do 19, 1881.....	D. McInnes.....	do	Part of lots Nos. 9 and 19, on King and John Streets Hamilton, Ont.	Post Office, &c.....	.....	35,908 33
Aug. 30, 1881....	A. Northwood.....	do	Part of lot No. 94, corner of King and Fourth Streets, Chatham, Ont.	Post Office, &c.....	.....	8,000 00
Oct 17, 1881....	Her Majesty.....	J. & W. Keough.	Old building standing on property purchased from A. Northwood, Chatham.	.....	.....	125 00
Nov. 22, 1881....	Trustees, C. W. Presbyterian Church (St. Thomas).	Her Majesty.....	Part of lots Nos. 4 and 5, on Talbot Street, St. Thomas, Ont.	Post Office, &c.....	132 X 122 feet....	7,000 00
Dec. 7, 1881....	A. H. Davidson.....	do	Part of lot No. 16, corner of Pitt and Second Streets, Cornwall, Ont.	do	100 X 80 feet....	8,000 00
Feb. 28, 1882....	Corporation of Town of Stratford.	do	Lot on Ontario Street, at its junction with north side of Erie Street, Stratford.	do .....	.....	Donated.
Dec. 5, 1881....	His Lordship the Bishop of Chicoutimi.	do	Part of lot No. 74, Town of Chicoutimi, Que.	Marine Hospital.....	209 X 418 feet....	400 00
Feb. 24, 1882...	Hairs Wright.....	do	Donation of portion of Reserve, on Main Street, Hull, Que.	Post Office, &c.....	120 X 125 feet....	Donated.
March 31, 1882...	F. A. Vail and others....	do	Lot of land in the Parish of Sussex, N. B....	do	90 X 130 feet....	1,600 00
Feb. 4, 1882....	Her Majesty.....	Geo. E. Franklin	Crown Grant of portion of Penitentiary Land at Halifax, N.S., between Franklin Street and the Harbour.	.....	100 X 100 feet....	900 00
April 12, 1882....	Roman Catholic Episcopal Corporation of Arichat.	Her Majesty.....	Lot known as St. Francis Xavier College Lot, corner College and Main Streets, at Antigonish, N.S.	Post Office, &c.....	210-square yards.	1,750 00

A. GOBELL.

DEPARTMENT OF PUBLIC WORKS,
OTTAWA, 12th December, 1882.

APPENDIX No. 15.

REPORT OF THE SECRETARY OF THE OFFICIAL ARBITRATORS.

No. 28718.

OFFICIAL ARBITRATORS, CANADA,
OTTAWA, 26th October, 1882.

SIR,—I beg to transmit herewith a statement of the claims referred to and arbitrated upon by the Official Arbitrators, in connection with the Department of Public Works during the fiscal year ended 30th June, 1882.

I have the honor to be, Sir,
Your obedient servant,

CHS. THIEAULT,
Secretary to the Official Arbitrators.

F. H. ENNIS, Esq.,
Secretary, Public Works Department.

STATEMENT of claims referred to and arbitrated or reported upon by the Official Arbitrators in connection with the Department of Public Works, during the Fiscal Year ended 30th June, 1882.

Claimant.	Nature of claim.	When referred.	To whom referred.	Whether referred for Award or Report.	Amount claimed.	Amount awarded or recommended.	Date of award or report.	Remarks.
Mrs. Mary Patton..	Graving dock, Pt. Lévis, damage by appropriation of a right of way.....	4th Nov., 1881	Full Board.....	Award.....	\$ cts. 23,500 00	\$ cts. 9,000 00	2nd Sept., '82..	
Samuel Platt	Goderich Harbor, damage to property in connection with works at.....	11th do	do	do	12,000 00 per year...	20,510 00	24th Feb'y '82.	
R. Fishery.....	St. John, N.B., Post-Office building, damage for wrongful condemnation of iron used for....	27th Jan. 1882	Wm Compton.	Report .....	.....	.....	.....	Claimant asked to postpone his case.

CHARLES THIBAUT,
Secretary to the Official Arbitrators.

APPENDIX No. 16.

STATEMENT of the Opening and Closing of Navigation.

PROVINCE OF NOVA SCOTIA.

Name of Port.	County.	Date of Closing, 1881.	Date of Opening, 1882.	Depth of Water available at low water.	Remarks.
				Feet.	
Annapolis	Annapolis	Always open .....	.....	15 to 20	In very severe winters thin ice forms, but screw steamers could always enter.
Barrington	Shelburne	do .....	.....	12 to 20	At anchorage, wharves dry at low water.
Digby	Digby	do .....	.....	18	About 10 feet at end of steamboat pier.
Halifax	Halifax	do .....	.....	20 to 30	At wharves. 70 to 180 ft. in harbor.
Liverpool	Queen's	do .....	.....	7	On bar. At Brooklyn 24 ft
Lockeport	Shelburne	do .....	.....	8	
Lunenburg	Lunenburg	do .....	.....	12	
Parrsboro'	Cumberland	do .....	.....	.....	Dry in harbor.
Pictou	Pictou	Jan. 4, '82	April 24	19	At wharves. 40 ft. in harbor.
Shelburne	Shelburne	Always open .....	.....	40 to 60	
Sydney	Cape Breton	Jan 6, '82	May 9	48	
Windsor	Hants	do 11, '82	Mar. 22 .....	.....	Dry.
Yarmouth	Yarmouth	Always open .....	.....	13	

PROVINCE OF NEW BRUNSWICK.

