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- Additional comments / Commentaires supplémentaires:

In Sessional paper No. 10, Annual report of the Minister of Public Works ... 1883-84, page xvi is incorrectly numbered page xv.

In Sessional paper No. 10, Appendices, pages 333, 402, 403 & 443 are incorrectly numbered pages 335, 403, 402 & 43.

In Sessional paper No. 11, Appendices, Appendix No. 3 starts at page 7.

In Sessional paper No. 11, Reports Railway Statistics ... 1883-84, page 19 is incorrectly numbered page 15.

In Sessional paper No. 12, Report of Secretary of State ... 31st December, 1884, pages 53-68 are incorrectly numbered pages 27-42.

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1. Public Accounts of Canada for the fiscal year ended 30th June, 1884. Presented to the House of Commons, 2nd February, 1885, by Sir Leonard Tilley. Estimates of the sums required for the service of the Dominion, for the year ending 30th June, 1886; presented 27th February. Supplementary Estimates of Canada for the fiscal year ended 30th June, 1885; presented 23rd June. Supplementary Estimates for the financial year ending 30th June, 1886; presented 13th July. Further Supplementary Estimates of Canada, for the financial year ending 30th June, 1886.....*Printed for both Distribution and Sessional Papers.*

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2. Tables of the Trade and Navigation of the Dominion of Canada, for the fiscal year ended 30th June, 1884, compiled from official returns. Presented to the House of Commons, 2nd February, 1885, by Hon. M. Bowell.....*Printed for both Distribution and Sessional Papers.*

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3. Report of the Department of Indian Affairs, for the year ended 31st December, 1884. Presented to the House of Commons, 2nd February, 1885, by Sir John A. Macdonald—
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4. Annual Report, Returns and Statistics of the Inland Revenues of the Dominion of Canada, for the fiscal year ended 30th June, 1884. Supplement No. 1—Canal Statistics for season of navigation, 1884. Supplement No. 2—Eleventh Report on Inspection of Weights, Measures and Gas, 1884. Supplement No. 3—Report on Adulteration of Food, 1884. Presented to the House of Commons, 2nd February, 1885, by Hon. J. Costigan—
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5. Annual Report of the Auditor-General on Appropriation Accounts, for the fiscal year ended 30th June, 1884. Presented to the House of Commons, 2nd February, 1885, by Sir Leonard Tilley.....*Printed for both Distribution and Sessional Papers.*
6. Annual Report of the Postmaster-General, for the year ended 30th June, 1884. Presented to the House of Commons, 11th February, 1885, by Hon. J. Carling—
Printed for both Distribution and Sessional Papers.

7. Annual Report of the Department of Militia and Defence of the Dominion of Canada, for the year ended 31st December, 1884. Presented to the House of Commons, 5th February, 1885, by Hon. J. P. R. A. Caron..... *Printed for both Distribution and Sessional Papers.*

CONTENTS OF VOLUME No. 5.

8. Annual Report of the Minister of Agriculture for the Dominion of Canada, for the year ended 31st December, 1884. Report on Historical Archives. Abstracts of the Returns of Mortuary Statistics, for the year 1884. Presented to the House of Commons, 20th March, 1885, by Hon. J. H. Pope..... *Printed for both Distribution and Sessional Papers.*

CONTENTS OF VOLUME No. 6.

9. Seventeenth Annual Report of the Department of Marine and Fisheries, being for the fiscal year ended 30th June, 1884. Presented to the House of Commons, 16th February, 1885, by Hon. A. W. McLelan..... *Printed for both Distribution and Sessional Papers.*
- 9a. Preliminary Report on the Fisheries of Canada, for the year 1884. Presented to the House of Commons, 27th February, 1885, by Hon. A. W. McLelan—
Printed for both Distribution and Sessional Papers.
- 9b. First Annual Report of the Department of Fisheries, Dominion of Canada, for the year 1884. Presented to the House of Commons, 28th May, 1885, by Hon. A. W. McLelan—
Printed for both Distribution and Sessional Papers.
- 9c. Report of the Fish-breeding in the Dominion of Canada, for 1884. Presented to the House of Commons, 14th April, 1885, by Hon. A. W. McLelan—
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10. Annual Report of the Minister of Public Works of Canada, for the fiscal year ended 30th June, 1884, on the works under his control. Presented to the House of Commons, 2nd February, 1885, by Sir Hector Langevin..... *Printed for both Distribution and Sessional Papers.*
11. Annual Report of the Minister of Railways and Canals, for the fiscal year ended 30th June, 1884, on the works under his control. Presented to the House of Commons, 11th February, 1885, by Hon. J. H. Pope..... *Printed for both Distribution and Sessional Papers.*
- 11a. Reports of the Railway Statistics of Canada, and capital, traffic and working expenditure of the railways of the Dominion, for the year 1883-84. Presented to the House of Commons, 15th April, 1885, by Hon. J. H. Pope..... *Printed for both Distribution and Sessional Papers.*
12. Annual Report of the Secretary of State of Canada, for the year ended 31st December, 1884. Presented to the House of Commons, 17th February, 1885, by Hon. J. A. Chapleau—
Printed for both Distribution and Sessional Papers.
13. Annual Report of the Department of the Interior, for the year ended 31st December, 1884. Presented to the House of Commons, 30th January, 1885, by Sir John A. Macdonald—
Printed for both Distribution and Sessional Papers.

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14. Report of the Superintendent of Insurance, for the year ended 31st December, 1884—
Printed for both Distribution and Sessional Papers.
- 14a. Abstract of Statements of Fire and Inland Marine Insurance Companies in Canada, for the year ended 31st December, 1884. Presented to the House of Commons, 30th March, 1885, by Sir Leonard Tilley. Report of the Superintendent of Insurance, for the year ended 31st December, 1884..... *Printed for both Distribution and Sessional Papers.*

- 14b.** Return to an Order of the House of Commons, dated 2nd March, 1885, for a statement showing the receipts and expenditure of the liquidators of the Canada Agricultural Insurance Company, from date of appointment up to this day, giving in detail the names of shareholders who have paid instalments, the dates and amounts of payments made, the balances due, the amount now owing by each shareholder, and the amounts for which they were liable when the company was put in liquidation; also a detailed statement of the sums paid by the said liquidators, the names of the persons to whom payments were made, the dates thereof, the object for which such payments were made, and all other information necessary to show precisely the financial condition of the said insolvent company, including a statement of the affairs of the company when it was placed in liquidation. Presented to the House of Commons, 31st March, 1885.—*Mr. Amyot* *Not printed.*
- 15.** Annual Report of the Minister of Justice as to Penitentiaries in Canada, for the year ended 30th June, 1884. Presented to the House of Commons, 2nd February, 1885, by Sir Hector Langevin.....*Printed for both Distribution and Sessional Papers.*
- 15a.** Return to an Order of the House of Commons, dated 30th March, 1885, for copies of all correspondence between the Department of Justice and the Inspectors or the Warden of the Penitentiary of British Columbia, in regard to the suspension, in whole or in part, of any of the rules of said institution. Presented to the House of Commons, 20th April, 1885.—*Mr. Shakespeare*.....*Not printed.*
- 16.** Annual Report on the Library of Parliament. Presented to the House of Commons, 29th January, 1885, by Hon. Mr. Speaker.....*Printed for Sessional Papers only.*

CONTENTS OF VOLUME No. 9.

- 17.** Shareholders in the Chartered Banks of the Dominion of Canada, as on the 31st of December, 1884. Presented to the House of Commons, 20th March, 1885, by Sir Leonard Tilley—
Printed for both Distribution and Sessional Papers.
- 17a.** Memorandum respecting the estate of the Bank of Upper Canada. Presented to the Senate, 25th February, 1885, by Hon. Sir Alexander Campbell.....*Not printed.*
- 18.** Dominion Police Commissioners' Return to Parliament, 1884, required by 31 Victoria, chapter 73. Presented to the House of Commons, 2nd February, 1885, by Sir Hector Langevin—
Not printed.
- 19.** Return of Governor General's Warrants issued since last Session of Parliament on account of 1883-84 and 1884-85, in accordance with 41 Victoria, chapter 7, section 32, sub-section 2. Presented to the House of Commons, 2nd February, 1885, by Sir Leonard Tilley.
Printed for Distribution only.
- 20.** Statement of payments charged to Unforeseen Expenses, by Orders in Council, from 1st July, 1884, to date, in conformity with Act 47 Victoria, chapter 2, schedule B. Presented to the House of Commons, 2nd February, 1885, by Sir Leonard Tilley.....*Not printed.*
- 21.** Report of the Commissioners appointed to consolidate and revise the Statutes of Canada. Presented to the House of Commons, 3rd February, 1885, by Sir John A. Macdonald.
Printed for Distribution only.
- 22.** Statement of name and rank of each person superannuated or retired, his salary, age, length of service, the allowance granted him on retirement, cause of his superannuation, and whether the vacancy has been subsequently filled, and, if so, whether by promotion or new appointment, and the salary of the new appointee, under 46 Victoria, chapter 8, section 15, from 1st January to 31st December, 1884. Presented to the House of Commons, 3rd February, 1885, by Sir Leonard Tilley.....*Printed for Distribution only.*
- 22a.** Return to an Order of the House of Commons, dated 6th February, 1885, for a statement showing for the time elapsed since the period covered by the Order of the House of Commons

of last Session, with reference to the Superannuation Fund: 1. The number of persons on the list for the year as entitled to the benefit of the Act. 2. The number superannuated during the year under the Act. 3. The number retired during the year on a gratuity under the Act. 4. The total amount paid into the fund from the beginning by those who were during the year superannuated or retired on a gratuity; distinguishing between those whose superannuation was caused by the abolition of office, those who were superannuated otherwise, and those who retired on a gratuity. 5. The number of persons on the list for the year who died in the service. 6. The total amount paid into the fund from the beginning by those who during the year died in the service. Presented to the House of Commons, 2nd March, 1885.—*Mr. Blake—*

Printed for Sessional Papers only.

- 22b.** Return to an Order of the House of Commons, dated 6th February, 1885, for a Return: 1. Showing the number of persons on the list of Civil Servants on the 1st day of January, in the years 1879-80-81-82-83-84 and '85, separately, contributing to the Superannuation Fund. 2. Showing the number of persons on the list of Civil Servants on the 1st day of January, 1885, entitled to the benefit of the Superannuation Act, by annuity in case of retirement. 3. The total amount paid into the fund from the beginning by each of those superannuated during the year 1884, also the respective amounts paid in by those granted a gratuity during the year 1884. Presented to the House of Commons, 23rd March, 1885.—*Mr. McMullen.....Not printed.*
- 22c.** Return to an Address of the House of Commons, dated 28th March, 1884, for copies of all Orders in Council, correspondence, complaints, reports or other documents in connection with the suspension, superannuation or retirement of W. F. Whitcher from the Public Service. Presented to the House of Commons, 8th June, 1885.—*Mr. Casey.....Not printed.*
- 23.** Return (*in part*) to an Order of the House of Commons, dated 14th February, 1884, for return of all sums paid to the *Gazette* Publishing Company of Montreal, and other newspapers, for printing and advertising during the years 1874 and 1883. Presented to the House of Commons, 4th February, 1885.—*Mr. McMullen.....Not printed.*
- 23a.** Return (*in part*) to an Address of the House of Commons, dated 17th February, 1885, for a Return showing the several sums paid and dates of payment made by the Government between the 1st day of January, 1884, and the 30th day of June, 1884, and between the 1st day of July and the 31st day of December, 1884, to the several printing and publishing companies of the Dominion, or to editors, agents or proprietors of newspapers, or publishers of any kind, for any work done or material furnished. Presented to the House of Commons, 29th May, 1885.—*Mr. McMullen.....Not printed.*
- 24.** Official Return of the distribution of the Dominion Statutes of Canada, being 47 Victoria, 2nd Session, 5th Parliament, 1884—Vols. 1 and 2 separately, and 1 and 2 together; English and French versions. Presented to the House of Commons, 6th February, 1885, by Hon. J. A. Chapeau.....*Not printed.*
- 25.** Articles of agreement entered into between Andrew Onderdonk and Her Majesty Queen Victoria, represented by the Minister of Railways and Canals of Canada, to furnish and erect a combined passenger and freight building at each of the following places on the line of the Canadian Pacific Railway in British Columbia, viz.:—Yale, Lytton and Ashcroft. Also between John Philip Bacon and Her Majesty Queen Victoria, &c., to construct nine water tanks on Canadian Pacific Railway in British Columbia, between Emory's Bar and Savona's Ferry. Presented to the House of Commons, 6th February, 1885, by Hon. J. H. Pope—*Not printed.*
- 25a.** Return (*in part*) under resolution of the House of Commons, passed on the 20th February, 1882, on all subjects affecting the Canadian Pacific Railway, respecting details as to: 1. The selection of the route. 2. The progress of the work. 3. The selection or reservation of land. 4. The payment of moneys. 5. The laying out of branches. 6. The progress thereon. 7. The rates of tolls for passengers and freight. 8. The particulars required by the Consolidated Railway Act and amendments thereto, up to the end of the previous fiscal year. 9. Like particulars up to the latest practicable date before the presentation of the return. 10. Copies of all

- Orders in Council and of all correspondence between the Government and the Railway Company, or any member or officer of either, relating to the affairs of the company. Presented to the House of Commons, 13th February, 1885, by Hon. J. H. Pope—
Printed for Sessional Papers only.
- 25b.** Annual Return *in re* the Canadian Pacific Railway, 1884-85, under resolution of the House of Commons, passed on the 20th February, 1882. Presented to the House of Commons, 13th February, 1885, by Sir John A. Macdonald.....*Printed for Sessional Papers only.*
- 25c.** Supplementary Return to a Standing Order of the House of Commons, dated 20th February, 1882, for full information on all subjects affecting the Canadian Pacific Railway up to the latest date, and particularly all details as to: 1. The selection of the route. 2. The progress of the work. 3. The selection or the reservation of land. 4. The payment of moneys. 5. The laying out of branches. 6. The progress thereon. 7. The rates of tolls for passengers and freight. 8. The particulars required by the Consolidated Railway Act and amendments thereto, up to the end of the previous fiscal year. 9. Like particulars up to the latest date before the presentation of the return. 10. Copies of all Orders in Council and of all correspondence between the Government and the Railway Company, or any member or officer of either, relating to the affairs of the company. Presented to the House of Commons, 17th February, 1885, by Hon. J. A. Chapleau.....*Printed for Sessional Papers only.*
- 25d.** Return to an Order of the House of Commons, dated 9th February, 1885, for a statement and plan showing the grades and curves on the temporary or permanent line actually constructed by the Canadian Pacific Railway Company, from the foot of the Rocky Mountains as far as the rails are laid; and the proposed grades and curves on the continuation to Kamloops; showing also the proposed grades and curves on the permanent line at a point at which a temporary line of about nine miles has been constructed. Presented to the House of Commons, 5th March, 1885.—*Mr. Blake*.....*Not printed.*
- 25e.** Return to an Order of the House of Commons, dated 5th February, 1885, for map or maps showing: 1. The location of the Canadian Pacific Railway, so far as approved of or constructed. 2. Its location, so far as proposed to Government, but not yet approved. 3. The location of any branches constructed or acquired and of any now contemplated by the company, so far as the Government is advised. 4. The lands set apart for the company, but not yet granted. 5. The lands granted. 6. The lands applied for, but not yet set apart. Presented to the House of Commons, 5th March, 1885.—*Mr. Blake*.....*Not printed.*
- 25f.** Return to an Address of the House of Commons, dated 5th February, 1885, to His Excellency the Governor General, praying that he will cause to be laid before the House a copy of: 1. Correspondence between the Canadian Pacific Railway Company and the North Shore Railway Company, for the purchase, by the said Canadian Pacific Railway Company, of the said North Shore Railway from St. Martin's Junction to Quebec, or to obtain control of the same, or to make such arrangements as would allow the said Canadian Pacific Railway to extend its railway to Quebec. 2. Of all correspondence between the Government and the Canadian Pacific Railway Company concerning the extension of their railway from St. Martin's Junction to the Harbor of Quebec. 3. Of all correspondence between the Government and any other persons for the purpose of incorporating such persons for the construction of a railway from the terminus of the Canadian Pacific Railway, at St. Martin's Junction, to the Harbor of Quebec. Presented to the House of Commons, 5th March, 1885.—*Mr. Laurier*.....*Not printed.*
- 25g.** Return to an Order of the House of Commons, dated 17th February, 1885, for a copy of separate report or finding of Judge Clarke, one of the arbitrators on the claims for damages of contractors for Section B, Canadian Pacific Railway, in regard to such claims or to the award in reference thereto, signed by Messrs. Brydges and Light, the other arbitrators. Presented to the House of Commons, 5th March, 1885.—*Mr. Casey*.....*Not printed.*
- 25h.** Return to an Order of the House of Commons, dated 17th February, 1885, for a copy of the case submitted by the Government to counsel, and opinion given by counsel consulted by the Government, as to the validity of the award of damages to contractors for Section B, Canadian Pacific Railway, and as to the action that should be taken in reference to such award. Presented to the House of Commons, 5th March, 1885.—*Mr. Casey*..... *Not printed.*

- 25i.** Return to an Order of the House of Commons, dated 16th February, 1885, for a statement of sums paid to the Canadian Pacific Railway Company up to date, for constructions on those portions of the Canadian Pacific Railway between Port Arthur and Winnipeg, the contract for which has been transferred to them from the original contractors, with dates of payment; also, copies of estimates on which such payments have been made, showing quantities and rates. Presented to the House of Commons, 5th March, 1885.—*Mr. Casey*.....*Not printed.*
- 25j.** Supplementary Return, under resolution of the House of Commons, passed on the 20th February, 1882, on all subjects affecting the Canadian Pacific Railway, respecting details as to:
1. The selection of the route. 2. The progress of the work. 3. The selection or reservation of land. 4. The payment of money. 5. The laying out of branches. 6. The progress thereon. 7. The rates of tolls for passengers and freight. 8. The particulars required by the Consolidated Railway Act and amendments thereto, up to the end of the previous fiscal year. 9. Like particulars up to the latest practicable date before the presentation of the Return. 10. Copies of all Orders in Council, and of all correspondence between the Government and the Railway Company, or any member or officer of either, relating to the affairs of the company. Presented to the House of Commons, 5th March, 1885, by Hon. J. A. Chapleau.
Printed for Sessional Papers only.
- 25k.** Return to an Address of the House of Commons, dated 5th February, 1885, for a statement showing the date and rate at which the ten million dollars of Canadian Pacific Railway stock formerly pledged for a loan of about \$4,950,000 was sold, and the net amount received by the company in respect of such sales. Presented to the House of Commons, 9th March, 1885.—*Mr. Blake*.....*Not Printed.*
- 25l.** Return to an Order of the House of Commons, dated 4th February, 1885, for copies of all reports of Government engineers, made previous to and on this day, in relation to the survey of the several proposed lines for the extension of the Canadian Pacific Railway from Montreal to a port on the Atlantic Ocean. Also the instructions and the official correspondence which passed between the several engineers and the Government. Presented to the House of Commons, 11th March, 1885.—*Mr. Lesage*.....*Not printed.*
- 25m.** Return to an Address of the House of Commons, dated 17th February, 1885, for a plan of the proposed route or routes of the Canadian Pacific Railway from Port Moody, or the neighborhood thereof, to English Bay or Coal Harbor, showing the point at which the route chosen diverges from the main line, and the distance thereof from the present terminus at Port Moody; also an estimate of the cost of constructing the proposed line to the new Pacific terminus, and of the cost of the terminal accommodations there. Presented to the House of Commons, 13th March, 1885.—*Mr. Blake*.....*Not printed.*
- 25n.** Return to an Address of the House of Commons, dated 23rd February, 1885, for copies of the report of Mr. Van Horne, Vice-President of the Canadian Pacific Railway Company, of September last, and of Mr. S. B. Read, C.E., of the same month, with reference to the Canadian Pacific Railway in British Columbia; and also reports of engineers of high standing, as to the route of the Canadian Pacific Railway at the point where a temporary line has been built, referred to in the letter from Mr. Van Horne to the Minister of Railways and Canals, of 19th May, 1884, and for any report of Mr. Fleming on the subject, in the possession of the Railway Company. Presented to the House of Commons, 13th March, 1885.—*Mr. Blake*—
Printed for Sessional Papers only.
- 25o.** Return to an Address of the House of Commons, dated 17th February, 1885, for a copy of the claim put in by the contractors of Section B, on which the award to them of \$395,600 was based; and of Order in Council of 2nd April, 1883, in reference to submission to arbitrators. Presented to the House of Commons, 13th March, 1885.—*Mr. Casey*.....*Not printed.*
- 25p.** Supplementary Return to an Order of the House of Commons, dated 17th February, 1885, for a copy of the case submitted by the Government, as to the validity of the award of damages to contractors for Section B, Canadian Pacific Railway, and as to the action that should be taken in reference to such award. Presented to the House of Commons, 16th March, 1885.—*Mr. Casey*.....*Not printed.*

- 25q.** Return to an Address of the House of Commons, dated 5th February, 1885, for copies of all correspondence, reports and Orders in Council not covered by the previous Address, relating to the allowances proposed to be paid to the Canadian manufacturers of certain goods required by the Canadian Pacific Railway; of all applications for such allowances, and correspondence in connection therewith; a statement of the calculations on which the allowances have been based, and an estimate in detail of the probable sums payable out of the Treasury in respect of each class of goods, assuming them to be made in Canada, to the extent of the company's requirements, and of the *ad valorem* percentage of all allowances on each such class. Presented to the House of Commons, 18th March, 1885.—*Mr. Blake*.....*Not printed.*
- 25r.** Return to an Address of the House of Commons, dated 12th March, 1885, for a statement showing the names and addresses of all shareholders in the Canadian Pacific Railway Company, with the amount of stock held by each, as of the date of 16th February, 1885. Presented to the House of Commons, 18th March, 1885.—*Mr. Blake*.....*Not printed.*
- 25s.** Return to an Order of the House of Commons, dated 16th February, 1885, for a copy of the report of the engineers appointed to re-measure and re-classify the work on Section B, Canadian Pacific Railway, in connection with the claims of the contractors for said section for increased remuneration for such work and for damages. Also all reports of the engineers in charge of said section, or of the Engineer-in-Chief or any other Government engineer, in reference to the questions of measurement, classification or damages at issue between the Government and the contractors. Presented to the House of Commons, 23rd March, 1885.—*Mr. Casey*—
Printed for Sessional Papers only.
- 25t.** Return to an Address of the House of Commons, dated 9th February, 1885, for a statement showing the number of passenger trains, freight trains and mixed trains, distinguishing each class, run daily, or weekly in cases in which there was not a daily train, over each division of the Canadian Pacific Railway, in each week of the years 1883 and 1884 respectively. Presented to the House of Commons, 26th March, 1885.—*Mr. Blake*.....*Not printed.*
- 25u.** Return to an Order of the House of Commons, dated 12th March, 1885, for copies of all memorials, letters and other representations, in writing, received by the Government on the subject of the non-payment by the Canadian Pacific Railway Company of amounts due to contractors, sub-contractors or laborers engaged in the construction of the Canadian Pacific Railway. Presented to the House of Commons, 26th March, 1885.—*Mr. Charlton*—
Not printed.
- 25v.** Supplementary Return to a Standing Order of the House of Commons, passed on the 20th February, 1882, for full information on all subjects affecting the Canadian Pacific Railway up to the latest date, and particularly all details as to: 1. The selection of the route. 2. The progress of the work. 3. The selection or reservation of land. 4. The payment of the moneys. 5. The laying out of branches. 6. The progress thereon. 7. The rates of tolls for passengers and freight. 8. The particulars required by the Consolidated Railway Act and amendments thereto up to the end of the previous fiscal year. 9. Like particulars up to the latest practicable date before the presentation of the return. 10. Copies of all Orders in Council and of all correspondence between the Government and the railway company, or any member or officer of either, relating to the affairs of the company. Presented to the House of Commons, 23rd April, 1885, by Hon. J. H. Pope.....*Not printed.*
- 25w.** Return to an Address of the House of Commons, dated 12th February, 1885, for a statement in detail of the present position of land grant and the land grant bonds of the Canadian Pacific Railway Company, showing, by the number of the section, the township and range or other description, the lots granted to the company. Also the lots sold by the company. Also the amount of land grant bonds in the hands of the Government; the amount in the hands of the company; the amount in the hands of the public; the amount pledged by the company for loans, or otherwise, with details, and the amount cancelled; showing also the sum received by the company for lands sold in each calendar year and in the course of the present year; and the amount now due to the company in respect of lands sold, with a separate statement showing the amount received by the company from sales in town sites, and

the amount now due on such sales, distinguishing between the receipts and debts on account of town sites comprised in the land grant, or in any arrangement with the Government, and the receipts and debts on account of other town sites. Presented to the House of Commons, 23rd April, 1885.—*Mr. Blake*.....*Not printed.*

25z. Return to an Order of the House of Commons, dated 2nd March, 1885, for copies of all reports, plans, specifications, estimates, contracts, correspondence and other papers in connection with the construction of the Canadian Pacific Railway wharf and freight shed at Port Moody, B.C., and relating to its deterioration and repairs or reconstruction. And like papers as to the bridge on the railway near Spuzzum, B.C. Presented to the House of Commons, 23rd April, 1885.—*Mr. Blake*.....*Not printed.*

25y. Return to an Order of the House of Commons, dated 24th February, 1885, for any information in the possession of the Department as to the character of the work done near Lytton, B.C., on the Canadian Pacific Railway, on that portion of the road for which Mr. Hugh J. Keefer had a sub-contract, and which was under the inspection of his brother, Mr. George Keefer, Government engineer; also copies of any statements as to the character of the material allowed as rock or as other than earth, in this part. Presented to the House of Commons, 24th April, 1885.—*Mr. Blake*.....*Printed for Sessional Papers only.*

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25z. Return to an Order of the House of Commons, dated 23rd February, 1885, for all reports, plans and other information in the possession of the Department in reference to the work on the Canadian Pacific Railway at or near Maple Ridge, a short distance above Hammond, on the bank of the Fraser, B.C.; for all reports and information in the possession of the Department as to the condition of the work on the Government sections of the Canadian Pacific Railway in British Columbia; and as to the extent of work remaining to be done before the completion of the contract; also for all correspondence with the Canadian Pacific Railway Company as to the taking over by them of these sections of the railway; also for a statement of the names, salaries and period of service in that region, of the Government engineers who have been employed on the Government sections in British Columbia of the Canadian Pacific Railway, with the dates at which any of them were relieved, a statement of the cause of their removal, and of their present occupation, if any, under the Government. Presented to the House of Commons, 5th May, 1885.—*Mr. Blake*.....*Printed for Sessional Papers only.*

25aa. Return to an Order of the House of Commons, dated 2nd of March, 1885, for copies of all applications, statements, estimates or letters sent from the Canadian Pacific Railway to the Government, or any of its officials, in relation to the change made by the Government between 7th April, 1884, and 16th May, 1884, in the dealing with rolling stock in progress estimates and payments in the Eastern Section, Western Division, and copies of all correspondence and papers upon the same subject. Presented to the House of Commons, 5th May, 1885.—*Mr. Edgar*.....*Not printed.*

25bb. Supplementary Return to a Standing Order of the House of Commons, passed on the 20th February, 1882, for full information on all subjects affecting the Canadian Pacific Railway up to the latest date, and particularly all details as to: 1. The selection of the route. 2. Progress of the work. 3. The selection or reservation of land. 4. The payment of moneys. 5. The laying out of branches. 6. The progress thereon. 7. The rates of tolls for passengers and freight. 8. The particulars required by the Consolidated Railway Act and amendments thereto, up to the end of the previous fiscal year. 9. Like particulars up to the latest practicable date before the presentation of the Return. 10. Copies of all Orders in Council and of all correspondence between the Government and the Railway Company, or any member or officer of either, relating to the affairs of the company. Presented to the House of Commons, 5th May, 1885, by Hon. J. H. Pope.....*Not printed.*

25cc. Letter and statements from George Stephen, Esq., President of the Canadian Pacific Railway Company, to the Hon. the Minister of Railways and Canals, accompanied by Mr. Miall's condensed balance sheet on the affairs of the Canadian Pacific Railway Company on the 1st January, 1885. Presented to the House of Commons, 7th May, 1885.—*Sir J. A. Macdonald*.....*Printed for both Distribution and Sessional Papers.*

- 25dd.** Return to an Order of the House of Commons, dated 6th February, 1885, for a Return of the names of persons in the employ of the Government along the line of the Canadian Pacific Railway during the year 1884, the date of their engagement, the length of time employed, the work assigned them and the salary, fee or allowance paid; also the amount of travelling expenses paid to each. Presented to the House of Commons, 8th May, 1885.—*Mr. McMullen*.....*Not printed.*
- 25ee.** Supplementary Return to an Order of the House of Commons, dated 2nd March, 1885, for copies of all applications, statements, estimates or letters sent from the Canadian Pacific Railway to the Government or any of its officials, in relation to the change made by the Government between 7th April, 1884, and 16th May, 1884, in the dealing with rolling stock, in progress estimates and payments in the Eastern Section, Western Division, and copies of all correspondence and papers upon the same subject. Presented to the House of Commons, 16th May, 1885.—*Mr. Edgar*.....*Not printed.*
- 25ff.** Return to an Order of the House of Commons, dated 2nd March, 1885, for copies of all the estimates, in detail, furnished to the Government by the Canadian Pacific Railway Company, and by the Government engineer, upon which the estimated cost of \$23,000 per mile was based for the portion of the Eastern Section from the 100th mile to the 120th mile west of Callander, giving quantities, classification and prices; also for a statement of the actual quantities, description and classification of the work from the 100th mile to the 120th mile west of Callander on the 12th August, 1884, when the subsidy and loan were paid by the Government as a completed line. Presented to the House of Commons, 16th May, 1885.—*Mr. Edgar*.....*Not printed.*
- 25gg.** Return to an Order of the House of Commons, dated 2nd March, 1885, for copies of the report of survey by Vernon Smith, C.E., in relation to the extension of the Canadian Pacific Railway to Canadian ports on the Atlantic. Presented to the House of Commons, 16th May, 1885.—*Mr. Lesage*.....*Not printed.*
- 25hh.** Return to an Address of the House of Commons, dated 12th March, 1885, for copy of all offers made to the Government for the construction of a railway connecting the Ontario railway system, at or near to Gravenhurst, with the Canadian Pacific Railway. Presented to the House of Commons, 9th June, 1885.—*Mr. Mulock*.....*Printed for Sessional Papers only.*
- 25ii.** Return to an Address of the House of Commons, dated 12th February, 1885, for a Return showing the amounts contributed to the Canada Central Railway between Ottawa and Brockville, either by the Government of Canada, the Provincial Government of Ontario, or by the municipalities along that line of railway. Also showing what securities were taken for the amounts so advanced to the said railway company, and what disposition has been made of the said securities. Also for similar returns concerning the St. Lawrence and Ottawa Railway from Ottawa to Prescott, together with the conditions upon which such grants were made to both railways; also statement showing the present train service on both lines of railway. Presented to the House of Commons, 9th June, 1885.—*Mr. Landerkin*...*Not printed.*
- 25jj.** Supplementary Return to an Order of the House of Commons, dated 5th February, 1885, for map or maps showing: 1. The location of the Canadian Pacific Railway, so far as approved of or constructed. 2. Its location, so far as proposed to Government, but not yet approved. 3. The location of any branches constructed or acquired, and of any now contemplated by the company, so far as the Government is advised. 4. The lands set apart for the company, but not yet granted. 5. The lands granted. 6. The lands applied for, but not yet set apart. Presented to the House of Commons, 11th June, 1885.—*Mr. Blake*.....*Not printed.*
- 25kk.** Return to an Address of the House of Commons, dated 12th March, 1885, for a copy of all correspondence between the Government of Quebec and the Government of Canada concerning the application of the sum of \$960,000 reserved by the statute 47 Victoria, chapter 8, for the extension of the Canadian Pacific Railway from its terminus at St. Martin's Junction to the Harbor of Quebec. Presented to the House of Commons, 15th June, 1885.—*Mr. Laurier*—*Printed for Sessional Papers only.*
- 25ll.** Return to an Address of the House of Commons, dated 9th February, 1885, for a statement showing the gross earnings, expenses and net earnings of the Canadian Pacific Railway for each month of the years 1883 and 1884, distinguishing between the main line and the lines now

worked under the lease from the Ontario and Quebec Railway Company; and distinguishing also between the main line east of Port Arthur or Fort William and the main line west of that point, giving in each case the mileage open for traffic during the month specified. Presented to the House of Commons, 16th June, 1885.—*Mr. Blake*.....*Printed for Sessional Papers only.*

- 25mm.** Return to an Address of the House of Commons, dated 12th February, 1885, for a statement showing: 1. The expenditure by the Canadian Pacific Railway Company upon its main line of railway between Callander and Port Arthur and between Selkirk and Kamloops, since the expenditure of \$23,078,950, shown by the letter of Mr. Stephen to the Minister of Railways and Canals on the 15th January, 1884. 2. The materials on hand in respect of the described main line of railway. 3. The receipts by the company since the account given in the said letter in respect of—(a.) Cash subsidy; (b.) Government loan; (c.) Land grant bonds or land sales, or from the pledging of land grant bonds. 4. The amount, if any, due by the company in respect of construction of the described main line. 5. Estimates of the cost of the work of construction remaining to be done on the described main line, showing whether the materials on hand are taken into account in such estimates or not. 6. An estimate of the whole cost of construction of the described main line when completed. 7. Statement of the cost of equipment of the described main line at the date of the account in Mr. Stephen's letter. 8. Statement of the cost of equipment of the described main line since that date. 9. Estimate of the further cost of equipment of the described main line when completed. 10. Estimate of the complete cost of equipping the described main line. All such statements and estimates being separate for each of the described divisions, viz., (a) that between Callander and Port Arthur, and (b) that between Selkirk and Kamloops. Presented to the House of Commons, 16th June, 1885.—*Mr. Blake*.....*Printed for Sessional Papers only.*
- 25nn.** Return to an Address of the House of Commons, dated 24th February, 1885, for a statement of the cost of the Canadian Pacific Railway from Winnipeg to a point 615 miles west of Winnipeg, divided under the usual sub-headings of cost of railway construction; or in case the company has not recorded the expense under the usual sub-headings, then divided in such a way and in such detail as the company has recorded it. Presented to the House of Commons, 16th June, 1885.—*Mr. Blake*.....*Printed for Sessional Papers only.*
- 25oo.** Return to an Address of the House of Commons, dated 8th April, 1885, for a Return showing the date of completion of the main line of the Canadian Pacific Railway from Winnipeg to Brandon, from Brandon to Moose Jaw, from Moose Jaw to Calgary, the dates on which each section was opened for traffic, the dates on which such section was inspected by the Government engineer, with all Orders in Council, papers and correspondence affecting the tariff rates for passengers and freight upon such line, not already brought down. Presented to the House of Commons, 15th June, 1885.—*Mr. Watson*.....*Not printed.*
- 25pp.** Return to an Address of the Senate, dated 25th February, 1885, for all correspondence had since the 1st January, 1884, between the Government of Canada and the Government of the Province of Quebec, concerning all sums of money granted by the Government of Canada to the Province of Quebec, and all claims of the Province of Quebec, by way of indemnity on account of the construction of the North Shore Railway, heretofore called the Quebec, Montreal, Ottawa and Occidental Railway, together with a copy of all memorials presented to the Federal Government during the same period by the Government of Quebec, respecting all claims or demands of indemnity for the same cause. Presented to the Senate, 16th April, 1885.—*Hon. Mr. Trudel*,.....*Printed for Sessional Papers only.*
- 25qq.** Return to an Order of the House of Commons, dated 13th February, 1885, for a statement showing: 1. The total number of permanent timber trestles and the total number of wooden bridges constructed, or under contract for construction, upon the line of the Canadian Pacific Railway. 2. The length, in feet, and the maximum height of each of said trestles and of each of said bridges. Such statement to identify the trestles and bridges by numbering them consecutively from Sudbury westward. Presented to the House of Commons, 14th July, 1885.—*Mr. Edgar*.....*Not printed.*
- 25rr.** Return to an Address of the House of Commons, dated 17th February, 1885, for: 1. A statement of the present position of the debt of six hundred thousand dollars, due last Session

by the North American Contracting Company to the Canadian Pacific Railway, with information as to whether the same has been settled, and if so, when and upon what terms, and if unsettled, what steps have been taken, or are being taken, to procure a settlement; also a statement of the present position of a sum of about six hundred thousand dollars invested by the Canadian Pacific Railway Company in stock of the Canada North-West Land Company, with a statement of its value, at the average price for the month of January, 1885. 2. Also plan and statement showing the grades and curves on the line of the Canadian Pacific Railway as far as constructed, including all the Government sections, but exclusive of the line constructed by the company from the foot of the Rocky Mountains to Kamloops. 3. Also a copy of the prospectus, advertisement and other papers in connection with the recent proposal for the issue of bonds of the Ontario and Quebec Railway Company, guaranteed by the Canadian Pacific Railway Company, with a statement of the amount sold and the average rate. 4. Also an estimate of the cost of the Canadian Pacific Railway between Callander and Port Arthur, divided under the usual heads of sub-divisions in railway construction, with separate estimate for equipment. 5. Also a like estimate, in similar form, of the cost of the construction of the Canadian Pacific Railway between Calgary and the summit of the Rocky Mountains, and from the summit of the Rocky Mountains to the junction with the Government section, each separately, with a statement of the items in which a saving of four million dollars upon the estimate of last Session is calculated by the officers of the company. 6. Also a statement of the expenditure by the Canadian Pacific Railway Company on any account, except the construction and equipment of the contracted line between Callander and Port Arthur, and between Selkirk and Kamloops. Presented to the House of Commons, 14th July, 1885.—*Mr. Blake*.....*Not printed.*

25ss. Return to an Address of the House of Commons, dated 17th February, 1885, for: 1. A statement of the expenditure of the Canadian Pacific Railway Company since the account in Mr. Stephen's letter to the Minister of Railways and Canals, 15th January, 1884, upon branch lines, specifying each line, the expenditure thereon, the purpose thereof, and the additional mileage beyond 269 miles completed at the date of Mr. Stephen's letter. 2. Statement of the cost of equipment of such branch lines; (a.) At the date of said letter; (b.) Since that time. 3. Estimate for any further cost of equipment for such branch lines so far as completed. 4. Statement in detail of the further sums paid in respect of the extensions or branches east of Callander, since the date of said letter, when they amounted to \$3,203,050. 5. A statement of the present condition of the account for advances towards acquiring a line to the seaboard, and for other purposes, alleged to be within the charter, shown by the said letter at \$3,482,251; with a detail of any further payments of a like character. Presented to the House of Commons, 18th July, 1885.—*Mr. Blake*.....*Not printed.*

25tt. Return to an Address of the House of Commons, dated 17th February, 1885, for copies of all correspondence and agreements between the Government and the Canadian Pacific Railway Company on the subject of immigration to Manitoba and the North-West, together with a statement showing the amount expended by the company in promoting such immigration, giving amounts paid, with dates, to whom paid, and the nature of service rendered; also estimate of the company of number of persons from foreign countries who have actually settled there in each year since date of charter. Presented to the House of Commons, 18th July, 1885.—*Mr. Paterson (Brant)*.....*Not printed.*

25uu. Supplementary Return to an Address of the House of Commons, dated 17th February, 1885, for: 1. A statement of the present position of the debt of six hundred thousand dollars due last Session by the North American Contracting Company to the Canadian Pacific Railway, with information as to whether the same has been settled, and, if so, when and upon what terms, and if unsettled, what steps have been taken, or are being taken, to procure a settlement; also a statement of the present position of a sum of about six hundred thousand dollars invested by the Canadian Pacific Railway Company in stock of the Canada North-West Land Company, with a statement of its value at the average price for the month of January, 1885. 2. Also plan and statement showing the grades and curves on the line of the Canadian Pacific Railway as far as constructed, including all the Government sections, but exclusive of the line constructed by the company from the foot of the Rocky Mountains to Kamloops. Presented to the House of Commons, 20th July, 1885.—*Mr. Blake*.....*Not printed.*

- 26.** Return to an Order of the House of Commons, dated 2nd February, 1885, for a Return of the receipts and expenditure, in detail, chargeable to the Consolidated Fund, from the 1st July, 1883, to the 31st January, 1884, and from 1st July, 1884, to 31st January, 1885. Presented to the House of Commons, 9th February, 1885.—*Sir Richard Cartwright*—
Printed for Distribution only.
- 27.** Return to an Order of the House of Commons, dated 2nd February, 1885, for a statement showing the amount of money on deposit to the credit of the Government of Canada on the 1st February, 1885, whether in Canada or elsewhere, together with the names of the banks wherein the said moneys are deposited, with the amount in each bank respectively; also the amount at interest and the rate of interest allowed on the said deposits in each case. Presented to the House of Commons, 9th February, 1885.—*Sir Richard Cartwright*—
Printed for Distribution only.
- 28.** Return to an Address of the House of Commons, dated 30th January, 1884, for copies of all Orders in Council, despatches, correspondence and telegrams relating to the negotiations between Canada and British Columbia, not already brought down; and for a statement of the estimated net cost to Canada of the dry dock in British Columbia. Presented to the House of Commons, 10th February, 1885.—*Mr. Blake*.....*Not printed.*
- 29.** Return (*in part*) to an Address of the House of Commons, dated 24th January, 1884, for copies of all Orders in Council, reports and correspondence, not already brought down, in reference to the exercise or non-exercise of the power of disallowance as to any Provincial Acts; with a statement of the dates of prorogation of each of the Provincial Assemblies; and of the dates at which the Acts of the Session were received at Ottawa; and copy of the despatches addressed to the Lieutenant-Governors on the subject of the transmission to the Government of Canada of such Acts. Presented to the House of Commons, 10th February, 1885.—*Mr. Mulock*.....*Printed for Sessional Papers only.*
- 30.** Return to an Order of the House of Commons, dated 25th February, 1884, for a detailed statement of all moneys expended upon the Dominion steamer "Sir James Douglas," in connection with the hauling out, lengthening of, repairs to, and launching of said vessel, from 1st January, 1882, to 31st December, 1883. Presented to the House of Commons, 10th February, 1885.—*Mr. Baker (Victoria)*.....*Not printed.*
- 30a.** Return to an Order of the House of Commons, dated 25th February, 1884, for a statement showing numbers of officers and crew of steamer "Sir James Douglas," their names, rank, pay and date of first appointment, the average cost per month of maintaining said vessel for the twelve months ending 31st December, 1883, nature of service in which she has been engaged for the period mentioned, increased speed obtained by lengthening, date on which she was last swung for adjustment of compasses and copy of deviation table made therefrom. Presented to the House of Commons, 10th February, 1885.—*Mr. Baker (Victoria)*.....*Not printed.*
- 30b.** Return to an Order of the House of Commons, dated 28th March, 1884, for all correspondence of a date subsequent to 1st January, 1883, upon the subjects of repairs to, hauling out, and launching of the steamer "Sir James Douglas," in the early part of said year, between the Department of Marine and Fisheries and their agents at Victoria, B.C., or between the Department and any other person or persons, in the Province of British Columbia, upon said subject; also copies of reports sent in to the Department by the agent of the Department in British Columbia, and the master of the steamer above referred to, in connection with the serious and unpleasant difference of opinion which arose between them, reflecting discreditably upon themselves and the Department. Also all correspondence upon that or any other subject between the Department and any British Columbia member or other person, in any way reflecting upon the agent of the Department in British Columbia, to date. Presented to the House of Commons, 10th February, 1885.—*Mr. Baker (Victoria)*.....*Not printed. See 30d.*
- 30c.** Return to an Address of the Senate, dated 9th April, 1884, for copies of all documents and correspondence in possession of the Government relating to the establishment of a line of steamships between France and Canada. Presented to the Senate, 24th February, 1885. *Hon. Mr. Pelletier*.....*Printed for Sessional Papers only.*

- 30d.** Return to an Order of the House of Commons, dated 28th March, 1884, for all correspondence of a date subsequent to 1st January, 1883, upon the subject of repairs to, hauling out and launching of the steamer "Sir James Douglas," in the early part of said year, between the Department of Marine and Fisheries and their agent at Victoria, B.C., and between the Department and any other person or persons in the Province of British Columbia, upon said subject; also copies of reports sent in to the Department by the agent in British Columbia, and the master of the steamer referred to, in connection with the serious and unpleasant difference of opinion which arose between them, reflecting discreditably upon themselves and the Department; also all correspondence upon that or any other subject between the Department and any British Columbia member or other person, in any way reflecting on the agent of the Department in British Columbia, to date. Presented to the House of Commons, 14th April, 1885.—*Mr. Baker (Victoria)*.....*Printed for Distribution only.*
- 30e.** Return to an Order of the House of Commons, dated 24th February, 1885, for copies in full of the accounts and vouchers of all provisions, coal and other supplies furnished the Hudson Bay steamer "Neptune" at Halifax, in July last, and copies of all the tenders upon which all the contracts were based. Presented to the House of Commons, 14th April, 1885.—*Mr. Vail*.....*Not printed.*
- 30f.** Return to an Address of the House of Commons, dated 23rd February, 1885, for copies of all reports, correspondence, contracts, Orders in Council and other papers, in connection with the arrangements under which public moneys have been paid by the Government to the Halifax Steam Navigation Company. Presented to the House of Commons, 30th April, 1885.—*Mr. Blake*.....*Not printed.*
- 31.** Return to an Address of the House of Commons, dated 28th March, 1884, for a statement showing the present constitution of the North-West Council, the number of elected members, the district for which they are elected, the number of votes polled, the names of the candidates, and the qualifications required of the voters. Presented to the House of Commons, 19th February, 1885.—*Mr. Mills*.....*Printed for both Distribution and Sessional Papers.*
- 32.** Return to an Address of the House of Commons, dated 28th March, 1884, for a statement of all moneys paid by the Dominion Government to the Local Government of Ontario since Confederation; stating the amounts in each year and stating on what account. Presented to the House of Commons, 10th February, 1885.—*Mr. Farrow*.....*Printed for Distribution only.*
- 33.** Return to an Order of the House of Commons, dated 28th March, 1884, for: 1. Correspondence, papers, draft, notarial transfer and telegram respecting Survey Contract No. 10, of L. J. E. Garon, of the season of 1881, by which Joseph Adhemar Martin, merchant, of Rimouski, has received the sum of \$800. 2. Correspondence, papers, draft, notarial transfer and telegram, between the Minister of the Interior and the said Joseph Adhemar Martin, concerning the balance remaining due on the said transfer of the said Survey Contract No. 10, of L. J. E. Garon, of the said season of 1881. Presented to the House of Commons, 19th February, 1885.—*Mr. Billy*.....*Not printed.*
- 34.** Return to an Address of the House of Commons, dated 7th February, 1884 for copies of all correspondence between the several Provincial Governments and the Dominion Government, respecting the readjustment or increase of the money subsidies paid, or to be paid, by the latter to the former, in pursuance of the confederation agreement, or of any other arrangements since made. Also copies of all petitions from the several Provincial Legislatures to the Government, or to the Parliament of Canada, and of any memorials received by the latter from the several Provincial Governments, asking for aid or assistance in money or otherwise. Also statement showing all that has been granted in money, or otherwise, by the Government of Canada to the several provinces since 1867. Presented to the House of Commons, 10th February, 1885.—*Mr. Ouimet*.....*Printed for Sessional Papers only.*
- 34a.** Return to an Address of the House of Commons, dated 5th February, 1885, to His Excellency the Governor General, praying that he will cause to be laid before the House any correspond-

ence or papers touching applications by Local Governments for advances of money on debt account, and for any papers throwing light on the reasons for the pending Bill on that subject. Presented to the House of Commons, 27th February, 1885.—*Mr. Blake—*

Printed for Sessional Papers only.