Buctouche	Kent	Dec. 1	May 10	12	8 ft. on bar.
Obatham	Northumberland	Nov. 28	do 5	35 to 40	In harbor. 17½ ft. on Horseshoe bar.
Dalhousie	Restigouche	Dec. 3	do 7	30	South channel. 70 ft. north channel.
Dorchester	Westmoreland	do 23	Mar. 22	10	
Moncton	do	Jan. 6, '82	April 4 .....	.....	Dry.
Newcastle	Northumberland	Nov. 23	May 5	30	In harbor. 17½ ft. on Horseshoe bar.
Richibucto	Kent	Dec. 18	do 9	12	
Sackville	Westmoreland	do 21	April 15	4	
Shediac	do	do 2	May 9	12	
St. Andrews	Charlotte	Always open .....	.....	14	In inner harbor.
St. John	St. John	do .....	.....	24	At entrance of harbor. 60 feet in harbor.
St. Stephen	Charlotte	do .....	.....	6	30 ft. at the Ledge, 4 miles below the town.

PROVINCE OF PRINCE EDWARD ISLAND.

Charlottetown	Queen's	Dec. 27	May 6	20	40 to 60 ft in stream.
Souris	King's	do 31	do 4	20	At end of railway wharf. 18 ft.
Summerside	Prince	Nov 28	do 9	16	At railway wharf. 26 to 30 ft. in harbor, low water, spring tides.

APPENDIX No. 16—Continued.

PROVINCE OF QUEBEC.

Name of Port.	County.	Date of Closing, 1881.	Date of Opening, 1882.	Depth of Water available at low water.	Remarks.
				Feet.	
Bay St. Paul.....	Charlevoix.....	Nov. 15...	April 15...	Over 36	
Berthier(en bas).....	Montmagny.....	do 15...	do 15...	.....
Carleton.....	Bonaventure.....	do 22...	May 3...	18 to 24	
Chicoutimi.....	Chicoutimi.....	do 18...	do 18...	10	
Éboulements.....	Charlevoix.....	Dec. 1...	April 1...	Over 36	
Etang du Nord.....	Gaspé.....	Oct. 15...	May 21...	.....
Matane.....	Rimouski.....	Nov. 28...	April 10...	17	Upper end new pier. 12 ft. old pier, 5 ft. on bar.
Montreal.....	.....	Jan. 2, '82	do 11...	20	22 ft. ordinary low water.
Murray Bay.....	Charlevoix.....	Dec. 8...	Mar. 28...	8 to 14	
New Carlisle.....	Bonaventure.....	do 1...	April 15...	10	At end of pier.
Port Daniel.....	do.....	do 1...	do 25...	.....
Quebec.....	.....	Nov. 28...	do 22...	6 to 168	
Rimouski.....	Rimouski.....	Dec. 25...	Mar 22...	8	L. W. sps. 10 ft. 6 in., half tide.
Three Rivers.....	.....	Nov. 23...	April 22...	17	At Richelieu and Ontario Navigation Co's Wharf.

PROVINCE OF ONTARIO.

Belleville.....	Hastings.....	Dec. 10...	Mar. 10...	5 to 9	At docks. 9 ft. in channel.
Brighton.....	Northumberland	do 19...	do 27...	.....
Cobourg.....	do.....	do 10...	April 10...	8	
Collingwood.....	Simcoe.....	Nov. 30...	do 18...	12	
Fort Williams.....	Algoma.....	do 20...	do 27...	.....
Kincardine.....	Bruce.....	do 20...	May 1...	9	
Kingsville.....	Essex.....	Jan. 1, '82	April 1...	7 to 9	
Little Current.....	Algoma.....	Nov. 28...	May 7...	.....
Meaford.....	Grey.....	Dec. 2...	Mar. 16...	10	
Morpeth.....	Kent.....	Open whole winter...	.....	9	11 ft. at outer end of dock.
Napanee.....	Lennox.....	Nov. 28...	Mar. 27...	7	
Newcastle.....	Durham.....	Dec. 10...	April 1...	8	Harbour free of ice nearly all last winter.
Oakville.....	Halton.....	do 5...	do 17...	10	
Owen Sound.....	Grey.....	do 31...	Mar. 20...	9	
Port Albert.....	Huron.....	Nov. 4...	April 15...	6	
Port Burwell.....	Elgin.....	do 30...	do 1...	7 to 8	
Port Darlington.....	Durham.....	Dec. 8...	Mar. 25...	8	
Port Hope.....	Durham.....	do 5...	Mar. 20...	12	
Port Stanley.....	Essex.....	do 15...	do 20...	10	At entrance.
Shannonville.....	Hastings.....	Nov. 25...	April 1...	6	
Thunder Bay.....	Algoma.....	Jan. 15, '82	do 28...	.....
Toronto.....	Toronto.....	Dec. 19...	Feb. 27...	11 to 15	
Trenton.....	Hastings.....	do 6...	April 4...	14	In harbor. 9 ft. on bar.
Whitby.....	Ontario.....	do 7...	do 4...	.....
Windsor.....	Essex.....	Open whole winter...	

PROVINCE OF MANITOBA.

Winnipeg.....	Saskatchewan.....	Nov. 5...	April 19...	6	
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