- 34b.** Return to an Address of the House of Commons, dated 2nd March, 1885, for copies of all correspondence since 1st January last, between the Dominion Government and the Government of the Province of Quebec, in relation to an increase or readjustment of the Dominion subsidy to the province, including any letter written to that end by one of the said Governments to the other, or by any of the Ministers thereof in relation to the subject; also of any such correspondence with any of the other Provinces of the Dominion. Presented to the House of Commons, 23rd April, 1885.—*Mr. Amyot.....* *Printed for Sessional Papers only.*
- 35.** Return to an Order of the House of Commons, dated 1st February, 1884, for copies of all correspondence and papers relating to any proposed or suggested reduction in letter postage in the Dominion of Canada. Presented to the House of Commons, 10th February, 1885.—*Mr. Charlton.....* *Not printed.*
- 36.** Return to an Order of the House of Commons, dated 11th February, 1884, for copies of all correspondence or complaints to the Postmaster-General, relative to delays or neglect of postmasters in transmitting newspapers and periodicals to the office of destination, since 1st January, 1883. Presented to the House of Commons, 10th February, 1885.—*Mr. Sproule—*
Not printed.
- 37.** Reports relative to the manufacturing industries in existence in Canada, submitted to the House of Commons for its information. Presented to the House of Commons, 11th February, 1885, by Sir Leonard Tilley..... *Printed for both Distribution and Sessional Papers.*
- 37a.** Return to an Address of the House of Commons, dated 6th February, 1885, for copy of the commission or other authorization, Order in Council, correspondence and instructions in relation to the commission issued for the investigation of certain facts as to the condition of the industries of Canada during the last recess. Copy of the report of the commissioners, and the evidence and data obtained by them. Statement in detail of all moneys paid in respect of the commission, and an estimate in detail of all moneys payable, but as yet unpaid; dated 11th February, 1885. Presented to the House of Commons, 12th February, 1885. *Mr. Blake—*
Printed for both Distribution and Sessional Papers.
- 37b.** Return to an Order of the House of Commons, dated 4th February, 1885, for all returns, statements or correspondence in possession of the Government, showing the number of operatives employed in factories in the Dominion in 1878 and in 1884, together with the amount of capital invested and wages paid. Presented to the House of Commons, 16th February, 1885.—*Sir Richard Cartwright.....* *Not printed.*

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- 38.** Return to an Order of the House of Commons, dated 5th February, 1885, for copies of all correspondence relative to any payments, claims or allowances on any account whatever, in respect to the office of High Commissioner, not already brought down; and separate statement in detail, with dates and sums of all payments made on any such accounts in respect to the office, during its tenure by the present incumbent; an estimate in detail of all sums payable on any such accounts up to this date and yet unpaid; also copies of all correspondence not yet brought down, as to the letting or purchase of a residence for the High Commissioner, and as to the repairs and furnishing thereof, with copies of all accounts in connection with the same; a statement in detail of all sums paid in respect of such letting or purchase, or furnishing or repairs; and an estimate of all sums payable, but not yet paid, in respect thereof. Presented to the House of Commons, 12th February, 1885.—*Mr. Blake.....* *Not printed.*
- 38a.** Return to an Address of the House of Commons, dated 2nd March, 1884, for a copy of all correspondence between this Government and the High Commissioner in England or the representatives of the Belgian Government in this country, or from the Belgian authorities at home,

or any other correspondence and papers concerning the International Exhibition in Antwerp; and also copies of the existing tariff between Belgium and England. Presented to the House of Commons, 12th March, 1885.—*Messrs. Bergeron and Amyot*.....*Not printed.*

- 38b.** Return to an Address of the House of Commons, dated 23rd February, 1885, for a copy of any further commission or Order in Council, or correspondence touching the position or salary of the High Commissioner of Canada, not already brought down. Presented to the House of Commons, 13th March, 1885.—*Mr. Blake*.....*Printed for Sessional Papers only.*
- 38c.** Return to an Order of the House of Commons, dated 23rd February, 1885, for a Return showing amount paid out on account of High Commissioner to London since the creation of the office; showing separately the amount paid on account of residence, furniture and all fittings and additions thereto, and amount of salary paid to 1st January, 1885, and all items or allowances on account of taxes, light, fuel, travelling and other expenses, including salaries of private secretary and other servants or attendants, each item separately set out up to 1st January, 1885. Presented to the House of Commons, 7th April, 1885.—*Mr. McMullen*—
Printed for Sessional Papers only.
- 39.** Return to an Address of the House of Commons, dated 4th February, 1885, for copy of all correspondence between the Government of Canada and the several Governments of the Australian and Tasmanian colonies, or anyone acting on their behalf, in relation to the establishing of a more direct communication and extension of trade between these colonies and Canada; also all correspondence between the Government of Canada and the British Government on the same subject. Presented to the House of Commons, 12th February, 1885.—*Mr. Mitchell*.....*Not printed.*
- 40.** Report of the operations and money expended, since the report of last Session, for the year 1884, with respect to the Census of 1881, in accordance with the provisions of section 25 of the Census and Statistics Act; also relating to mortuary statistics. Presented to the House of Commons, 12th February, 1885, by Hon. J. H. Pope.....*Not printed.*
- 40a.** A form of Census Return for the year 1885. Presented to the House of Commons, 13th February, 1885, by Hon. J. H. Pope.....*Not printed.*
- 41.** Return to an Order of the House of Commons, dated 4th February, 1885, for amount of sums advanced to the Government of the Dominion by way of loan by any banks or persons in Canada or England, as appearing on the 1st February, 1885. Presented to the House of Commons, 13th February, 1885.—*Sir Richard Cartwright*—
Printed for both Distribution and Sessional Papers.
- 41a.** Return to an Order of the House of Commons, dated 4th February, 1885, for a Return giving names of all newspapers in which the loans of 1874, 1875, 1876, 1878 and 1884 were advertised, together with statement of length of time during which the said advertisements appeared. Presented to the House of Commons, 16th February, 1885.—*Sir Richard Cartwright*—
Not printed.
- 41b.** Return to an Address of the House of Commons, dated 4th February, 1885, for copy of the prospectus of the loan recently issued in London; also a statement showing the amounts of the commission and other charges paid thereon, and to whom paid, together with the amount of the said loan subscribed for by the financial agents of the Dominion, or by the Bank of Montreal, with the dates of the said subscriptions, and copies of all Orders in Council connected with the said loan. Presented to the House of Commons, 16th February, 1885.—*Sir Richard Cartwright*.....*Printed for both Distribution and Sessional Papers.*
- 42.** Return to an Order of the House of Commons, dated 6th February, 1885, for copies of all correspondence, memorials, petitions or other documents relating to the abolition of the duty on grain, flour and coal during 1884 and up to the present time. Presented to the House of Commons, 13th February, 1885.—*Mr. Cameron (Middlesex)*.....*Not printed.*
- 42a.** Return to an Order of the House of Commons, dated 12th March, 1885, for a Return of the amount of duty collected on wheat, flour, cornmeal and corn, in the several ports of the Province of Nova Scotia, between the 30th June, 1884, and 31st December, 1884. Presented to the House of Commons, 18th March, 1885.—*Mr. Vail*.....*Not printed.*

- 42b.** Return to an Order of the House of Commons, dated 27th April, 1885, for: 1. Duties imposed on various articles in the old Province of Canada and duties now imposed. 2. Tariff in force in British Columbia and in Manitoba, respectively, at the time of Union. 3. Length of time such tariff continued in force after Union. Presented to the House of Commons, 15th June, 1885.—*Mr. Watson*.....*Not printed.*
- 42c.** Papers and telegrams respecting the Imperial Act for granting to Her Majesty certain duties on goods, wares and merchandise imported into this colony and its dependencies. Presented to the House of Commons, 11th July, 1885, by Hon. M. Bowell.....*Not printed.*
- 43.** Message from His Excellency the Governor General, transmitting to the House of Commons copies of all petitions, resolutions, correspondence and memorials on the matter of bankruptcy, which have been submitted to His Excellency in Council for consideration. Presented to the House of Commons, 13th February, 1885, by Sir John A. Macdonald.....*Not printed.*
- 44.** Return to an Address of the House of Commons, dated 9th February, 1885, for copy of memorial from the county council of Grey, praying for a refund of bonuses paid by municipalities of that county in aid of railways which are now used for Dominion purposes or tributary to such. Presented to the House of Commons, 13th February, 1885.—*Mr. Landerkin*—
Not printed.
- 44a.** Return to an Address of the House of Commons, dated 18th March, 1885, for copies of petitions from the county council of the county of Elgin, presented to the Governor General in Council or the Minister of Railways and Canals, praying for a general measure of relief to municipalities of Ontario which have aided railways declared to be for Dominion purposes, by granting bonuses to them; and of all correspondence in reference to such petitions. Presented to the House of Commons, 8th April, 1885.—*Mr. Wilson*.....*Not printed.*
- 44b.** Return to an Address of the House of Commons, dated 16th March, 1885, for a copy of the memorial presented to the Government by the county council of the county of Simcoe, Ontario, praying for a refund of bonuses granted by the different municipalities of that county to railways that have been declared by this Parliament to be works for the general advantage of Canada, together with copies of all correspondence and other papers relating thereto. Presented to the House of Commons, 20th April, 1885.—*Mr. Cook*.....*Not printed.*
- 44c.** Return to an Address of the House of Commons, dated 27th April, 1885, for copies of the memorials presented to the Government by the delegates who waited on the Government in reference to the bonuses granted to railways declared to be for the general advantage of Canada. Presented to the House of Commons, 16th May, 1885.—*Mr. Watson*.....*Not printed.*
- 45.** Return to an Order of the House of Commons, dated 17th February, 1885, for a Return showing the quantity and value of wheat and flour imported into, and exported from the Dominion, by Provinces, during the six months ending 31st December, 1884—distinguishing, in the imports, the quantity entered for home consumption; and, in the exports, the product of Canada. Presented to the House of Commons, 24th February, 1885.—*Mr. Paterson (Brant)*...*Not printed.*
- 45a.** Return to an Order of the House of Commons, dated 6th February, 1885, for a Return showing the quantity of wheat, flour, corn and cornmeal imported into and exported from the various Provinces, from the 1st of July to the 31st December, 1884. Presented to the House of Commons, 24th February, 1885.—*Mr. Cameron (Middlesex)*.....*Not printed.*
- 46.** Return of the names and salaries, &c., of all persons appointed to or promoted in the Civil Service during the year ended the 31st December, 1884, specifying the office to which each has been appointed or promoted under the Canada Civil Service Act, 1882, section 55, sub-section 2. Presented to the House of Commons, 16th February, 1885, by Hon. J. A. Chapleau—
Printed for Sessional Papers only.
- 46a.** Report of the proceedings of the Board of Examiners for the year 1884—presented to Parliament in terms of section 55 of the Canada Civil Service Act, 1882, 45-46 Victoria, chapters 4-7. Presented to the House of Commons, 16th February, 1885, by Hon. J. A. Chapleau—
Printed for both Distribution and Sessional Papers.

- 46b.** Return to an Order of the House of Commons, dated 27th April, 1885, for a Return of all officers of the Civil Service, from the resident Dominion Government agent down to the messenger, in each and every Department (by Departments) in British Columbia, giving full Christian and surnames, their ages, present rank, pay, allowances, dates of appointment and promotion, made up to the 31st December, 1884, or nearest possible date. Presented to the House of Commons, 15th June, 1885.—*Mr. Baker (Victoria)*.....*Not printed.*
- 47.** Return to an Order of the House of Commons, dated 28th March, 1884, for copies of all correspondence, reports of engineers, with maps and plans, relating to the improvements required to be made in order to secure a better supply of water to the Rideau Canal, as well as to open up a large section of the country bordering on lakes in the counties of Frontenac and Addington. Presented to the House of Commons, 17th February, 1885.—*Mr. Bell*.....*Not printed.*
- 47a.** Return to an Order of the House of Commons, dated 28th March, 1884, for copies of all correspondence and reports of engineers, with maps and plans, relating to the extension of the Rideau Canal from the village of Morton to Charleston Lake and the village of Gananoque, in the county of Leeds. Presented to the House of Commons, 17th February, 1885.—*Mr. McDougald*.....*Not printed.*
- 48.** Return to an Order of the House of Commons, dated 2nd February, 1885, for all papers relating to the resignation of Capt. Ludger Bolduc, after the collision which occurred on the 20th May, 1884, between "La Canadienne" and the brig "Alliance," of Jersey; covering complaint, enquiry, report, &c., and all correspondence relating to the matter. Presented to the House of Commons, 17th February, 1885.—*Mr. Landry (Montmagny)*.....*Not printed.*
- 49.** Return to an Order of the House of Commons, dated 5th February, 1885, for a statement showing sums expended on capital account, from the 1st day of July, 1884, to the 1st day of February, 1885, and the purposes for which said sums were expended. Also for statement of the gross amount of the debt of the Dominion on the 1st day of February, 1885; and a statement of debts and assets to that date, as given in Public Accounts, pages 13 and 14. Presented to the House of Commons, 17th February, 1885.—*Sir Richard Cartwright*—
Printed for Distribution only.
- 50.** Return to an Address of the House of Commons, dated 5th February, 1885, for a copy of the resignation of the Hon. Judge Meredith as Chief Justice of the Superior Court of the Province of Quebec, and of the correspondence which followed that resignation. Presented to the House of Commons, 17th February, 1885.—*Mr. Laurier*.....*Not printed.*
- 50b.** 1884. Return to an Address of the House of Commons, dated 25th January, 1884, for copies of all Orders in Council, correspondence and departmental orders, with reference to the granting, cancellation and suspension of licenses to cut timber on lands of the Indians near Fort William, on the Fort William reserve. Presented to the House of Commons, 8th April, 1884.—*Mr. Blake*.....*Printed for Distribution only.*
- 51.** Return to an Address of the House of Commons, dated 25th February, 1884, for: 1. A copy of all Orders in Council, departmental orders and correspondence, respecting the sale, lease or other disposal of the grist and saw mill owned by the Dominion and situate south of Calgary, North-West Territories, to whom disposed, when, at what price, and how paid or payable? 2. Statement showing the original costs thereof, the costs expended thereon, when the same was erected, including working expenses. 3. Statement showing the quantity of agricultural land or timber limits disposed of with said mill or mills, or to the person who purchased or obtained the same. 4. All applications for the purchase or leasing of said farm, lands and limits. 5. Statement of the machinery in said mill or mills, and the cost thereof. 6. All other correspondence in respect to said mill or mills, land and limits. Presented to the House of Commons, 17th February, 1885.—*Mr. Cameron (Huron)*.....*Not printed.*
- 52.** Return to an Order of the House of Commons, dated 28th March, 1884, for all correspondence between the Hon. P. Mitchell and the Minister of the Interior, in relation to a timber limit or limits on Jack Head River, with the plans submitted in connection therewith; also in relation to timber limits on the Lake of the Woods. Presented to the House of Commons, 19th February, 1885.—*Mr. Mitchell*.....*Not printed.*

- 52a.** Return to an Order of the House of Commons, dated 30th January, 1884, for a Return showing: 1. The total number of timber licenses or permits applied for and granted or refused, since 1st February, 1883; the estimated area covered by each license or application, and the total number of square miles estimated to be covered by the timber licenses issued during the period named. 2. The amount of bonuses or premiums per square mile, and on the aggregate, paid to and received by the Government on each such license, and the total amount of bonuses or premiums received. 3. The name and residence of each applicant for a license. 4. The date of application for each license and the number of years each license is granted for. 5. The Crown dues or stumpage charged or chargeable on each license, and the kind and estimated quantity and quality of timber on each area so licensed. 6. Whether in each case, where a license or permit was granted, the berth was put up at public auction, after public notice inviting tenders was given, and was sold to the highest bidder, or whether granted upon application or tender from the grantee without inviting public competition. 7. Copies of all claims made on the Government for any such area or timber by any persons, and all petitions, remonstrances or communications sent or made to the Government respecting such areas, licenses or timber, and copies of all correspondence had with the Government respecting such claims, or in any way respecting such areas, lands, licenses or timber, and the action of the Government therein; also a copy of all maps and plans showing the location or areas of such licenses or permits. Presented to the House of Commons, 19th February, 1885.—*Mr. Charlton*.....*Not printed.*
- 52b.** Return to an Order of the House of Commons, dated 23rd February, 1885, for a Return showing: 1. The total number of applications made, and not granted, for licenses or permits to cut timber, saw-logs, cordwood, ties and poles, within the territory lately in dispute between the Province of Manitoba and Ontario. 2. The date of each rejected application and the name and residence of each applicant. 3. The geographical location of the area applied for and not granted. 4. The offer of bonus, and of Crown dues or stumpage, in each or any case accompanying such application. 5. The reason assigned for refusal in the case of each of such rejected applications. Presented to the House of Commons, 23rd April, 1885.—*Mr. Blake*—*Printed for Sessional Papers only.*
- 52c.** Return to an Order of the House of Commons, dated 23rd February, 1885, for a Return showing: 1. The total number of timber licenses and permits to cut timber, sawlogs, cordwood, ties or poles, on lands not within the disputed territory, applied for and refused since 1st February, 1883. 2. The date of each rejected application, and the name and residence of each applicant. 3. The geographical location of the area applied for and not granted, and the area of the same. 4. The offer of bonus, and Crown dues or stumpage in each or any case accompanying such application. 5. The reason assigned for refusal in the case of each of such rejected applications. Presented to the House of Commons, 23rd April, 1885.—*Mr. Blake*—*Printed for Sessional Papers only.*
- 52d.** Return to an Order of the House of Commons, dated 9th February, 1885, for copies of all correspondence and regulations, not already brought down, respecting timber for settlers' fuel, applicable to the neighborhood of Moosomin, N.W.T. For all correspondence as to the demands made during the winter of 1882-83 by the Mounted Police, of twenty-five cents a load for settlers' firewood. For all correspondence concerning the demand made by a sub-agent of Mr. Stephenson during the winter of 1883-84, for fifty cents for a permit, in addition to the charge of twenty-five cents a cord. For all correspondence as to the demands made during the winter of 1884-85, including the demands of the present sub-agent, of twenty-five cents for affidavits as to how much wood each settler had burned since he first came to the locality; and for all letters and instructions from the Department or from the Winnipeg office upon these subjects. Presented to the House of Commons, 5th May, 1885.—*Mr. Blake*—*Printed for Sessional Papers only.*
- 52e.** Return to an Address of the House of Commons, dated 23rd February, 1885, for copies of all permits, liberties or other papers given to any person or persons to cut timber in any part of the territory declared by the Order of the Queen in Council to be within the Province of Ontario; and of all Orders in Council, departmental regulations or orders relating to the matter. Presented to the House of Commons, 15th July, 1885.—*Mr. Mills*.....*Not printed.*

- 52f.** Return to an Order of the House of Commons, dated 16th February, 1885, for copies of all permits, licenses or liberties given to any person or persons to cut timber in any part of the territory declared by the Order of the Queen in Council to be within the Province of Ontario. Also the name or names of the person or persons obtaining such permission, the extent of territory embraced, the amount received by the Government, and the amount, if any, still unpaid by the party or parties for such permission. Presented to the House of Commons, 15th July, 1885.—*Mr. Mills**Not printed.*
- 52g.** Return to an Order of the House of Commons, dated 23rd February, 1885, for a Return showing: 1. The total number of applications for timber licenses or berths in the Province of British Columbia, and within 50 miles of the line of the Canadian Pacific Railway; the date of such application; the place from which it was made; the name and address of the applicant; the area applied for and the geographical situation of the same; whether the application was rejected or granted, and, if rejected, the reasons assigned for the same. 2. The total number of applications for timber licenses or berths in the Province of British Columbia and transmitted to the Department of the Interior at Ottawa; the date of such application; the place from which it was made; the name and address of the applicant; the area applied for and the geographical situation of the same; whether the application was rejected or granted, and, if rejected, the reason assigned for the same. 3. A summary statement showing the number of licenses or permits granted either upon applications made at Ottawa or made at Victoria and transmitted to Ottawa, designating when the application was made, the date of the application, and the name and address of the grantee. 4. The geographical location of the area covered by each license or permit issued, and the number of square miles embraced in each, and the aggregate amount of the same. 5. The amount of bonuses or premiums received upon each and the aggregate amount of the same. 6. Full particulars as to the Crown dues or stumpage charged or chargeable upon each license or permit issued as to whether by percentage of values or specific charges. 7. A statement in case of each license or permit issued as to whether the Government had caused a survey to be made of the same and was in possession of estimates made by its own surveyors, woodsmen or bushrangers, as to the kinds, the quantity and the quality of timber upon each area covered by such license or permit. 8. Whether in each case where a license or permit was granted, the berth was put up at public auction, after due public notice was given inviting tenders, and was sold to the highest bidder, or whether granted upon application or tender from the grantee without inviting public competition. 9. In case of application by two or more parties for the same berth, and competition between them for the purchase of the same, the name and residence of each applicant and the particulars of the tender made by each. 10. Copies of all claims, petitions, remonstrances, letters or communications made to the Government respecting such permits or licenses applied for or granted, also a copy of all maps or plans showing the location and areas of such licenses or permits. 11. A minute of all assignments of such licenses or permits recorded with the Government, with the names and residence of the assignor and the assignee and the consideration in each case paid. Presented to the House of Commons, 15th July, 1885.—*Mr. Charlton*.....*Not printed.*
- 53.** Return to an Address of the House of Commons, dated 26th March, 1884, for copies of all documents, statements, &c., of a nature to afford the information asked for by the following questions:—Whether the Government has, by sale, grant, location or otherwise, disposed of the lands belonging to it in the county of Richelieu? If so, what are the lands; what is the extent of each lot; to whom was it disposed; what are the conditions of each such grant, location or sale; what are the prices paid in each case, and when and how were the amounts paid? Also of all documents relating to the subject matter of the said questions, and of those evidencing the said transactions. Presented to the House of Commons, 19th February, 1885.—*Mr. Amyot*—*Not printed.*
- 53a.** Return to an Order of the House of Commons, dated 17th February, 1885, for a list of all the unsold Indian lands in the township of Toronto, in the county of Peel. Presented to the House of Commons, 9th March, 1885.—*Mr. Paterson (Brant)*.....*Not printed.*
- 53b.** Return to an Order of the House of Commons, dated 17th February, 1885, for a statement showing all properties, islands and other lands, whether built upon or not, belonging to the Dominion Government, and situated within the limits of the county of Richelieu, the names of

- the parties occupying the said properties as tenants or otherwise; the time for which such properties are leased, the annual rent and the arrears due, if any, on each such property, up to the 1st January, 1885. Presented to the House of Commons, 9th March, 1885.—*Mr. Massue—*
Not printed.
- 53c.** Return to an Order of the House of Commons, dated 23rd February, 1885, for a statement showing: 1. All sales of coal lands since 23rd April, 1883; the name and residence of each party to whom sales have been made; the number of acres sold to each; the price per acre received from each; the location of the land sold; the total number of acres sold, and the total amount received from such sales. 2. All leases of coal lands made since 23rd April, 1883; the name and residence of each lessee; the number of acres leased to each; the payments made by each; the location of each leasehold; the total number of acres leased; and the total sum derived from such leases, the considerations paid and royalties collected; and also from all other charges, if any. 3. Copies of all applications, correspondence, protests and written communications, in relation to coal lands sold or leased since 23rd April, 1883. Presented to the House of Commons, 31st March, 1885.—*Mr. Charlton.....Printed for Sessional Papers only.*
- 53d.** Return to an Order of the House of Commons, dated 12th March, 1885, for a detailed list of all the unsold Indian lands in the township of Trafalgar, in the county of Halton. Presented to the House of Commons, 31st March, 1885.—*Mr. McCraney.....Not printed.*
- 53e.** Return to an Order of the House of Commons, dated 18th March, 1885, for a return of all properties owned by the Government for military purposes in New Brunswick disposed of or leased, since the transfer from the Imperial Government; the parties to whom sold and at what price, and as to leased properties, to whom leased, for what period and at what rents. Presented to the House of Commons, 22nd April, 1885.—*Mr. Weldon.....Not printed.*
- 53f.** Return to an Order of the House of Commons, dated 4th February, 1885, for a statement showing the several amounts collected by the Dominion Government for lands sold or leased; for timber, logs or staves, cordwood, telegraph poles or other product of the forest; with the names of persons making such payments, within the bounds and limits of the western part of Ontario, as determined by the decision of the Privy Council against the claim of the Dominion Government. Presented to the House of Commons, 23rd April, 1885.—*Mr. Mackenzie—*
Printed for Sessional Papers only.
- 53g.** Order in Council, of the 4th June, 1883, respecting allotment of lands of various colonization companies under the land regulations, and to accord to railway companies the privilege of purchasing land south of the 54th parallel of latitude, &c. Presented to the House of Commons, 29th April, 1885, by Sir John A. Macdonald.....*Not printed.*
- 53h.** Return to an Order of the House of Commons, dated 23rd February, 1885, for a return giving copies of all regulations or orders issued by the Department of the Interior concerning the sale or management of agricultural lands, timber lands, pasture lands, mineral lands and town sites, since 26th February, 1884. Presented to the House of Commons, 5th May, 1885.—*Mr. Charlton.....Not printed.*
- 53i.** Return to an Order of the House of Commons, dated 12th February, 1885, for copies of all correspondence and petitions of railway companies in Manitoba and the North-West, praying for grants of land, or modifications in the condition and extent of the grants of land already conceded to them; and of all Orders in Council or agreements or letters, not already brought down, affecting or in any wise relating to any railway company in Manitoba or the North-West other than the Canadian Pacific Railway Company. Presented to the House of Commons, 5th May, 1885.—*Mr. Blake.....Not printed.*
- 53j.** Return to an Order of the House of Commons, dated 23rd February, 1885, for a return showing: 1. The names of grazing land lessees who have cattle upon their leaseholds, the number of acres in each leasehold, the date of the lease, the geographical position of the area covered by each lease, the number of the lease, the number of cattle reported on each leasehold, the date when the leasehold was first stocked with cattle, and the aggregate number of acres

covered by such leases. 2. The names of grazing land lessees who have not placed cattle upon their leaseholds; the number of acres in each leasehold; the geographical position of the area covered by each lease; the number of the lease and the aggregate number of acres covered by such leases. Presented to the House of Commons, 26th May, 1885.—*Mr. Charlton*—

Printed for Sessional Papers only.

- 53k.** Return to an Address of the House of Commons, dated 11th March, 1885, for: 1. Copy of all Orders in Council or departmental orders respecting south-east $\frac{1}{4}$, section 2, township 10, range 19, west. 2. Copies of all claims made to said land, and the action of the Government thereon. 3. Copies of all petitions, papers and correspondence with the Government by one Joseph Bell and one J. E. Kavanagh, and all other persons; and all replies thereto, respecting said land. Presented to the House of Commons, 26th May, 1885.—*Mr. Cameron (Huron)*.....*Not printed.*
- 53l.** Copy of an Order in Council, under date the 4th June, 1883, respecting an area of land having been allotted to colonization companies under the land regulations, &c. Presented to the House of Commons, 12th June, 1885, by Sir Hector Langevin.....*Not printed.*
- 53m.** Return to an Address of the House of Commons, dated 27th April, 1885, for copies of all Orders in Council, correspondence and papers, not already brought down, touching the surrender or definition of the claims of Canada upon any of the railway lands in British Columbia, or touching any change as to the relations of Canada and British Columbia in reference to such railway lands. Presented to the House of Commons, 14th July, 1885.—*Mr. Blake*.....*Not printed.*
- 54f.** Return to an Order of the House of Commons, dated 2nd February, 1885, for a statement showing: 1. The Christian and surnames of the present employés of the Immigration Office at Quebec, and the nature of their employment. 2. The amount of the yearly salary paid to each such employé on 31st December, 1884. 3. The amount of the yearly salary attached to the said offices on 31st December, 1877. Also all correspondence respecting the increase or non-increase of the salary of any employé of the said office between the two dates above named. Presented to the House of Commons, 20th February, 1885.—*Mr. Landry (Montmagny)*—
Not printed.
- 54a.** Message transmitting the Report of the Royal Commission on Chinese Immigration, and the evidence taken thereon. Presented to the House of Commons, 25th February, 1885, by Hon. J. A. Chapleau.....*Printed for both Distribution and Sessional Papers.*

CONTENTS OF VOLUME No. 12.

- 54b.** Return to an Address of the House of Commons, dated 6th February, 1885, for a copy of the commission and the names of the commissioners appointed to proceed to British Columbia to enquire into and report upon the Chinese difficulty in that country. The date of the commissioners' engagement, the salary or other allowance paid them, and the amount of travelling and other expenses up to the 1st February, 1885. Presented to the House of Commons, 13th April, 1885.—*Mr. McMullen*.....*Not printed.*
- 54c.** Return to an Address of the Senate, dated 26th March, 1885, to His Excellency the Governor General, praying that he will cause to be laid before this House a detailed statement of the expenditure incurred in connection with the recent visit of the Hon. the Secretary of State to British Columbia and California. Presented to the Senate, 13th April, 1885.—*Hon. Mr. Power*.....*Not printed.*
- 55.** Return to an Address of the House of Commons, dated 28th February, 1883, for copies of all papers and correspondence relating to the change of mail service between Durham and Walkerton; also a statement showing the cost of the old and new service, and the comparative efficiency of each. Presented to the House of Commons, 23rd February, 1885.—*Mr. Landerkin*.....*Not printed.*
- 55a.** Return to an Order of the House of Commons, dated 26th March, 1884, for copies of advertisement calling for tenders for carrying mails from Kamloops to Spencer's Bridge, B.C.,

- dated 13th June, 1883; also copies of tenders received for such service; also copy of contract based on such tenders, and the hours of arrival and departure of mails from both places. Presented to the House of Commons, 23rd February, 1885.—*Mr. Mackenzie*.....*Not printed.*
- 55b.** Return to an Order of the House of Commons, dated 30th January, 1884, for copies of any correspondence, memorial or other documents from the Board of Trade in the city of St. John, or other parties, in relation to the conveyance of mails on the night train on the St. John and Maine Railway to St. Stephen and Woodstock; also as to the conveyance of mails over the Grand Southern Railway to St. George. Presented to the House of Commons, 23rd February, 1885.—*Mr. Gillmor*.....*Not printed.*
- 55c.** Return to an Order of the House of Commons, dated 3rd March, 1884, for copies of petitions and all correspondence between the Dominion Government and any person or persons, upon the subject of a daily mail service between Port Townsend, in Washington Territory, and Victoria, in the Province of British Columbia, being substituted for the semi-weekly service at present existing. Presented to the House of Commons, 23rd February, 1885.—*Mr. Baker (Victoria)*.....*Not printed.*
- 55d.** Return to an Order of the House of Commons, dated 14th February, 1884, for copies of all petitions, correspondence, returns and papers, of any nature whatsoever, respecting the establishing of a daily mail service in the parishes of St. Giles, St. Patrick and St. Sylvester, in the county of Lotbinière. Presented to the House of Commons, 23rd February, 1885.—*Mr. Rinfret*.....*Not printed.*
- 55e.** Agreement made 15th day of May, 1884, between Andrew Allan, Esq., of the city of Montreal, in the Province of Quebec, in the Dominion of Canada, shipowner, and Hon. John Carling, Postmaster-General of the said Dominion; and an Order in Council in relation thereto, respecting the conveyance of mails. Presented to the House of Commons, 24th April, 1885, by Hon. J. Carling.....*Printed for Sessional Papers only.*
- 55f.** Return to an Order of the House of Commons, dated 23rd February, 1885, for a statement in detail of the annual cost in connection with the ocean mail service, for salaries, allowances of mail clerks and conductors, or railway post office clerks in charge of the British mails; also for all correspondence as to the landing of the post office bags containing the British mails outward bound from Canada at Derry, and the saving of loss of time effected thereby. Presented to the House of Commons, 7th May, 1885.—*Mr. Blake*.....*Not printed.*
- 55g.** Return to an Order of the House of Commons, dated 16th February, 1885, for a Return showing the nature of the mail service on the Canada Southern Railway between Essex Centre and Amherstburg; also the annual amount paid to the Canada Southern Railway for mail service. Presented to the House of Commons, 7th May, 1885.—*Mr. Wigle*.....*Not printed.*
- 56.** Return to an Order of the House of Commons, dated 28th March, 1884, for: 1. Copies of all correspondence and papers relating to certain charges or complaints made against J. E. Gaboury, Esquire, as postmaster of St. Césaire, and to his subsequent dismissal from the said office of postmaster. 2. A copy of the instructions given to the person who investigated the charges against said J. E. Gaboury, if any investigation took place, and a copy of the report made by such person. Presented to the House of Commons, 23rd February, 1885.—*Mr. Bécharde*—*Not printed.*
- 57.** Return to an Order of the House of Commons, dated 12th February, 1885, for a statement of the receipts of the post office at St. Stephens, N.B., for the calendar year 1884; also a statement of the value of postage stamps sold at the said office. Presented to the House of Commons, 23rd February, 1885.—*Mr. Burpee (Sunbury)*.....*Not printed.*
- 57a.** Return to an Order of the House of Commons, dated 27th April, 1885, for a Return showing the postal revenue at Victoria, B.C., from all sources, specifying the amount from each source, month by month, for the eight months included in the period 1st July, 1884, to 28th February, 1885. Presented to the House of Commons, 5th May, 1885.—*Mr. Baker (Victoria)*.....*Not printed.*

- 58.** Return to an Order of the House of Commons, dated 9th April, 1883, for copies of all letters, reports and other documents relating to any complaint preferred against Stephen G. Burpee, postmaster at Florenceville, N.B., since 1st January, 1879. Presented to the House of Commons, 23rd February, 1885.—*Mr. Irvine*.....*Not printed.*
- 59.** Return to an Order of the House of Commons, dated 4th February, 1885, for a return of all sugars imported at Halifax from Jamaica from the 1st of January, 1883, to the 31st of December, 1883; also a return of all sugars from Jamaica entered for the same term at Montreal, either direct or *viâ* Halifax, giving name of vessel, number of pounds landed, value for duty of each cargo, and rate of duty per 100 lbs. of each shipment. Presented to the House of Commons, 23rd February, 1885.—*Mr. Vail*.....*Not printed.*
- 59a.** Supplementary Return to an Order of the House of Commons, dated 13th March, 1885, for a Return of all sugars imported at Halifax from Jamaica, from the 1st January, 1883, to the 31st December, 1883; also a return of all sugars from Jamaica entered for the same term at Montreal, either direct or *viâ* Halifax, giving the name of vessel, number of pounds landed, value for duty of each cargo, and rate of duty per 100 lbs. of each shipment. Presented to the House of Commons, 13th March, 1885.—*Mr. Vail*.....*Not printed.*
- 60.** Return to an Order of the House of Commons, dated 2nd February, 1885, for a Return in the form used in the statement usually published in the *Gazette*, of the exports and imports from the 1st day of July, 1883, to the 1st day of January, 1884, and from the 1st day of July, 1884 to the 1st day of January, 1885, distinguishing the products of Canada and those of other countries. Presented to the House of Commons, 23rd February, 1885.—*Sir Richard Cartwright*.....*Printed for Distribution only.*
- 61.** The Governor General transmits to the House of Commons two approved Minutes in Council, dated respectively the 20th May, 1884, and the 23rd January, 1885, regarding the terms of the provisional settlement of the claims of the Province of Manitoba. Presented to the House of Commons, 23rd February, 1885, by Sir John A. Macdonald.—
Printed for both Distribution and Sessional Papers.
- 62.** A detailed statement of all bonds and securities registered in the Department of the Secretary of State of Canada, under 31 Victoria, chapter 37, section 15. Presented to the House of Commons, 24th February, 1885, by Hon. J. A. Chapleau.....*Not printed.*
- 63.** Return to an Address of the House of Commons, dated 3rd February, 1885, to His Excellency the Governor General, praying that he will cause to be laid before the House copies of all correspondence between the Federal and Ontario Governments, and the Imperial Government, on the subject of the Imperial Act 21-22 Victoria, chapter 90, known as the British Medical Act, 1858; the Imperial Act 31-32 Victoria, chapter 29, known as the British Medical Amendment Act, 1868; the Imperial Act 41-42 Victoria, chapter 33, known as the Dentists Act, 1878; and the amendments proposed to be made thereto during the present Session of the Imperial Parliament. Presented to the House of Commons, 26th February, 1885.—*Mr. Bergin*—
Printed (condensed) for both Distribution and Sessional Papers.
- 64.** Return to an Order of the House of Commons, dated 9th February, 1885, for a Return of all reports of Government engineers respecting the construction of a harbor of refuge at Port Stanley and Port Burwell, on the north shore of Lake Erie, together with the estimated cost of each. Presented to the House of Commons, 27th February, 1885.—*Mr. Wilson*.....*Not printed.*
- 64a.** Return to an Address of the House of Commons, dated 2nd March, 1885, for a copy of any memorials that may have been addressed to the Government with respect to the construction of a harbor of refuge at Port Rowan, in the Province of Ontario. Also for a copy of Richard Stevens' report made to the Department of Public Works on the same subject. Presented to the House of Commons, 8th April, 1885.—*Mr. Jackson*.....*Not printed.*
- 64b.** Supplementary Return to an Order of the House of Commons, dated 9th February, 1885, for a Return of all reports of Government engineers respecting the construction of a harbor of refuge at Port Stanley and Port Burwell, on the north shore of Lake Erie, together with the estimated cost of each. Presented to the House of Commons, 8th April, 1885.—*Mr. Wilson*—
Not printed.

- 64c.** Return to an Order of the House of Commons, dated 16th February, 1885, for copies of all reports and communications made to the Government by the Port Credit Harbor Company; and all memorials, petitions, reports of engineers and correspondence in reference to the condition and state of repair of the said harbor. Presented to the House of Commons, 20th July, 1885.—*Mr. Platt*.....*Not printed.*
- 65.** Return to an Order of the House of Commons, dated 11th February, 1885, for copies of all reports and correspondence not already brought down, relating to the construction of the post office, Inland Revenue and Custom house at St. Thomas, giving the amount expended to date; also the names of all persons to whom any portion of the expenditure has been paid; together with the amount paid to each, and for what. Presented to the House of Commons, 27th February, 1885.—*Mr. Wilson*.....*Not printed.*
- 66.** Return to an Order of the House of Commons, dated 6th February, 1885, for a copy of the report made in 1884 by the chief engineer of the Department of Public Works, on the Church Point and Trout Cove piers. Presented to the House of Commons, 26th February, 1885.—*Mr. Vail*.....*Not printed.*
- 67.** Return to an Order of the House of Commons, dated 9th February, 1885, for copies of all correspondence, documents and reports of engineers relating to improvements of the entrance into McIsaac's Pond, Inverness, Nova Scotia. Presented to the House of Commons, 27th February, 1885.—*Mr. Cameron (Inverness)*.....*Not printed.*
- 68.** Return to an Order of the House of Commons, dated 17th February, 1885, for a statement of the amounts paid by the Government to Messrs. George and Andrew Holland, or any other persons, for services as official reporters of the Senate, or for the short-hand work of any kind outside of parliamentary reporting, since 1st January, 1882. Presented to the House of Commons, 16th March, 1885.—*Mr. Auger*.....*Not printed.*
- 69.** Return to an Order of the House of Commons, dated 6th February, 1885, for a Return showing the number of dredges, tugs and dumping scows built in the United States for the Government of Canada during the years 1883 and 1884, showing where they were built, giving the contractor's name, and the price paid for the same. Presented to the House of Commons, 27th February, 1885.—*Mr. Jackson*.....*Not printed.*
- 69a.** Return to an Order of the House of Commons, dated 8th April, 1885, for copies of all correspondence and contracts entered into relative to the purchases of tug-barges, dredge and machinery used on Red River; a detailed statement of the cost of the same, the time when the work of dredging was commenced and discontinued, the quantity of dredging completed and the depth of water drawn by the Government tug "Sir Hector." Presented to the House of Commons, 23rd April, 1885.—*Mr. Watson*.....*Not printed.*
- 70.** Return to an Order of the House of Commons, dated 9th February, 1885, for copies of departmental instructions and correspondence on the subject of apportionment of sea lots to individuals desiring to place lobster traps in the open sea off the coast of Prince Edward Island. Presented to the House of Commons, 27th February, 1885.—*Mr. Blake*—
Printed for Distribution only.
- 71.** Return to an Order of the House of Commons, dated 17th February, 1885, for a statement of the amount expended in repairing the breakwater at Tracadie, Nova Scotia, from 30th June, 1884, to 31st January, 1885, giving the names of all persons to whom any portion of the expenditure has been paid, together with the amount paid to each, and for what. Presented to the House of Commons, 2nd March, 1885.—*Mr. McIsaac*.....*Not printed.*
- 71a.** Return to an Order of the House of Commons, dated 17th February, 1885, for a copy of the report made by the engineer since January, 1884, on the cost of erecting breakwaters at New Harbor and Indian Harbor, in the county of Guysboro', Nova Scotia, and also copy of report on White Haven boat canal. Presented to the House of Commons, 2nd March, 1885.—*Mr. Kirk*.....*Not printed.*
- 71b.** Return to an Order of the House of Commons, dated 9th February, 1885, for copies of all tenders for the construction of breakwater at Parrsboro' lighthouse station, in the county of

Cumberland, N.S. ; copies of letter from Deputy Minister of Marine and Fisheries accepting the tender of one Neil McRay, and of telegram postponing the work ; also all letters objecting to the said Neil McRay as contractor and to the bondsmen offered by him, and letters tendering other names as bondsmen if required, and all other correspondence on the subject. Presented to the House of Commons, 2nd March, 1885.—*Mr. Robertson (Shelburne)*.....*Not printed.*

- 71c.** Return to Order, correspondence, reports of engineers and others, in reference to the construction of a breakwater at Salmon Point, together with lists of tenders and amount of each, and all other documents in the possession of the Government relative to the above mentioned work. Presented to the House of Commons, 23rd March, 1885.—*Mr. Platt*.....*Not printed.*
- 72.** Return to an Order of the House of Commons, dated 12th February, 1885, for a statement for the last fiscal year of the cost connected with the heating of public buildings (including wages as well as fuel) now paid under a lump vote, such statement to show the costs under the same sub-headings as those in which it was formerly included in the Public Accounts before the change in the system. Presented to the House of Commons, 2nd March, 1885.—*Mr. Blake*.....*Printed for both Distribution and Sessional Papers.*
- 73.** Return to an Order of the House of Commons, dated 6th February, 1885, for a statement showing the number of seizures made at each port of entry in the Dominion during the last fiscal year ; also during the six months ending the 31st December last ; the amount of fines exacted at each port during each of the said periods ; and the manner in which the said fines were disposed of, giving the names of the officers receiving any portion thereof, and the amount received by each of such officers out of the said fund. Presented to the House of Commons, 2nd March, 1885.—*Mr. Blake*.....*Printed for Distribution only.*
- 73a.** Return to an Order of the House of Commons, dated 2nd March, 1885, for a statement showing the seizures made at the port of Winnipeg by the Department of Customs or any of its officers or officials, between 1st January, 1883, and 1st January, 1885 ; giving the estimated value of each of such seizures, the amount of fine imposed in each case and the manner in which the said fines were disposed of, and stating, in detail, the amount paid to each officer or employé of the Government, the name of such officer or employé, and when paid, also the salary paid to each such officer or employé ; the disposal made of all such goods seized, and if sold—when, for how much, and how the proceeds were disposed of. Presented to the House of Commons, 10th March, 1885.—*Mr. Paterson (Brant)*.....*Printed for Distribution only.*
- 73b.** Return to an Order of the House of Commons, dated 12th March, 1885, for a statement showing the number of seizures made at each port of entry in Nova Scotia during the last fiscal year ; also during the six months ending the 31st December last ; and the names of the parties from whom such seizures were made, the amount of fines exacted at each port during each of the said periods, and the manner in which the said fines were disposed of, giving the names of the officers receiving any portion thereof, and the amount received by each of such officers out of the said fund. Presented to the House of Commons, 17th April, 1885.—*Mr. Stairs*—
Not printed.
- 73c.** Return to an Order of the House of Commons, dated 27th April, 1885, for a Return showing seizures made at the Port of Winnipeg by the Customs officers or officials between 1st January, 1883, and 1st January, 1885, in which deposits were forfeited or goods sold after seizure ; giving the amount of each sum forfeited and the amount realized in each case in which goods were sold ; and stating in detail the name of each officer to whom any portion of the money so realized was paid, and the amount in each case thus paid to the said officer ; and also stating the salary paid such officer. Presented to the House of Commons, 18th July, 1885. *Mr. Paterson (Brant)*.....*Not printed.*
- 74.** Return to an Order of the House of Commons, dated 23rd February, 1885, for copies of all correspondence, reports, &c., in connection with the weighing and measuring of potatoes and other roots in the Province of Prince Edward Island. Presented to the House of Commons, 2nd March, 1885.—*Mr. Macdonald (King's)*.....*Not printed.*
- 75.** Return to an Order of the House of Commons, dated 12th February, 1885, for a Return of all claims presented for drawback on materials used for shipbuilding, for the year ending 30th

June, 1884; also for the six months ending 31st December, 1884; giving the name of the applicant, the name and tonnage of the vessel, the amount claimed and the amount paid. Presented to the House of Commons, 2nd March, 1885.—*Mr. Burpee (Sunbury)*—

Printed for Distribution only.

- 75a.** Return to an Order of the House of Commons, dated 17th February, 1885, for a Return of all claims presented up to the 1st February, 1885, for drawbacks on goods manufactured for export (since the date of the last return made to that House), showing the names of all applicants, their place of business, the articles on which the drawback was claimed, and the amount of each claim, distinguishing between the claims which have been allowed and those which have been disallowed, and those under consideration and not yet decided, and giving the reason for such disallowance. Also copies of all regulations made by the Department with reference to such claims, together with a copy of one allowed claim and the sworn declaration thereto of each exporter. Presented to the House of Commons, 6th March, 1885.—*Mr. Paterson (Brant)*—
- Printed for Distribution only.*
- 76.** Return to an Order of the House of Commons, dated 30th January, 1884, for copies of any correspondence, documents, contracts or agreements with the Pullman Palace Car Company, in relation to the company's cars running over the Intercolonial Railway; also any contract or agreement with express companies as to conveyance of express matter over the said railway. Presented to the House of Commons, 2nd March, 1885.—*Mr. Weldon*—
- Printed for Sessional Papers only.*
- 76a.** Return to an Address of the House of Commons, dated 20th February, 1885, to His Excellency the Governor General, praying that he will cause to be laid before the House a copy of the Order in Council appointing Mr. L. K. Jones secretary of the Intercolonial Railway Commission, also a copy of the recommendation on which such Order in Council was based. Presented to the House of Commons, 5th March, 1885.—*Mr. Rykert*.....*Not printed.*
- 76b.** Return to an Order of the House of Commons, dated 12th February, 1885, for a return of the casualties to trains on the Intercolonial Railway arising from collision, broken rails, or otherwise, for the calendar year 1884; the respective causes and dates; the amount of damages (if any), in each case, to property; the amount of compensation paid to owners of property destroyed or damaged, as well as amount of claims for loss or damage to property (if any) unsettled. Presented to the House of Commons, 5th March, 1885.—*Mr. Burpee (Sunbury)*—
- Not printed.*
- 76c.** Return to an Order of the House of Commons, dated 23rd February, 1885, for a comparative statement of the cost of working the Intercolonial Railway for each of the years 1874, 1875, 1876, 1877, 1878, 1879, 1880, 1881, 1882, 1883 and 1884, and the number of miles operated in each year, giving for each year the cost for locomotive power, under the seven sub-headings given in the Minister's report, appendix, page 37; for car expenses, under the seven sub-headings given in the same report, same page; for maintenance, way and works, under the ten sub-headings given in the same report, page 37; for station expenses, under the three sub-headings given in the same report, same page; and for general charges, under the seven sub-headings given in the same report, page 39. Presented to the House of Commons, 9th March, 1885.—*Mr. Blake*.....*Printed for both Distribution and Sessional Papers.*
- 76d.** Return to an Order of the House of Commons, dated 12th February, 1885, for a statement of the revenue and working expenses of the Intercolonial Railway, accrued for the six months of the year ending 31st December, 1884, under the several divisions, similar to Annual Statement B, Intercolonial Railway, in the Public Accounts. Presented to the House of Commons, 9th March, 1885.—*Mr. Burpee (Sunbury)*.....*Not printed.*
- 76e.** Return to an Order of the House of Commons, dated 17th February, 1885, for copies of all correspondence between the Intercolonial officials or the Government and the Canada Shipping Company, or the Beaver line of steamships, with reference to the terms for through rates of freight over the Intercolonial. Presented to the House of Commons, 10th March, 1885.—*Mr. Blake*.....*Not printed.*
- 76f.** Return to an Order of the House of Commons, dated 17th February, 1885, for copies of the claim of J. B. Plante, of St. Charles, Bellechasse, in relation to certain horses which he alleges

- have been killed by a train of the Intercolonial Railway, and of which he demands the value ; copies of the order referring the said claim to the official arbitrators, and of their enquiry, report and award ; of the second reference to the said arbitrators, and of their enquiry and further report ; also all documents and papers relating to the matter in question. Presented to the House of Commons, 13th March, 1885.—*Mr. Landry (Montmagny)*.....*Not printed.*
- 76g.** Return to an Order of the House of Commons, dated 12th February, 1885, for a return showing the quantity of rolling stock purchased for the Intercolonial Railway during the six months of the year ending 31st December, 1884, giving each kind of rolling stock, and whether purchased under contract or otherwise, the parties from whom bought, and the cost of each kind ; also a statement showing what has been built during the year in the Government workshops, giving each kind. Presented to the House of Commons, 23rd March, 1885.—*Mr. Burpee (Sunbury)*.....*Not printed.*
- 76h.** Return to an Address of the House of Commons, dated 12th February, 1885, for copies of all Orders in Council, instructions to and correspondence with the commissioners under the commission issued in connection with the claims arising out of the construction of the Intercolonial Railway, and a statement of the matters referred to them, and of the moneys paid to them and to the secretary, and of the number of days during which the commissioners sat, all subsequent to the period covered by the return to the Address of last Session. Presented to the House of Commons, 31st March, 1885.—*Mr. Burpee (Sunbury)*.....*Not printed.*
- 76i.** Return to an Address of the House of Commons, dated 27th April, 1885, for copies of all memorials or correspondence presented to or sent the Government by the mayors or city councils of the cities of St. John and Portland, relating to the interruption of traffic between these cities by the railway crossing on Mill Street, and for the erection of a bridge across the said street. Presented to the House of Commons, 9th June, 1885.—*Mr. Weldon*....*Not printed.*
- 76j.** Return to an Order of the House of Commons, dated 27th April, 1885, for all papers, documents and correspondence respecting the claim of John D. Robertson for compensation for taking his factory, premises and land for the Intercolonial Railway, last May, at St. John ; the report of Alexander Christie, as appraiser ; the report of C. W. Fairweather, and others, as valuers, and the evidence taken before Mr. Compton, or any other arbitrator before whom the claim was heard. Presented to the House of Commons, 9th June, 1885.—*Mr. Mills*—*Not printed.*
- 76k.** Return to an Order of the House of Commons, dated 27th April, 1885, for a Return of the freight earnings of the Intercolonial Railway for the year ending 30th June, 1884, similar to the descriptive statement of the freight earnings of the Prince Edward Island Railway, to be found on page 84 of the report of the Minister of Railways, with the addition of such other articles of freight not contained in said descriptive statement as were carried on the Intercolonial Railway. Also a comparative statement of the operation of the Intercolonial Railway for said year, showing: 1. Passenger earnings per mile of road in operation. 2. Freight earnings per mile of road in operation. 3. Gross earnings per mile of road in operation. 4. Net traffic earnings per mile of road in operation. 5. Percentage of expenses to earnings. 6. Passenger earnings per passenger train per mile. 7. Freight earnings per freight train per mile. 8. Earnings per passenger per mile. 9. Earnings per ton per mile. 10. Average distance per passenger. 11. Average distance per ton. Presented to the House of Commons, 11th June, 1885.—*Mr. Davies*.....*Not printed.*
- 76l.** Return to an Order of the House of Commons, dated 12th March, 1885, for a Return of all contracts made by the Government for the erection of wire fences on the line of the Intercolonial Railway and the names of the contractors and the number of miles put under contract. Presented to the House of Commons, 11th June, 1885.—*Mr. Weldon*.....*Not printed.*
- 76m.** Return to an Order of the House of Commons, dated 24th February, 1885, for a statement of all free passes over the Intercolonial Railway issued to persons not actually employed as officers or workmen on this road during the year 1884, distinguishing between annual passes, passes for a more limited period, and single or return trip ; with the names of the persons to whom, the dates when, and the occasion for which the same was issued. Presented to the House of Commons, 14th July, 1885.—*Mr. Gilmor*.....*Not printed.*

- 76n.** Return to an Order of the House of Commons, dated 11th March, 1885, for a Return showing : The number of free passes or reduced fare tickets granted to parties to travel on or over the Intercolonial Railway from the 1st January, 1884, to the 1st February, 1885 ; the names of the parties to whom granted ; the date of issue ; the length of time to remain in force, and, in case of a reduced fare, the reduction made. Presented to the House of Commons, 15th July, 1885.—*Mr. McMullen* *Not printed.*
- 77.** Return to an Address of the House of Commons, dated 24th February, 1885, to His Excellency the Governor General, praying that he will cause to be laid before the House a copy of the judgment of the Supreme Court in the case of the Queen against Robinson, so far as relates to the rights of the Provincial Governments to control the inland fisheries of the Dominion ; and also for copies of all correspondence between the Government of the Dominion and that of the Province of Ontario in relation thereto. Presented to the House of Commons, 2nd March, 1885.—*Mr. O'Brien* *Not printed.*
- 77a.** Return to an Address of the House of Commons, dated 23rd February, 1885, for a Return : 1. Of all contested cases judged upon the merits in the Supreme Court of Canada, during the twelve months ending 1st February instant. 2. Of the dates of final arguments. 3. Of the dates of final judgment. 4. Of the divisions, when such have been, among the judges at the rendering of the final judgments. Presented to the House of Commons, 9th March, 1885.—*Mr. Curran* *Not printed.*
- 77b.** General Rule, No. 265, of the Exchequer Court of Canada, pursuant to section 79 of the Supreme and Exchequer Court Act. Presented to the House of Commons, 10th April, 1885, by *Hon. J. Costigan* *Not printed.*
- 77c.** Return to an Order of the House of Commons, dated 12th March, 1885, for copies of all judgments rendered by the Supreme Court, from the period when it was first established up to this date, reversing decisions of the Court of Queen's Bench of the Province of Quebec, with a succinct summary of the reasons given by the judges. Presented to the House of Commons, 17th July, 1885.—*Mr. Landry (Montmagny)* *Not printed.*
- 78.** Return to an Order of the House of Commons, dated 17th February, 1885, for a Return showing all sums of money paid and the dates of payment to A. F. Wood and J. A. Wilkinson, or either of them, from the first day of January, 1879, to the first day of January, 1885 ; the work done or services rendered as valuers or otherwise during each year, showing the number of days, weeks or months employed and the number of valuations made on the Murray Canal ; the amount paid to the several parties on the recommendation or joint recommendations of them or either of them ; the length of time the claims had been in existence ; the amount claimed and the dates of payment, and the amount paid and the travelling and all other expenses connected therewith and paid to the said Wood and Wilkinson, or either of them, or to any other person or persons on their or either of their accounts. Presented to the House of Commons, 2nd March, 1885.—*Mr. McMullen* *Not printed.*
- 79.** Return to an Address of the House of Commons, dated 23rd February, 1885, to His Excellency the Governor General, praying that he will cause to be laid before the House copies of all Orders in Council, leases, correspondence and other documents in possession of the Government in reference to the leasing of the piece of property in the city of Kingston known as the Tête du Pont Barracks. Presented to the House of Commons, 2nd March, 1885.—*Mr. Platt*—*Not printed.*
- 80.** Return to an Order of the House of Commons, dated 2nd February, 1885, for copies of all documents, correspondence and contracts between the Government or its officers and the several parties tendering for the supplying of wood to the lightship at the Lower Traverse, for the years 1883 and 1884. Presented to the House of Commons, 4th March, 1885.—*Mr. Casgrain* *Not printed.*
- 81.** Return to an Order of the House of Commons, dated 12th February, 1885, for a statement showing the names and places of residence of all militiamen of 1812 who received their pension during the last fiscal year, and the amount paid to each of them. Presented to the House of Commons, 5th March, 1885.—*Mr. Bourassa* *Printed for Sessional Papers only.*

- 81a.** Return to an Order of the House of Commons, dated 12th February, 1885, for a copy of the charges against Lieut.-Colonel O'Malley, of the 25th Battalion, Ontario; date of O'Malley's suspension; date of the court of enquiry into the charges; also a copy of the evidence taken before said court of enquiry, together with the report of said court to the Major-General commanding the militia; also copy of report of the Major-General commanding the militia in reference to the charges against Lieut.-Colonel O'Malley, 25th Battalion Presented to the House of Commons, 12th March, 1885.—*Mr. Wilson*.....*Not printed.*
- 81b.** Return to an Order of the House of Commons, dated 2nd March, 1885, for a Return showing the number of officers, non-commissioned officers and men comprising "A," "B" "C" Batteries, the Cavalry and Infantry Schools; also the pay and allowances of the commissioned officers of said batteries and schools, with their rank and names, and distinguishing such of said commissioned officers as are graduates of the Royal Military College, the date of appointment of all said officers to the schools and of their commissions in the militia, as well as showing their qualifications and the Provinces from which they come; also return showing the expenditure on account of "A," "B" "C" Batteries, the Cavalry and Infantry Schools, from the 1st July, 1884, to 1st January, 1885, distinguishing the disbursements on account of pay and allowances, and the names of the parties to whom payments were made. Presented to the House of Commons, 13th March, 1885.—*Mr. Lister*.....*Not printed.*
- 81c.** Return (in part) to an Order of the House of Commons, dated 2nd March, 1885, for a return showing: 1. Number and names of the students having passed or graduated from the Royal Military College, Kingston, in each year to date. 2. Total number of marks received by each, together with the total number possible to be obtained in each year, respectively, and the percentage of such total obtained by each pupil. 3. Number and names of those cadets who, after passing through said college, are now employed in the service of the Dominion, together with statement of the position occupied by each. 4. Number and names of cadets who have been offered employment in the service of the Dominion, and have declined the offer, together with statement of the position offered and declined by each respectively. Presented to the House of Commons, 16th March, 1885.—*Mr. Blake*—
Printed for both Distribution and Sessional Papers.
- 81d.** Return to an Order of the House of Commons, dated 5th February, 1885, for a return of all rifle associations in the Dominion, their headquarters, the annual grant to each, with the names of the members of each of such associations. Presented to the House of Commons, 20th March, 1885.—*Mr. Bergin*.....*Not printed.*
- 81e.** Supplementary Return to an Order of the House of Commons, dated 2nd March, 1885, for a Return showing: 1. Number and names of the students having passed or graduated from the Royal Military College, Kingston, in each year to date. 2. Total number of marks received by each, together with the total number possible to be obtained in each year, respectively, and the percentage of such total obtained by each pupil. 3. Number and names of those cadets who, after passing through said college, are now employed in the service of the Dominion, together with statement of the positions occupied by each. 4. Number and names of cadets who have been offered employment in the service of the Dominion, and have declined the offer, together with statement of the position offered and declined by each, respectively. Presented to the House of Commons, 27th April, 1885.—*Mr. Blake*.....*Not printed.*
- 81f.** Copy of a Report of a Committee of the Honorable the Privy Council, approved by His Excellency the Governor General in Council, dated the 8th July, 1885, on a memorandum of the 30th June, 1885, from the Minister of Militia and Defence, submitting certain regulations relating to gratuities and pensions to be granted under the provisions of section 68 of the Consolidated Militia Act of 1883, to officers and men of the active militia who have been or may be killed or wounded on actual service after the 20th day of March, 1885, or who have died since that date, or may die hereafter, from illness or injuries contracted on actual service. Presented to the House of Commons, 10th July, 1885, by Hon. J. P. R. A. Caron—
Printed for both Distribution and Sessional Papers.
- 82.** Return to an Address of the House of Commons, dated 22nd February, 1885, for copies of the petition of J. Hickson, Esq., and others, relative to the continuation of the pension of the late

- John Martin to his widow, and all papers in connection therewith. Presented to the House of Commons, 5th March, 1885.—*Mr. Curran*.....*Not printed.*
- 83.** Return to an Address of the House of Commons, for copies of all Orders in Council, memorials and representations, on the subject of the bounty on manufactures of iron, not already brought down, together with all letters, accounts and vouchers in respect of claims made for such bounty; and statement in detail of all sums paid or allowed in respect thereof. Presented to the House of Commons, 6th March, 1885.—*Mr. Blake*.....*Printed for Sessional Papers only.*
- 84.** Return to an Order of the House of Commons, dated 12th February, 1885, for copies of all papers and correspondence between the Government and D. J. Hughes, county judge of Elgin, or any other person or persons, relating to charges preferred by certain petitioners of said county, asking for a commission of enquiry into the official conduct of the said judge. Presented to the House of Commons, 6th March, 1885.—*Mr. Wilson*.....*Not printed.*
- 85.** Return to an Order of the House of Commons, dated 17th February, 1885, for a Return of all certificates for liquor sold under section 99, clause 4, second part of the Canada Temperance Act of 1878, by the physicians of the several counties now under the said Act in Nova Scotia, giving the names of each physician and the names of the persons to whom certificates were granted, and the quantity supplied in each case, from 1st January, 1884, to 1st January, 1885. Presented to the House of Commons, 6th March, 1885.—*Mr. Kirk*.....*Not printed.*
- 85a.** Return to an Address of the House of Commons, dated 5th February, 1885, for: 1. A copy of the Order in Council respecting the submission to the Supreme Court of the case agreed on between the Government of Canada and the Government of each of the Provinces under the Liquor License Act of 1883, and the Act to amend the Liquor License Act of 1883, as to the competency of Parliament to pass the said Acts in whole or in part. 2. A copy of the said case of the factum of the Government of Canada and of the factum of each of the said Provinces, the arguments of counsel in such case and the notes of the shorthand reporter taken during such argument. 3. A copy of the report of said court in said case. 4. All correspondence between the Government of Canada and the Government of each of said Provinces touching said case, and the submission thereof, and the report thereon; and all correspondence between said Governments before and since said report, respecting the same and the matters in dispute and so referred. Presented to the House of Commons, 11th March, 1885.—*Mr. Cameron (Huron)**Printed for Sessional Papers only.*
- 85b.** Return (*in part*) to an Order of the House of Commons, dated 16th February, 1885, for a statement from the records of all the votings held in various counties and cities under the provisions of the Canada Temperance Act, 1878, showing by electoral districts and the various sub-divisions thereof, the total number of names on the electoral lists, the number of votes polled for the adoption of the Act, and the number of votes polled against the adoption of the Act, with the number of the population of each such electoral district at the time of the taking of the census next preceding the vote in such electoral district. Presented to the House of Commons, 11th March, 1885.—*Mr. Fisher*.....*Not printed.*
- 85c.** Return to an Address of the House of Commons, dated 2nd March, 1885, for all correspondence between this Government and the Local Government of the Province of Quebec about the working of the License Act. Presented to the House of Commons, 13th March, 1885.—*Mr. Bergeron*.....*Not printed.*
- 85d.** Return to an Address of the House of Commons, dated 2nd March, 1885, for: 1. The amount of revenue derived from the importation of wines, spirits, ale, beer, porter, cordials and other liquors, during the last fiscal year. 2. The amount of revenue derived from the manufacture of the same for the same period. Presented to the House of Commons, 13th March, 1885.—*Mr. Bergin*.....*Not printed.*
- 85e.** Return to an Order of the House of Commons, dated 9th February, 1885, for a Return of all certificates for liquor under section ninety-nine, clause four, second part of the Canada Temperance Act of 1878, by the physicians of the county of Halton; giving the name of each physician and the name of each person to whom certificates were granted from the first of May, 1884, to the first of February, 1885. Presented to the House of Commons, 18th March, 1885.—*Mr. McCraney*.....*Not printed.*

- 85f.** Return to an Order of the House of Commons, dated 16th February, 1885, for a statement from the records of all the voting held in various counties and cities under the provisions of the Canada Temperance Act, 1878, showing by electoral districts and the various sub-divisions thereof the total number of names on the electoral lists, the number of votes polled for the adoption of the Act, and the number of votes polled against the adoption of the Act, with the number of the population of each such electoral district at the time of the taking of the census next preceding the vote in such electoral district. Presented to the House of Commons, 23rd March, 1885.—*Mr. Fisher*.....*Not printed.*
- 85g.** Return to an Address of the Senate, dated 20th February, 1885, for a return of the amounts of revenue received from duties or excise on wine, beer and spirits, for the year ending 31st December, 1884. Presented to the Senate, 13th March, 1885.—*Hon. Mr. Plumb*.....*Not printed.*
- 85h.** Return to an Address of the House of Commons, dated 27th April, 1885, for copies of all correspondence between Charles H. Lugrin and the Secretary of State, in reference to an appeal to the Supreme Court of Canada to test the constitutionality of the Canada Temperance Act, between the dates of 31st May, 1879, and 31st May, 1884. Presented to the House of Commons, 5th May, 1885.—*Mr. Burpee (Sunbury)*.....*Not printed.*
- 85i.** Return to an Order of the House of Commons, dated 5th February, 1885, for a Return showing the number of persons who applied in the year 1884 for licenses under the Liquor License Act of 1883; the total number of licenses granted in Canada, the total number in each province and in each electoral district; the total number refused a license and the reason for refusal; the total number in each province who paid part of the fee but did not take out a license; the total amount received by the Government for such licenses in Canada, in each province of Canada, and also in each electoral division; together with a statement showing what salary was paid the commissioners, inspectors and sub-inspectors under the Act, and giving the names and addresses of said commissioners, inspectors and sub-inspectors in every electoral district of Canada. Presented to the House of Commons, 23rd June, 1885.—*Mr. Landerkin*—*Not printed.*
- 85j.** Return to an Order of the House of Commons, dated 5th February, 1885, for a Return showing the names and residences of all officials appointed by the Government or the Board of License Commissioners under the Liquor License Act of 1883, and amending Act; the salary, fees and emoluments paid to each, and the aggregate costs incurred up to 1st January, 1885, under the said Act, and for carrying out and enforcing the same. 2. A statement of the name and residence of each person who obtained a license under the said Act, as well as under any local law. 3. A statement of all sums received by the Government or any persons appointed under the said Acts, up to 1st January, 1885, as license fees or otherwise, and the name and residence of the person from whom received, and the disposal made by the Government or the officials of the Government of such sums. 4. A full and detailed statement of all costs, charges and expenses paid by the Government up to 1st January, 1885, under the said Acts or in connection therewith, or arising therefrom for the purpose of carrying said Acts into effect and enforcing the same and testing the constitutionality of the said Acts. Presented to the House of Commons, 23rd June, 1885.—*Mr. Cameron (Huron)*.....*Not printed.*
- 85k.** Return to an Order of the House of Commons, dated 12th February, 1885, for a copy of all correspondence had with the Government, or any member thereof, in relation to any proposed alteration or relaxation of the provisions of the present Prohibitory Liquor Law of the North-West Territories. Presented to the House of Commons, 15th July, 1885.—*Mr. Foster*—*Printed for Sessional Papers only.*
- 86.** Return to an Address of the House of Commons, dated 6th February, 1885, for: 1. A statement showing all tolls of the Northern Railway Company of Canada, the Hamilton and North-Western Railway Company, and the Northern and Pacific Junction Railway Company, respectively. 2. Copies of the respective by-laws of such companies fixing and regulating such tolls. 3. Copies of any Orders in Council approving of any of such tolls. Presented to the House of Commons, 9th March, 1885.—*Mr. Mulock*.....*Not printed.*
- 87.** Return to an Order of the House of Commons, dated 17th February, 1885, for a Return showing the number of islands leased in the river St. Lawrence, the names of such islands, the party or

- parties to whom leased, and the yearly rental payable for each of the said islands respectively. Presented to the House of Commons, 11th March, 1885.—*Mr. Wood (Brockville)*....*Not printed.*
88. Return to an Order of the House of Commons, dated 23rd February, 1885, for copies of all correspondence relative to the proposal to have the waters of the Muskoka lakes connected with the proposed Trent Valley Canal system by the construction of a short canal from Gravenhurst Bay to the waters of the Severn River. Presented to the House of Commons, 11th March, 1885.—*Mr. Cockburn*.....*Not printed.*
89. Return to an Order of the House of Commons, dated 16th February, 1885, for a statement of the various amounts of money paid by the Government of Canada, or any of the public departments, since 1882, to Henry J. Morgan, for services of any kind, or for copies of a certain book, called the "Annual Register;" together with copies of the certificate of each public official to whom such books have been delivered. Presented to the House of Commons, 11th March, 1885.—*Mr. McCraney*.....*Not printed.*
- 89a. Return to an Order of the House of Commons, dated 27th April, 1885, for a statement of all payments during 1882-83 and 1883-84 for the *Dominion Annual Register* to anyone except H. J. Morgan, with the names of the persons who received the money, and a statement of the manner in which the number of books were distributed. Presented to the House of Commons, 19th May, 1885.—*Mr. McCraney*.....*Not printed.*
90. Report of Progress of the Geological and Natural History Survey and Museum of Canada, containing reports and maps of investigation and surveys, for 1882-83 and 1884. Presented to the House of Commons, 11th March, 1885, by Sir John A. Macdonald—
Not re-printed for Sessional Papers.
91. The Annual Report of the Life Association of Canada, for year ending 31st December, 1883. Presented to the House of Commons, 20th March, 1885.....*Not printed.*
92. A statement of affairs and list of shareholders of the British Canadian Loan and Investment Company, on the 31st December, 1884. Presented to the House of Commons, 20th March, 1885, by Sir Leonard Tilley.....*Not printed.*
93. Return to an Order of the House of Commons, dated 17th February, 1885, for copies of all papers connected with the sale of the Dundas and Waterloo Macadamized Road by the Government on the 15th day of March, 1884, including previous applications by any municipality or private parties for the purchase or other acquisition of the road, the conditions under which the road was offered for sale; statement, in detail, of the expenses incurred in connection with the sale, to whom sold, the amount realized and the amount and dates of the payments made by the purchaser, and the balance, if any, remaining unpaid at the date of this Order. Presented to the House of Commons, 12th March, 1885.—*Mr. Paterson (Brant)*—
Not printed.
94. Return to an Order of the House of Commons, dated 23rd February, 1885, for a statement showing in the case of each election which has taken place since the general election of 1878: 1. The date of certificate of the judge or court showing the election was void, or of the communication from members that there was a vacancy, or of the member's warrant to the Clerk of the Crown in Chancery, or of any other instrument under which primary action was taken towards a new election, specifying in each case the nature of the instrument. 2. Date of receipt by the Speaker or Clerk, as the case may be, of above instrument. 3. Date of the issue of Speaker's warrant to the Clerk of the Crown in Chancery to make out a new writ. 4. Date of the receipt of the Speaker's warrant by the Clerk of the Crown in Chancery. 5. Date of the issue of new writ by the Clerk of the Crown in Chancery. 6. Date of despatch of new writ to Returning Officer. 7. Dates named in new writ for nomination and polling respectively. 8. Dates on which nomination and polling took place. 9. Date of return. 10. Date of receipt of return by Clerk of the Crown in Chancery. Presented to the House of Commons, 18th March, 1885.—*Mr. Blake*.....*Not printed.*
- 94a. Return (*in part*) to an Order of the House of Commons, dated 23rd February, 1885, for a statement respecting each election which has taken place since the general election of 1878; dated 20th March, 1885. Presented to the House of Commons, 20th March, 1885.—*Mr. Blake*—
Not Printed.

- 95.** Return to an Order of the House of Commons, dated 2nd March, 1885, for: 1. Copies of the petition praying for the deepening of Bras St. Nicholas, in the county of Montmagny. 2. Statement of the amount expended in the said work, the names of the persons to whom the same was paid, the work for which such sum was paid, the date of payment, and the report, estimate or account upon which each payment was made. 3. Statement of the amount paid to Jules Bélanger in connection with the said work. Presented to the House of Commons, 13th March, 1885.—*Mr. Laurier*.....*Not printed.*
- 96.** Return to an Order of the House of Commons, dated 6th February, 1885, for copies of all correspondence, leases, agreements and statements of payments for rent or taxes, or allowances to any Government employé for the same, for a building occupied by the engineer or assistant engineers of the Trent Valley Canal on part of lot 2 west of Colborne Street and north of Frances Street, in the village of Fenelon Falls, Ontario. Presented to the House of Commons, 13th March, 1885.—*Mr. Cockburn*.....*Not printed.*
- 96a.** Return to an Address of the House of Commons, dated 17th February, 1885, for copies of all correspondence, reports to Council, Orders in Council, reports of engineers on the ground, engineers in charge, and of the chief engineer, plans and estimates of cost, in connection with the proposed Trent Valley Canal. Presented to the House of Commons, 8th May, 1885.—*Mr. Blake*.....*Printed for Sessional Papers only.*
- 96b.** Return to an Address of the House of Commons, dated 30th March, 1885, for copies of all advertisements, tenders, contracts, specifications, Orders in Council, correspondence and other papers in connection with George Goodwin's contracts in respect to the Trent Valley Canal navigation, including all accounts and letters with reference to claims for extras on such contracts. Presented to the House of Commons, 8th May, 1885.—*Mr. Blake*...*Not printed.*
- 97.** Return to an Order of the House of Commons, dated 17th February, 1885, for a statement of subsidies in cash and subventions, of whatever kind, on railways in the Province of Nova Scotia, including the island of Cape Breton, chargeable to capital account, since the date of Confederation, whether in aid of construction or acquiring of said railways, and the number of miles located in each county. Presented to the House of Commons, 13th March, 1885.—*Mr. McDougall (Cape Breton)*.....*Not printed.*
- 97a.** Return to an Address of the House of Commons, dated 6th February, 1885, for copies of all Orders in Council, reports, correspondence and papers respecting the grant or payment of any subsidies to railways other than the Canadian Pacific Railway, not already brought down; and statements, in detail, of all such payments to date. Presented to the House of Commons, 31st March, 1885.—*Mr. Blake*.....*Printed for Sessional Papers only.*
- 97b.** Orders in Council recommending the grant of Dominion lands to the Alberta and Athabasca Railway Company, to the Manitoba South-Western Colonization Railway Company, to the Qu'Appelle, Long Lake and Saskatchewan Railroad and Steamboat Company, and to the Manitoba and North-Western Railway Company. Presented to the House of Commons, 15th April, 1885, by Hon. J. H. Pope.....*Not printed.*
- 97c.** Papers, correspondence, etc., relative to grants of Dominion lands to the following railways:—Manitoba South-Western Railway Company, Manitoba North-Western Railway Company, Qu'Appelle, Long Lake and Saskatchewan Railway and Steamboat Company, Winnipeg and Hudson Bay Railway and Steamship Company, North-Western Coal and Navigation Company, North-West Central Railway Company, Qu'Appelle and Wood Mountain Railway Company, and the Portage, Westbourne and North-Western Railway Company. Presented to the House of Commons, 22nd April, 1885, by Hon. J. H. Pope.....*Not printed.*
- 97d.** Copy of an Order in Council, under date the 6th May, 1885, respecting the Manitoba and North-Western Railway Company. Presented to the House of Commons, 15th June, 1885, by Sir Hector Langevin.....*Not printed.*
- 98.** Return to an Order of the House of Commons, dated 2nd March, 1885, for a statement showing the earnings and working expenses of the Eastern Extension Railway, from New Glasgow to Port Mulgrave, Nova Scotia, for each month of the calendar year 1884, respectively. Presented to the House of Commons, 13th March, 1885.—*Mr. Cameron (Inverness)*.....*Not printed.*

- 99.** Return to an Address of the House of Commons, dated 17th February, 1885, for copies of all petitions, letters and other correspondence between the Government and any other parties, relating to the payment of wages due the laborers employed on the construction of the Cape Traverse Branch of the Prince Edward Island Railway. Presented to the House of Commons, 13th March, 1885.—*Mr. Hackett*.....*Not printed.*
- 99a.** Return to an Address of the Senate, dated 20th March, 1885, showing, in detail, the total cost of the Cape Traverse Branch Railway; including the sums paid to engineers and for superintending its construction, the rolling stock, stations and other buildings. Presented to the Senate, 20th April, 1885.—*Hon. Mr. Botsford*.....*Not printed.*
- 100.** Return to an Address of the House of Commons, dated 2nd March, 1885, for copies of all correspondence between the Government of British Columbia or any other person and the Dominion Government, in reference to the troubles among the Indians at Metlakatla, in the year 1884; also all correspondence, including the Order of Council, referring to or recommending the commutation of the sentence passed by the court in British Columbia upon the murderer of Mrs. Yeomans. Presented to the House of Commons, 18th March, 1885.—*Mr. Shakespeare and Mr. Gordon's amendment*.....*Not printed.*
- 100a.** Return to an Order of the House of Commons, dated 12th March, 1885, for: 1. Copy of form of tender for Indian supplies in the North-West for the year 1884. 2. Copies of all tenders received by the Government for such supplies in 1884. 3. The action or decision of the Government on such tenders, and the reasons therefor. 4. Copies of all contracts made by the Government with parties whose tenders have been accepted. 5. All correspondence with the Government respecting all tenders and contracts. Presented to the House of Commons, 29th April, 1885.—*Mr. Paterson (Brant)*.....*Printed for Sessional Papers only.*

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- 101.** Return to an Order of the House of Commons, dated 2nd March, 1885, for a Return of all fish taken in the bay and river of Miramichi and its branches for the year ending 1st February, 1885, defining the separate quantities of each kind by weight, the places to which they were exported, and the route of transport in each case, and the average price received for each kind of fish; together with an estimate, in detail, of the several kinds of fish taken in that time. Presented to the House of Commons, 20th March, 1885.—*Mr. Macmillan (Middlesex)*—
Not printed.
- 101a.** Return to an Address of the House of Commons, dated 6th February, 1885, for copies of all minutes of Council, reports to Council, and of correspondence between the Canadian Government and the British Government, or any of its officers or members, not already laid before Parliament, relating to the so-called fishery question, from the 1st of July, 1867, up to the time of the signing of the Washington Treaty. Presented to the House of Commons, 22nd April, 1885.—*Mr. Mulock*.....*Printed for Sessional Papers only.*
- 101b.** Return to an Order of the House of Commons, dated 12th March, 1885, for copies of all documents, plans and reports furnished to the Department of Marine and Fisheries by J. U. Gregory, in relation to the porpoise fishery of Ste. Ann la Pocatière. Presented to the House of Commons, 28th May, 1885.—*Mr. Blondeau*.....*Not printed.*
- 101c.** Return to an Order of the House of Commons, dated 27th April, 1885, for a statement of amounts paid in bounty in the years 1883 and 1884 on fish caught in Bras d'Or Lakes, in the counties of Cape Breton, Inverness, Richmond and Victoria, and number of boats drawing such bounty in each county. Presented to the House of Commons, 28th May, 1885.—*Mr. McDougall (Cape Breton)*.....*Not printed.*
- 101d.** Return to an Order of the House of Commons, dated 12th March, 1885, for a return of all leases or licenses issued by the Department of Marine and Fisheries to fish on non-tidal waters in the Province of New Brunswick; the names of the lessees or licensees, and the respective territories and streams leased or licensed, and the respective amounts of rent paid by each lessee or licensee annually. Presented to the House of Commons, 28th May, 1885.—*Mr. Weldon*.....*Not printed.*

- 101e.** Return to an Order of the House of Commons, dated 12th March, 1885, for copies of the report of Mr. Jules Gauvreau, fishery overseer, and all details relating thereto, for the year 1884. Presented to the House of Commons, 28th May, 1885.—*Mr. Blondeau*.....*Not printed.*
- 101f.** Return to an Order of the House of Commons, dated 12th March, 1885, for copies of the report of the enquiry made by J. U. Gregory against Mr. Clovis Caron, fishery overseer, and of all documents relating thereto. Presented to the House of Commons, 28th May, 1885.—*Mr. Blondeau*.....*Not printed.*
- 101g.** Return to an Order of the House of Commons, dated 12th March, 1885, for copies of the report of Mr. Clovis Caron, fishery overseer, and all details therewith connected, for the year 1884. Presented to the House of Commons, 28th May, 1885.—*Mr. Blondeau*.....*Not printed.*
- 101h.** Return to an Address of the House of Commons, dated 27th April, 1885, for copies of all correspondence, Orders in Council, reports and other papers in connection with the removal of Mr. J. E. Starr, of Port Williams, Nova Scotia, from the office of fishery overseer, and the appointment of his successor; and a statement of the distance between the residence of Mr. Starr and that of his successor, and of the length of the coast line of King's County, N.S. Presented to the House of Commons, 5th June, 1885.—*Mr. Blake*.....*Not printed.*
- 101i.** Message from His Excellency the Governor General, transmitting to the House of Commons copies of despatches, correspondence and papers having reference to the negotiations at Washington with respect to the termination of the fishery clauses of the Treaty of Washington during the year 1884 and to the present date in 1885. Presented to the House of Commons, 9th July, 1885, by Sir John A. Macdonald.....*Printed for Sessional Papers only.*
- 102.** Return to an Address of the House of Commons, dated 2nd March, 1884, for copies of all correspondence, reports, Orders in Council, statements of accounts and other documents in the possession of the Government relating to the claim of the Government against the Allan Steamship Company for services rendered by the steamer "Newfield," in 1881, with a statement of the Government claim and the amount received in liquidation thereof. Presented to the House of Commons, 20th March, 1885.—*Mr. Forbes*.....*Not printed.*
- 103.** Return to an Order of the House of Commons, dated 2nd February, 1885, for copies of the complaint, correspondence, documents and reports, relating to the enquiry respecting Captain Alphonse Miville DeChêne about the year 1879, at St. Roch des Aulnets. Presented to the House of Commons, 20th March, 1885.—*Mr. Casgrain*.....*Not printed.*
- 104.** General statements and returns of baptisms, marriages and burials for certain districts of the Province of Quebec, for the year 1884. Presented to the House of Commons, 20th March, 1885, by Hon. J. H. Pope.....*Not printed.*
- 105.** Return to an Order of the House of Commons, dated 2nd March, 1885, for a statement of the quantity and value of coal purchased in 1883 and 1884 for the use of the public buildings at Ottawa, including Rideau Hall, showing from whom purchased, the price paid per ton, the kind of coal, and where produced. Presented to the House of Commons, 23rd March, 1885.—*Mr. Kirk*.....*Not printed.*
- 105a.** Return to an Order of the House of Commons, dated 12th March, 1885, for a Return of all animal charcoal imported into the Dominion, whether as fertilizers or for manufacturing purposes, the value of each kind, and the duties collected thereon at the respective ports of the Dominion, for the last fiscal year ending 30th June, 1884. Presented to the House of Commons, 27th April, 1885.—*Mr. Stairs*.....*Not printed.*
- 105b.** Return to an Order of the House of Commons, dated 12th March, 1885, for copies of all notices asking for tenders for supplying the fog-whistles and lighthouses in the Bay of Fundy and on the south shore of Nova Scotia with coal; copies of tenders submitted, names of party or parties whose tenders were accepted; copies of all vouchers, bills of lading and receipts upon which moneys were paid, and all other information in the Department in reference to this service. Presented to the House of Commons, 27th April, 1885.—*Mr. Robertson (Shelburne)*—*Not printed.*

- 105c.** Return to an Order of the House of Commons, dated 12th February, 1885, for a return giving a full statement of all coal entered ex-warehouse, free for exportation, during the year ending 30th June, 1884, showing the quantity so entered at each port; the names of persons having entered; the quantities ex-warehoused by each person, and, if exported, the name of the vessel or railroad by which exported; the place to which exported, and copies of all the cancelling certificates, showing that such coal had been landed in the ports to which exported. Presented to the House of Commons, 7th May, 1885.—*Mr. Burpee (Sunbury)*.....*Not printed.*
- 105d.** Return to an Order of the House of Commons, dated 12th March, 1885, for a return of the quantity of coal carried from the Spring Hill Coal Mines by the Intercolonial Railway from 1st January, 1884, to 31st December, 1884, showing the distance carried, the several places where delivered, and the rate per ton or per car for the carriage thereof from the mines to the several points of delivery. Presented to the House of Commons, 14th July, 1885.—*Mr. McMullen**Not printed.*
- 106.** Return to an Order of the House of Commons, dated 24th February, 1885, for copies of all correspondence exchanged between the Department of Public Works and any person whomsoever, in relation to the construction of a wharf at Pointe aux Trembles, in the county of Portneuf. Presented to the House of Commons, 23rd March, 1885.—*Mr. De St. Georges*—*Not printed.*
- 106a.** Return to an Order of the House of Commons, dated 12th March, 1885, for a return of the wharfage collected at the Digby Pier from the 1st January, 1884, to the 31st of December, 1884. Also a return of the wharfage collected at the Metaghan River Pier, in the county of Digby, for the same period. Presented to the House of Commons, 16th April, 1885.—*Mr. Vail*—*Not printed.*
- 107.** Return to an Order of the House of Commons, dated 23rd February, 1885, for copies of correspondence, petitions, reports of engineers, lighthouse inspectors and others, in reference to change in dimensions of location of the lighthouses known as "Range Lights," at Weller's Bay, Ontario. Presented to the House of Commons, 23rd March, 1885.—*Mr. Platt*—*Not printed.*
- 107a.** Return to an Order of the House of Commons, dated 27th April, 1885, for a return of any memorials or correspondence with the Department of Marine and Fisheries in reference to the site of the new lighthouse at Quaco, built in place of a former one destroyed by fire; showing what was the purchase money paid for the present site, and to whom paid; and showing also who is the present keeper of the light, when appointed, and at what salary. Presented to the House of Commons, 5th June, 1885.—*Mr. Weldon*.....*Not printed.*
- 107b.** Return to an Order of the House of Commons, dated 27th April, 1885, for copies of all correspondence and complaints regarding the management of Bird Island Light, Victoria, Nova Scotia, during the past two years. Also the reports of the several superintendents of lights during the above period, and the evidence taken before the several superintendents regarding the management of the said Bird Island Light. And also the name of the person (if any) now in charge of said light, and the amount of salary paid to such keeper, and if he is permanently engaged. Presented to the House of Commons, 8th June, 1885.—*Mr. Campbell (Victoria)*.....*Not printed.*
- 108.** Return to an Address of the House of Commons, dated 23rd February, 1885, for copies of all Orders in Council, leases, correspondence and other documents in possession of the Government, in reference to the leasing of the piece of property in the city of Kingston known as the Market Battery. Presented to the House of Commons, 23rd March, 1885.—*Mr. Platt*—*Not printed.*
- 109.** Return to an Order of the House of Commons, dated 17th February, 1885, for a copy of the document or instrument containing the assurance received by the Government on or about the 17th day of April last from the Grand Trunk Railway Company, referred to by the Right Hon. Sir John A. Macdonald on that day in his place in this House, to the effect that the Grand Trunk Railway Company would set aside one million pounds sterling for the purpose of double

tracking the line of the Grand Trunk Railway between Montreal and Toronto. Also copy of the report of the denial of the said assurance and of the statements alleged to have been made in respect of it, by Sir Henry Tyler, the president of the said company, at the meeting thereof held in London, England, shortly after the said announcement; and copies of all correspondence between the Government and any official of the said company respecting the said assurance. Presented to the House of Commons, 23rd March, 1885.—*Mr. Mitchell*.....*Not printed.*

109a. Return to an Order of the House of Commons, dated 28th March, 1884, for a statement showing the names of all stockholders in the Grand Trunk Railway of Canada, with the amounts of stock held by each of said stockholders, at the close of the first year after the charter was granted or operations commenced. Also the names of all stockholders in said company and the amounts of stock held by each on the first day of the current year. Presented to the House of Commons, 31st March, 1885.—*Mr. Mitchell*.....*Not printed.*

109b. Return to an Order of the House of Commons, dated 24th February, 1885, for a statement in detail of the several casualties or accidents, whereby passengers were injured or killed, which have occurred on the Grand Trunk Railway and any of its branches, and the Canadian Pacific Railway and any of its branches, from the 1st day of January, 1884, to the 1st day of January, 1885, stating in detail where and when such casualties occurred, the number of persons killed in each casualty, also number injured, stating whether seriously or otherwise, the several amounts paid, and to whom paid, as damages in each accident, whether any law suits for recovery of damages are pending, and stating in detail what amounts are still claimed thereon; also the causes of such accidents. Presented to the House of Commons, 16th April, 1885.—*Mr. Mitchell*.....*Not printed.*

109c. Supplementary Return to an Order of the House of Commons, dated 24th February, 1885, for a statement, in detail, of the several casualties or accidents, whereby passengers were injured or killed, which have occurred on the Grand Trunk Railway and any of its branches, and the Canadian Pacific Railway and any of its branches, from the 1st day of January, 1884, to the 1st day of January, 1885, stating, in detail, where and when such casualties occurred, the number of persons killed in each casualty, also number injured, stating whether seriously or otherwise, the several amounts paid, and to whom paid, as damages in each accident, whether any lawsuits for recovery of damages are pending, and stating, in detail, what amounts are still claimed thereon; also the causes of such accidents. Presented to the House of Commons, 20th April, 1885.—*Mr. Mitchell*.....*Not printed.*

109d. Return (*in part*) to an Order of the House of Commons, dated 24th February, 1885, for copies of the returns as required to be made under the Consolidated Railway Act of 1879, and the Acts in amendment thereof, of 1881 and 1884, by the Grand Trunk Railway Company, for the fiscal year 1883-84, in each year separately; and—1. The number of miles of main line of Grand Trunk, with statement of actual total cost of construction and equipment thereof. The separate cost per mile of construction thereof, without rolling stock. The total amount of capital account now standing against the said railway, including its equipment. 2. A statement, in detail, showing the several branches or side lines now owned by the said company, including the number of miles in each, with the amounts severally paid for each. How such amounts were paid; whether paid in cash or securities, and the statement and character thereof, in detail. The amount for which each of such securities was sold, and the net amounts which were realized in each. 3. A statement, in detail, of any railway line or lines leased by the Grand Trunk Company or agreed to be worked by them on a percentage of earnings or other terms, with the length of each of such lines and the conditions, in detail, of the agreements in relation thereto. 4. A statement, in detail, of any interest the Grand Trunk Railway may have in any other railway or railways, with the securities, in detail, that they may hold in relation thereto. 5. A statement in detail of the net earnings of each of the railways mentioned in the four preceding clauses, after the payment of working expenses, for the past financial year, of each of the said railways, with a statement, in detail, of the percentage that working expenses bear in each case to the gross earnings. 6. Whether any and what amounts were paid by the Grand Trunk Company towards the construction of the Toronto and Ottawa Railway, and the amount thereof, with the statement of the gross, as well as the net, earnings of the said railway for the past financial year of the said railway; and a statement of where

- these funds came from; also a statement as to where they appear in the accounts of the Grand Trunk Company's accounts or returns. Presented to the House of Commons, 5th May, 1885.—*Mr. Mitchell*.....*Not printed.*
- 110.** Return to an Order of the House of Commons, dated 12th March, 1885, for a Return showing all properties or rooms leased by the various branches of the Public Service from private parties or companies in the city of Ottawa, stating the amount of rental paid in each case; also the purposes for which such properties or rooms are used. Presented to the House of Commons, 24th March, 1885.—*Mr. Somerville (Brant)*.....*Not printed.*
- 111.** Return to an Address of the House of Commons, dated 6th February, 1885, for copy of the lease of the Northern and Pacific Junction Railway Company to the Northern Railway Company of Canada and Hamilton and North-West Railway Company, or either of them. Presented to the House of Commons, 24th March, 1885.—*Mr. Mulock*—
Printed for Sessional Papers only.
- 112.** Return to an Order of the House of Commons, dated 9th February, 1885, for a statement in detail showing amount of work done, contracts made and with whom, moneys paid and to whom, and all expenditures in connection with the improvements of Great Village River, in the county of Colchester, Nova Scotia. Presented to the House of Commons, 24th March, 1885.—*Mr. Robertson (Shelburne)*.....*Not printed.*
- 113.** Return to an Order of the House of Commons, dated 12th March, 1885, for: 1. The names of all persons who tendered for the construction of the drill shed at Quebec. 2. The amount asked by each person so tendering. 3. The amount of the cheque deposited by each such person in support of his tender, with the names of the signers and endorsers of each cheque, and the names of the several banks by which such cheques were accepted. Presented to the House of Commons, 26th March, 1885.—*Mr. Landry (Montmagny)*.....*Not printed.*
- 114.** Return to an Order of the House of Commons, dated 12th March, 1885, for a copy of report of the Superintendent of Burlington Bay Canal of the soundings taken during the summer of 1884, the plottings and cross-sections made, showing the present conformation of the bottom of the said canal, together with a statement showing the depths on both sides, as well as all plans giving information in reference to said soundings. Presented to the House of Commons, 26th March, 1885.—*Mr. Robertson (Hamilton)*.....*Not printed.*
- 115.** Return to an Order of the House of Commons, dated 17th February, 1885, for a report of the Auditor General and also one McGee, as well as for all papers, letters, accounts, cheques and newspapers connected with any claim of Staff Commander Boulton against the Department of Marine and Fisheries or the Government for any amount of money which he alleges to be due him for salary or otherwise, or which he asserts has been withheld from him, or in relation to any dispute between said Boulton and any officer of the Marine and Fisheries Department in regard to cheques drawn in favor of said Boulton. Also a Return to an Order of the House of Commons, dated 2nd March, 1885, for a return of any papers or letters in the hands of the Government signed by Deputy Minister Smith, bearing on the subject of dispute or irregularity between Deputy Minister Tilton and Staff Commander Boulton, or in any way relating thereto; also copies of any letters addressed to Mr. Tilton by Mr. Smith, as Deputy Minister, on the subject. Presented to the House of Commons, 30th March, 1885.—*Mr. McMullen*.....*Not printed.*
- 116.** Papers and correspondence, up to the present time, with respect to the commission recently appointed to investigate and report upon the claims existing in connection with the extinguishment of the Indian title preferred by half-breeds resident in the North-West Territories outside of the limits of the Province of Manitoba, previous to the 15th day of July, 1870. Presented to the House of Commons, 20th April, 1885.—*Mr. Blake*.....*Printed for Sessional Papers only.*
- 116a.** Copy of commission appointing commissioners to make enumeration of half-breeds in the North-West Territories previous to the 15th July, 1870. Presented to the House of Commons, 22nd April, 1885, by Sir John A. Macdonald.....*Printed for Sessional Papers only.*
- 116b.** Certified copy of a Report of a Committee of the Honorable the Privy Council, approved by His Excellency the Governor General in Council on the 19th April, 1885, for instructions

given to the three commissioners appointed to proceed to the North-West to enquire into and adjudicate upon the claims of the half-breeds and others in the Saskatchewan settlement. Presented to the Senate, 20th April, 1885.—*Hon. Mr. Alexander*—

Not printed. See 116.

- 116c.** Papers and correspondence in relation to claims for land in the Prince Albert district, North-West Territories. Presented to the House of Commons, 27th April, 1885.—*Mr. Blake*.
Not printed.
- 116d.** Return to an Order of the House of Commons, dated 7th March, 1883, for copies of all correspondence and memorials relating to the claims of the inhabitants of Prince Albert and the neighboring districts, in the North-West Territories, in respect of the lands they occupy, and to other matters affecting their condition. Presented to the House of Commons, 5th May, 1885.—*Mr. Blake*.....*Not printed.*
- 116e.** Papers and correspondence in connection with half-breed claims and other matters relating to the North-West Territories. Presented to the House of Commons, 11th June, 1885.—*Mr. Blake*.....*Printed for Sessional Papers only.*
- 116f.** Papers and correspondence in connection with half-breed claims and other matters relating to the North-West Territories. Presented to the House of Commons, 22nd June, 1885.—*Mr. Blake*.....*Printed for Sessional Papers only.*
- 116g.** Papers and correspondence in connection with half-breed claims and other matters relating to the North-West Territories. Presented to the House of Commons, 30th June, 1885.—*Mr. Blake*.....*Not printed.*
- 116h.** Copy of the Official Report from Major-General Middleton, C.B., commanding the North-West field forces, concerning the engagements at Fish Creek on the 24th April, 1885; Pound-maker's Camp (near Crees' Reserve), 2nd May, 1885; and Batoche, 9th, 10th, 11th and 12th May, 1885. Presented to the House of Commons, 6th July, 1885, by Hon. J. P. R. A. Caron—
Printed for Distribution only.
- 116i.** Plan and Views of Engagement at Fish Creek on the 24th April, 1885. Presented to the House of Commons, 16th July, 1885, by Hon. J. P. R. A. Caron.....*Not printed.*
- 117.** Return to an Order of the House of Commons, dated 12th March, 1885, for copies of all reports, correspondence, petitions, &c., in reference to the seizure of the schooner "Lion," of the Port of Barrington, in Nova Scotia, in December, 1883. Presented to the House of Commons, 31st March, 1885.—*Mr. Robertson (Shelburne)*.....*Not printed.*
- 118.** Return to an Order of the House of Commons, dated 12th March, 1885, for all correspondence with reference to the making of a road on the Indian Reserve at Fort William, Ontario, and the expenditure thereon of funds belonging to the Indians, and particularly with reference to the payments to be made to the licensees, for stumpage or otherwise, for the timber required in the construction of the bridges on the road. Presented to the House of Commons, 7th April, 1885.—*Mr. Blake*.....*Not printed.*
- 118a.** Return to an Address of the House of Commons, dated 27th April 1885, for copies of all correspondence and Orders in Council in any way bearing upon the subject of purchase or offers of purchase of Indian reserve lands in British Columbia, of a date subsequent to 1st June, 1882. Presented to the House of Commons, 30th June, 1885.—*Mr. Baker (Victoria)*—
Not printed.
- 119.** Return to an Order of the House of Commons, dated 23rd March, 1885, for a Return showing, if any, and, if so, what sum or sums of money have been paid to J. E. Collins for services rendered to the Government; also showing travelling and other expenses paid him, if any; and showing in what position or capacity he is employed. Presented to the House of Commons, 8th April, 1885.—*Mr. McMullen*.....*Not printed.*
- 120.** Return to an Order of the House of Commons, dated 23rd March, 1885, for copy of the record in the matter of Eugene Gosselin, of St. Charles de Bellechasse, *versus* the Queen, as it stands

- in the office of the Supreme Court of Canada, including the proceedings before the Exchequer Court and before Dominion Arbitrators. Presented to the House of Commons, 8th April, 1885.—*Mr. Amyot*.....*Not printed.*
- 121.** Return to an Address of the House of Commons, dated 12th March, 1885, for copies of petitions or correspondence in reference to making Ridgetown a port of entry. Presented to the House of Commons, 21st April, 1885.—*Mr. Casey*.....*Not printed.*
- 122.** Return to an Order of the House of Commons, dated 23rd March, 1885, for a Return of all sums (apart from his salary as county judge) which have been paid to G. M. K. Clarke in each of the years 1879, 1880, 1881, 1882, 1883 and 1884, respectively, and for what services in each year; also what sums, if any, have been paid him from the 1st January, 1884, to this date. Presented to the House of Commons, 13th April, 1885.—*Sir Richard Cartwright*—*Not printed.*
- 123.** Return to an Address of the House of Commons, dated 23rd March, 1885, for copies of all correspondence having reference to the appointment of a joint commission with the United States Government for surveying the boundary line between the Province of British Columbia and the United States Territory of Alaska. Presented to the House of Commons, 13th April, 1885.—*Mr. Gordon*.....*Not printed.*
- 123a.** Return to an Address of the House of Commons, dated 12th March, 1885, for copies of all correspondence with the Government of British Columbia and Imperial Government, in relation to the eastern boundary of that province. Presented to the House of Commons, 5th May, 1885.—*Mr. Mills*.....*Not printed.*
- 123b.** Return to an Address of the House of Commons, for copies of all Orders in Council, Imperial, Canadian or provincial, in the hands of the Government, and not already laid before Parliament, relating to the disputed boundaries of Ontario. Also all despatches and correspondence with any of the provinces and with the Imperial Government upon the same subject. Presented to the House of Commons, 23rd June, 1885.—*Mr. Mills*—*Printed for Sessional Papers only.*
- 124.** Return to an Order of the House of Commons, dated 4th February, 1885, for all Customs collections in Algoma during the six months ending 31st December, 1884, showing the amount collected at Port Arthur and its outports, and at Sault Ste. Marie and its outports, respectively; also the amount collected at Spanish River and such other stations in Algoma as report to Collingwood. Presented to the House of Commons, 13th April, 1885.—*Mr. Dawson*.....*Not printed.*
- 125.** Return to an Order of the House of Commons, dated 17th February, 1885, for all correspondence from 1st January, 1884, to 1st January, 1885, between W. H. Rogers, inspector of fisheries for Nova Scotia, also Mr. Sellon, overseer of river fisheries for Liverpool, Queen's county, Nova Scotia, also between John Millard, J. Newton Freeman, S. J. R. Bill and others, and the Government or Department of Marine and Fisheries, in reference to a breach of the "Sawdust Law," by putting mill rubbish and shingle shavings into the Mersey River; showing also what fines have been imposed and how many collected; if not collected, whether remitted. Presented to the House of Commons, 16th April, 1885.—*Mr. Forbes*.....*Not printed.*
- 125a.** Return to an Order of the House of Commons, dated 1st April, 1885, for copies of all correspondence and reports from W. H. Rogers, inspector of fisheries for Nova Scotia, to the Department of Marine and Fisheries, relating to the adoption of Rogers' patented fish ladder, and the places at which the said inspector recommends that it should be placed; also any instructions from the Department concerning the same. Also a statement of moneys claimed or paid, as a royalty or otherwise, on account of patent fishway, stating by whom and to whom such moneys were paid, together with an account of any other moneys paid by the Department, and to whom, towards the construction of Rogers' fish ladder, the Return to cover the years 1880, 1881, 1882, 1883 and 1884. Presented to the House of Commons, 30th June, 1885.—*Mr. Robertson (Shelburne)*.....*Not printed.*
- 126.** Return to an Order of the House of Commons, dated 9th February, 1885, for the names of all Government officials in the North-West Territories, the date of their appointment, and the

date upon which they entered upon their respective duties; the salary, fee or other allowance granted to each, including travelling or other expenses; the names and respective locations of sheriffs and registrars, the date of their respective appointments, and the date upon which they entered upon their duties, and the date from which their salary commenced to run; the receipts of their respective offices, monthly or annually, from their establishment up to the 1st of January, 1885. Presented to the House of Commons, 16th April, 1885.—*Mr. McMullen*.....*Not printed.*

127. Return (*in part*) to an Order of the House of Commons, dated 2nd March, 1885, for copies of all advertisements for tenders, of all specifications, and of all tenders received for fog horns and letter box fronts, from 1st January, 1884, to 31st January, 1885; also of all correspondence, contracts, accounts, receipts and documents relating to the furnishing of such fog horns and letter box fronts. Presented to the House of Commons, 16th April, 1885.—*Mr. Laurier*—

Printed for Distribution only.

127a. Supplementary Return to an Order of the House of Commons, dated 2nd March, 1885, for copies of all advertisements for tenders, of all specifications, and of all tenders received for fog horns and letter box fronts, from 1st January, 1884, to 31st January, 1885; also of all correspondence, contracts, accounts, receipts and documents relating to the furnishing of such fog horns and letter box fronts. Presented to the House of Commons, 22nd April, 1885.—*Mr. Laurier*.....*Not printed.*

127b. Return to an Order of the House of Commons, dated 2nd March, 1885, for copies of all correspondence between the Government and one Captain Conally, or any other person, in regard to placing a fog horn or fog whistle on what is called the Dummy Lighthouse, near the head of Lake Erie. Presented to the House of Commons, 5th May, 1885.—*Mr. Jackson*—

Not printed.

127, 1880. Return to an Address of the House of Commons, dated 23rd February, 1880, for a copy of any Order or Orders in Council approving of the treaties made with the Indian tribes at Forts Carlton and Pitt in the year 1870, and of all despatches from the Minister of the Interior or his Deputy to the Commissioners, or any of them, communicating the same to them, and having reference to the terms embodied in such treaties, together with the replies of the said Commissioners, or any of them, to such despatches. Presented to the House of Commons, 5th April, 1880.—*Mr. White (Cardwell)*.....*Printed for Distribution only.*

128. Return to an Order of the House of Commons, dated 17th January, 1885, for copies of all correspondence between the Government and the Captain of the Life Saving Service at Port Rowan, Province of Ontario, not already brought down. Presented to the House of Commons, 22nd April, 1885.—*Mr. Jackson*.....*Not printed.*

128, 1880. Return to an Address of the House of Commons, dated 23rd February, 1880, for copies of all despatches from the Lieutenant Governor of Manitoba, relating to the reserve promised under the provisions of Treaty No. 1, relating to the reserve stipulated thereby to be assigned to the band of Indians in Manitoba of whom Yellow Quill was Chief; and of all correspondence and despatches from the Secretary of State, the Minister of the Interior, or the Deputy Minister of the Interior, addressed to the said Lieutenant Governor in reply or in relation thereto; also correspondence between the Government of Canada and the Hudson Bay Company on the subject. Presented to the House of Commons, 5th April, 1880.—*Mr. White (Cardwell)*.....*Not printed.*

129. Return to an Order of the House of Commons, dated 3rd March, 1884, for a Return showing the names, rank, present positions occupied, length of service at sea, of each individual who has received a certificate of either competency or service under the Act passed last Session, making provision for the examination of masters and mates of coasters and inland waters, from the passage of said Act to the nearest possible date, for each and every province of the Dominion; as also a statement giving dates and names of applicants who have been refused certificates of service, or whose certificates have been for some reason withheld, and the reasons for such refusals or retentions. Presented to the House of Commons, 22nd April, 1885.—*Mr. Baker (Victoria)*.....*Not printed.*

- 130.** Return to an Address of the House of Commons, dated 17th February, 1885, for copies of all Orders in Council, despatches and correspondence between the Government of Canada and the United Kingdom, and between the Government of Canada and Her Majesty's Ambassador at Washington, not already brought down, relating to the subject of extradition and extradition arrangements. Presented to the House of Commons, 23rd April, 1885.—*Mr. Blake*—*Printed for Sessional Papers only.*
- 130a.** Return to an Address of the House of Commons, dated 9th February, 1885, for a statement with reference to the cases in which demands for extradition have been made by or upon the Government of Canada, or in which extradition proceedings have been taken in continuation of, and in the same form as, the statement transmitted by the Government of Canada to the Government of the United Kingdom, in or about the year 1876. Presented to the House of Commons, 5th May, 1885.—*Mr. Blake*.....*Printed for Sessional Papers only.*
- 131.** Return to an Address of the House of Commons, dated 20th February, 1885, for a copy of the Order in Council creating the Forestry Commission, and appointing Mr. J. H. Morgan as such commissioner; also a copy of the recommendation on which such Order in Council was based. Presented to the House of Commons, 23rd April, 1885.—*Mr. Rykert*.....*Not printed.*
- 131a.** Return to an Address of the House of Commons, dated 17th February, 1885, for a copy of Order in Council appointing J. H. Morgan as Forestry Commissioner; also copy of instructions accompanying the same; also date of report from the said J. H. Morgan which appears as part of the last report of the Minister of the Interior, and copies of any subsequent reports and the date on which the same were received by the Department; also statement of any payments made to the said J. H. Morgan subsequent to those appearing in the Public Accounts of 1884. Presented to the House of Commons, 26th May, 1885.—*Mr. Paterson (Brant)*—*Not printed.*
- 132.** Return to an Address of the Senate, dated 6th March, 1885, for a Return of all exports from ports on Hudson and James Bays, other than York Factory, of furs, fish, whale, seal or porpoise oil. Presented to the Senate, 20th April, 1885.—*Hon. Mr. Schultz*.....*Not printed.*
- 133.** Return to an Order of the House of Commons, dated 27th April, 1885, for a Return of all correspondence and petitions from mariners, vessel owners and others, not already brought down, relative to the selection of a route for the construction of the Murray Canal, or the character of the harbors afforded by Presqu'Isle and Weller's Bay respectively. Also all offers made by tenders or otherwise to construct said canal by any other than the adopted route, together with all reports as to progress of work of construction in possession of the Government. Presented to the House of Commons, 14th July, 1885.—*Mr. Cockburn*.....*Not printed.*
- 134.** Return to an Order of the House of Commons, dated 23rd March, 1885, for a Return of any orders or instructions of the Railway Department as to the sale of return tickets, limiting the periods in which such tickets can be used; also of any claims made by persons holding such tickets for damages for being ejected from the cars, and what amounts, if any, have been paid for such claims. Presented to the House of Commons, 5th May, 1885.—*Mr. Weldon*—*Not printed.*
- 135.** Return to an Order of the House of Commons, dated 12th February, 1885, for copies of all correspondence and petitions to the Postmaster General, or any member of the Government, with reference to the adoption in Canada of a system to encourage small savings, similar to that brought in by the late Mr. Fawcett in England. Presented to the House of Commons, 7th May, 1885.—*Mr. Blake*.....*Not printed.*
- 136.** Return to an Address presented by the Senate to His Excellency the Governor General, dated 17th March, 1885, praying His Excellency to cause to be laid before this House, copies of the reports of the various surveys made by engineers under the direction of the Government, for a line of railway connecting Montreal with the harbors of St. John and Halifax by the shortest and best practicable route (including the reports of Messrs. A. L. Light and Vernon Smith on the lines surveyed by them, respectively, running up the valley of the Etchemin River and from Canterbury, New Brunswick, to the northern end of Chesuncook Lake, in the

- State of Maine); together with a statement showing the height of the summit level, the maximum grade per mile, the number of miles with a grade exceeding 42 feet, the average grade per mile, and the number and position of the curves with a less radius than 1,910 feet, upon each of such surveyed lines, as well as upon any existing railway proposed to be used in connection with any such surveyed lines; and also a detailed statement of the distances from Montreal to St. John and Halifax by each of such surveyed lines and the existing railways proposed to be used in connection therewith. Presented to the Senate, 5th May, 1885.—*Hon. Mr. Power*.....*Printed for both Distribution and Sessional Papers.*
- 136a.** Return to an Address of the House of Commons, dated 3rd February, 1885, for copies of all Orders in Council, instructions given, reports of engineers, and all documents whatsoever, in relation to the selection of the shortest and best line for a railway between the present terminus of the Canadian Pacific Railway and one of the seaports of the Maritime Provinces. Presented to the House of Commons, 20th July, 1885.—*Mr. Landry (Montmagny)*.....*Not printed.*
- 137.** Return to an Address of the House of Commons, dated 17th February, 1885, for copies of all correspondence, Orders in Council, contracts, and other papers in connection with the projected railway between Oxford and New Glasgow, in Nova Scotia, or in relation to any of the companies or individuals negotiating for the construction of any part of the projected short line within the bounds of the Province of Nova Scotia, and particularly an instrument signed by Sir Charles Tupper, the Minister of Railways, about the 9th May, 1884, whereby he, as representing the Crown, entered into certain engagements with Norvin Green, president of the Montreal and European Short Line Company, or with that company; and of all Orders or arrangements cancelling the said agreement; and of the evidence as to the ability of the company on which said agreement was made; and of all Orders and authorities under which the Oxford Branch Railway was completed or money thereon expended out of the Intercolonial appropriation; and of all agreements in connection with such expenditure, and of all statements, representations and letters made by or on behalf of contractors, companies, railway companies, construction companies, laborers, merchants or others, who have been concerned in the work, and of all reports made to any department or to Council upon any of the above subjects. Presented to the House of Commons, 8th May, 1885.—*Mr. Blake*—
Printed for Sessional Papers only.
- 137a.** Supplementary Return to an Address of the House of Commons, dated 17th February, 1885, for copies of all correspondence, Orders in Council, contracts and other papers in connection with the projected railway between Oxford and New Glasgow, in Nova Scotia, or in relation to any of the companies or individuals negotiating for the construction of any part of the projected Short Line within the bounds of the Province of Nova Scotia; and particularly an instrument signed by Sir Charles Tupper, then Minister of Railways, about 9th May, 1884, whereby he, as representing the Crown, entered into certain engagements with Norvin Green, president of the Montreal and European Short Line Company, or with that company; and of all Orders or arrangements cancelling the said agreement, and of the evidence as to the ability of the company on which said agreement was made; and of all Orders and authorities under which the Oxford Branch Railway was completed, or money thereon expended out of the Intercolonial appropriation, and of all agreements in connection with such expenditure; and of all statements, representations and letters made by or on behalf of contractors, companies, railway companies, construction companies, laborers, merchants or others, who have been concerned in the work; and of all reports made to any department or to Council upon any of the above subjects. Presented to the House of Commons, 14th July, 1885.—*Mr. Mills*—
Not printed.
- 137b.** Return to an Address of the House of Commons, dated 11th February, 1885, for copies of all reports made by engineers employed by the Great American and European Short Line Railway Company in Nova Scotia and Cape Breton, with the plans, papers and correspondence connected therewith; also for copies of all correspondence with the Dominion Government and the Government of Nova Scotia on the same subject; also copies of all contracts by and between the said company and other persons; also a statement of all moneys paid out and expended on contracts for salaries, wages and labor; showing also the amounts, if any, still due and owing by the said company to their contractors, agents or workmen; and also a statement of the

- number of miles completed and graded in each of the counties of Cumberland, Colchester and Pictou. Presented to the House of Commons, 14th July, 1885.—*Mr. Paint*.....*Not printed.*
- 138.** Return to an Order of the House of Commons, dated 23rd March, 1885, for copies of all reports, correspondence, and surveys, if any, in the Department of Public Works, as to the improvement of the North Saskatchewan River, for the purpose of navigation. Presented to the House of Commons, 28th May, 1885.—*Mr. McCallum*—
Printed for both Distribution and Sessional Papers.
- 139.** Return to an Address of the House of Commons, dated 27th April, 1885, for all letters and correspondence had between the Dominion Government or any of its members and the Local Government of New Brunswick or any of its members, on the subject of the building of a foot and carriage bridge on the St. John River, at or near Fredericton. Presented to the House of Commons, 11th May, 1885.—*Mr. Landry (Kent)*.....*Printed for Distribution only.*
- 139a.** Supplementary Return to an Address of the House of Commons, dated 27th April, 1885, for all letters and correspondence had between the Dominion Government or any of its members and the Local Government of New Brunswick, or any of its members, on the subject of the building of a foot and carriage bridge on the St. John River, at or near Fredericton. Presented to the House of Commons, 9th June, 1885.—*Mr. Landry (Kent)*.....*Printed for Distribution only.*
- 140.** Reports of Messrs. Perley and Guerin as to works respecting which application has been made on the River Ottawa and Lake Temiscaming; together with the memorandum of the Reverend Father Paradis, O.M.I. Presented to the House of Commons, 11th May, 1885, by Sir Hector Langevin.....*Printed for Distribution only.*
- 141.** Return to an Order of the House of Commons, dated 28th March, 1884, showing the total cost of old and new works, with expenditure for repairs and maintenance in each year since Confederation: 1. For cost of Welland Canal. 2. For new works, repairs, and all incidental expenses connected therewith. 3. For maintenance. 4. For revenue derived therefrom. 5. For return similar to that contained in 1, 2, 3 and 4, connected with the St. Lawrence Canals. 6. For estimated cost for deepening and completing the St. Lawrence Canals to a depth of twelve and fourteen feet, separately. Presented to the House of Commons, 16th May, 1885.—*Mr. McCraney*.....*Not printed.*
- 142.** Return to an Order of the House of Commons, dated 27th April, 1885, for a Return of instructions to the health officers of the ports in the Province of New Brunswick, and quarantine regulations issued by the Department of Marine and Fisheries or the Department of Agriculture relating to these ports. Presented to the House of Commons, 16th May, 1885.—*Mr. Weldon*.....*Not printed.*
- 143.** Return to an Order of the House of Commons, dated 27th April, 1885, for a Return showing the actual cost of laying the telegraph cable from Clover Point, Victoria, British Columbia, across the Straits of Juan de Fuca to a point at or near Dungeness, W.T.; said return to give the names of persons to whom sums have been paid; the nature and extent of services rendered, entitling them to such payments; the cost of the cable, time occupied in laying said cable, and its length. Presented to the House of Commons, 18th May, 1885.—*Mr. Baker (Victoria)*.....*Not printed.*
- 144.** Return to an Address of the House of Commons, dated 9th March, 1885, for: 1. Copies of all demands and claims made by the town of Emerson on the Government for financial or other aid, and all correspondence respecting the same. 2. Copies of all Orders in Council or departmental orders respecting such demands or claim, and the action or decision of the Government thereon. Presented to the House of Commons, 18th May, 1885.—*Mr. Cameron (Huron)*.....*Not printed.*
- 145.** Return to an Order of the House of Commons, dated 17th February, 1885, for a statement showing the names of all persons employed by the Department of Public Works or other department of the Government as inspectors or clerks of works on any building or other public work since 1873-74 until 1883-84 inclusive, with statement showing the amount paid to

such persons for services as such officials, and the rate per month or per diem to each; also the gross amount expended by the Government in each year on such works under the inspection of each clerk of works; also a statement showing the actual profession or calling of each such clerk of works. Presented to the House of Commons, 26th May, 1885.—*Sir Richard Cartwright*—*Not printed.*

- 146.** Return to an Address of the House of Commons, dated 27th April, 1885, for all the correspondence, papers and report of the officers of Customs at the port of Halifax and any other port, in connection with the entry by A. & W. Mackinlay, as agents of Thomas Nelson & Son, of school books at an undervaluation. Presented to the House of Commons, 26th May, 1885.—*Mr. Rykert*.....*Not printed.*
- 146a.** Return to an Address of the House of Commons, dated 27th April, 1885, for all papers, correspondence and reports with reference to Nelson & Son's consignment of school books to the late firm of James Campbell & Sons, Toronto. Presented to the House of Commons, 26th May, 1885.—*Mr. Wallace (York)*.....*Not printed.*
- 146b.** Return to an Address of the House of Commons, dated 27th April, 1885, for all the correspondence, papers and report of the officer of Customs for the port of Toronto, in connection with the seizure of school books entered at an undervaluation by Thomas Nelson & Son, Edinburgh. Presented to the House of Commons, 26th May, 1885.—*Mr. Rykert*....*Not printed.*
- 146c.** Supplementary Return to an Address of the House of Commons, dated 27th April, 1885, for a Return of all papers, correspondence and reports with reference to Nelson & Son's consignments of school books to the late firm of James Campbell & Sons, Toronto. Presented to the House of Commons, 26th June, 1885.—*Mr. Wallace (York)*.....*Not printed.*
- 146d.** Supplementary Return to an Address of the House of Commons, dated 27th April, 1885, for a Return of all the correspondence, papers and report of the officer of Customs at the port of Halifax, and any other port, in connection with the entry by A. & W. Mackinlay, as agents of Thos. Nelson & Son, of school books at an undervaluation. Presented to the House of Commons, 26th June, 1885.—*Mr. Rykert*.....*Not printed.*
- 146e.** Supplementary Return to an Address of the House of Commons, dated 27th April, 1885, for a Return of all the correspondence, papers and report of the officer of Customs at the port of Toronto, in connection with the seizure of school books entered at an undervaluation by Thos. Nelson & Son, of Edinburgh. Presented to the House of Commons, 26th June, 1885.—*Mr. Rykert*.....*Not printed.*
- 147.** Return to an Order of the House of Commons, dated 27th April, 1885, for a Return showing:
1. The detailed amounts actually due to the Supervisor of Cullers at Quebec for culling and measuring. 2. The names of all parties indebted, and the date of incurring of each liability. Presented to the House of Commons, 28th May, 1885.—*Mr. De St. Georges*.....*Not printed.*
- 148.** Return to an Address of the House of Commons, dated 12th March, 1885, for copies of all Orders in Council, agreements and correspondence in the possession of the Government since 1872, respecting the Windsor Branch Railway; also copies of pleadings and verdicts in the various suits at law respecting the same branch. Presented to the House of Commons, 9th June, 1885.—*Mr. Kinney*.....*Not printed.*
- 149.** Return to an Order of the House of Commons, dated 9th March, 1885, for all correspondence between the Auditor-General and the Department of Marine and Fisheries, relating to an Order of this House made on the 28th March last, for a return showing all sums received by the Department of Marine and Fisheries on account of rental of rivers and streams, &c.; or in any way relating to any irregularity or inaccuracy connected with matters of the said Department. Presented to the House of Commons, 28th May, 1885.—*Mr. McMullen*—*Not printed.*
- 150.** Return to an Address of the House of Commons, dated 8th April, 1885, for all papers concerning the appointment, instruction and salary of Mr. Hector Fabre, as Canadian agent at Paris, France, and the reports from that gentleman to the Government since his appointment. Presented to the House of Commons, 2nd June, 1885.—*Mr. Bergeron*—

Printed for Distribution only,

- 151.** Return to an Address of the House of Commons, dated 12th March, 1885, for copies of all correspondence which has taken place between the Dominion Government and the Local Government of New Brunswick, with reference to the Northern and Western Railway, since May, 1884, up to February, 1885. Presented to the House of Commons, 11th June, 1885.—*Mr. Temple*.....*Not printed.*
- 152.** Return to an Address of the Senate, dated 20th April, 1885, for copies of all memorials, letters or telegrams addressed to the Railway Department, respecting the establishment of the York station on the Prince Edward Island Railway, and the answers thereto; also copies of any memorials, letters or telegrams, which may have been received by that Department, having reference to the abolition of the said station, and the replies, if any, made thereto. Presented to the Senate, 16th June, 1885.—*Hon. Mr. Haythorne*.....*Not printed.*
- 153.** Return to an Order of the House of Commons, dated 11th March, 1885, for a Return showing the amount of money paid for injuries to parties in the Mounted Police since 1878, specifying the names of the parties injured, the nature of the injuries, the amount of money paid, and to whom paid. Presented to the House of Commons, 7th April, 1885.—*Mr. Somerville (Brant)*—*Not printed.*
- 153a.** Annual Report of the Commissioner of the North-West Mounted Police Force for the year 1884. Presented to the House of Commons, 23rd June, 1885.—*Sir John A. Macdonald*—*Printed for both Distribution and Sessional Papers.*
- 154.** Return (*in two parts*) to an Order of the House of Commons, dated 12th March, 1885, for a return showing:—1. Total number of depositors in the Savings Banks, Post Office, or other banks holding deposits of \$1,000 or upwards; also the amount so held. 2. Total number of depositors having deposits of less than \$1,000 and more than \$500 each; also the total amount so held. 3. Total number of said depositors holding less than \$500 each; also total amount so held. Presented to the House of Commons, 30th June, 1885.—*Sir Richard Cartwright and Mr. Fairbank*.....*Not printed.*
- 155.** Return to an Order of the House of Commons, dated 27th April, 1885, for copies of all correspondence and papers relative to the dismissal of George E. Cherrier from the Indian Agency in Caughnawaga; also of the reports of the investigation into the affairs of the agency held by Mr. de Boucherville in 1883, and by A. Dingman in 1884, with copies of all instructions at any time given by the Department to Mr. Cherrier. Presented to the House of Commons, 30th June, 1885.—*Mr. Bain (Wentworth)*.....*Not printed.*
- 156.** Return to an Order of the House of Commons, dated 12th March, 1885, for a Return of all hardware purchased at Halifax by the Department of Marine and Fisheries, from 1st July, 1878, to 31st December, 1884; the names of the firms who furnished the supplies, amount supplied by each firm in each year; the names of the firms who supplied stoves, galvanized and tinware, in each year from 1st October, 1878, to 31st December, 1884, showing if by tender, whose tender was accepted, and if tenders asked for each year. Presented to the House of Commons, 30th June, 1885.—*Mr. Forbes*.....*Not printed.*
- 157.** Return to an Order of the House of Commons, dated 11th March, 1885, for a Return showing the number of days W. Ingles Bradley, a clerk in the Department of Railways, has been registered on the Departmental Attendance Book since 1st July, 1884; also showing the number of days' attendance for which he has received payment, and the total amount paid, together with the name of the departmental officer certifying the account. Presented to the House of Commons, 14th July, 1885.—*Mr. Somerville (Brant)*.....*Not printed.*
- 158.** Return to an Order of the House of Commons, dated 27th April, 1885, for copies of all correspondence of a recent date between the Superintendent General of Indian Affairs and the agent of the Department in British Columbia, or any other person, upon the subject of establishing Indian schools in said province. Presented to the House of Commons, 14th July, 1885.—*Mr. Baker (Victoria)*.....*Printed for Sessional Papers only.*

- 158a.** Return to an Order of the House of Commons, dated 27th April, 1885, for a Return showing :
 1. How many industrial schools for the instruction of Indian half-breed youth have been established in the Province of Manitoba and the North-West Territories respectively, under the authority and by permission of the Government of Canada, and where they are located. 2. At what places lands have been surveyed and set apart for Indian half-breed schools in 1884, and what quantity at each place. 3. Through whose representations and recommendations these half-breed schools are established from time to time, and whether any request from the Indian half-breeds themselves is required for the establishment of a school. 4. What subjects of instruction are provided for these schools in regard to industrial pursuits, moral and religious, and are both sexes included in the general school provisions. 5. Whether any of the Indian half-breed schools are placed under the care or supervision of any religious body or denomination ; if so, what are the conditions upon which such control is granted, and what is the extent of the denominational control, and is it, to the extent granted, a temporary or permanent control ; if there are denominational schools, what is the number belonging to each denomination, where they are located, and what quantity of land is owned or controlled by each, and what is the number of pupils. 6. Whether, when the moral and religious instruction of an Indian half-breed school is placed under the supervision or control of any denomination, it gives to the denomination control of the land and buildings of such school. 7. At whose cost the Indian half-breed school buildings are erected and furnished, and under whose directions the text books are selected or compiled, and by whom they are paid for. 8. What standing of attainment is required of teachers in these schools ; how and from whom they receive certificates of qualification, and whether there is a system of Governmental inspection of these Indian half-breed schools. 9. Whether the teachers and trustees or managers of these schools are required to make any periodical returns to the Government of the attendance, general condition, progress and expenditure of each. 10. Whether any of the religious denominations have obtained lands for church or school purposes from the Government or from any Indian reservation by treaty or otherwise. 11. Whether any of the religious bodies, on their own responsibility, have established schools among the Indians or half-breeds, and if they have, whether they receive any assistance directly or indirectly by land grants or otherwise for the support of such schools from the Government. Presented to the House of Commons, 18th July, 1885.—*Mr. Kirk* *Not printed.*
- 159.** Return to an Address of the House of Commons, dated 12th February, 1885, for copies of all correspondence, petitions and Orders in Council, relating to any applications by or on behalf of any railway company elsewhere than in Manitoba or the North-West, for aid or additional aid. Presented to the House of Commons, 14th July, 1885.—*Mr. Blake*..... *Not printed.*
- 160.** Return to an Address of the House of Commons, dated 2nd March, 1885, for : 1. Copies of all correspondence between the Government and the North-West Council respecting the representation of the Territories in this Parliament. 2. Copies of all petitions, representations and correspondence addressed to the Government, or any member of it, on the same subject, and any replies thereto. 3. Copies of all petitions, representations and correspondence with the Government, or any member of it, on the subject of the establishment of Local Governments in the Territories, and of all replies thereto. Presented to the House of Commons, 15th July, 1885.—*Mr. Cameron (Huron)*..... *Not printed.*
- 161.** Return to an Address of the House of Commons, dated 23rd March, 1885, for a Return of all correspondence, papers and documents which have passed between the Imperial Government and the Dominion Government or the Dominion Government and the Government of British Columbia, relative to the public reserves of British Columbia and to the claim of the Crown to the land between high and low water mark, and generally all information as to "fore shore" rights of the Dominion. Presented to the House of Commons, 15th July, 1885.—*Mr. Baker (Victoria)*..... *Printed for Sessional Papers only.*

CANADA.

ANNUAL REPORT

OF THE

MINISTER OF PUBLIC WORKS

FOR THE

FISCAL YEAR 1883-84

ON THE WORKS UNDER HIS CONTROL.

SUBMITTED IN ACCORDANCE WITH THE PROVISIONS OF THE ACT THIRTY-FIRST VICTORIA, CHAPTER TWELVE, SECTION NINETEEN, AS AMENDED BY THE ACT FORTY-SECOND VICTORIA, CHAPTER SEVEN.

Printed by Order of Parliament.



OTTAWA:
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1884.

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CANADA.
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REPORT
OF THE
MINISTER OF PUBLIC WORKS
FOR THE
FISCAL YEAR ENDED 30TH JUNE, 1884.

To His Excellency the Most Honourable Henry Charles Keith Petty-Fitzmaurice, Marquis of Landsdowne, in the County of Somerset, Earl of Wycombe, of Chipping Wycombe, in the County of Bucks, Viscount Caln and Calstone in the County of Wilts, and Lord Wycombe, Baron of Chipping Wycombe, in the County of Bucks, in the Peerage of Great Britain; Earl of Kerry and Earl of Shelburne, Viscount Clanmaurice and Fitzmaurice, Baron of Kerry, Lixnaw and Dunkerron, in the Peerage of Ireland; Governor General of Canada, and Vice Admiral of the same, &c.;

MAY IT PLEASE YOUR EXCELLENCY:

In compliance with the requirements of the Act 31 Victoria, Chapter 12, assented to on 21st December, 1867, I have the honour to submit the Annual Report of the Department of Public Works, for the fiscal year ended 30th June, 1884.

The report contains an abstract of the general expenditure, showing the total amount appropriated by Parliament, and available from other sources, for expenditure on Public Works throughout the Dominion during the past fiscal year, together with a description of the works executed; and is accompanied by thirty appendices giving the Annual Reports of the Chief Engineer, Chief Architect, and other officers of the Department, together with a number of tables and other statements containing information pertaining to this Department.

The works under the control of this Department are:—

PUBLIC BUILDINGS, their construction and maintenance.

HARBOURS AND PIERS, their improvement and construction.

WORKS ON NAVIGABLE RIVERS.

DREDGING AND DREDGE VESSELS.

ROADS AND BRIDGES.

SLIDES AND BOOMS.

TELEGRAPHS.

GENERAL EXPENDITURE.

By the Act 46 Victoria, Chapter 2, assented to on 25th May, 1883, the sum of \$3,548,000.85 was appropriated for expenditure on Public Works, during the fiscal year ending 30th June, 1884; and by the Act 47 Victoria, Chapter 2, assented to on the 19th April, 1884, the further sum of \$399,180.30 was granted for the same purpose. In addition to these amounts, the sum of \$646,085.76, unexpended balance of appropriations for 1882-83, was carried forward; \$26,000.00 were, by Order in Coun-

cil, dated 1st April, 1884, transferred from the Department of Indian Affairs to that of Public Works, and \$85,702.27 were contributed by Provincial Governments, Municipalities and other Corporations, towards the construction of works, partly of a provincial or local character. The total amount, therefore, available from all sources, was \$4,704,969.18, of which the sum of \$3,179,950.78 was expended during the fiscal year, \$249,240.41 lapsed on 30th September, 1883, and the balance remained unexpended on 30th June, 1884. The following table shows the total amount available for each service, amount lapsed and the amount expended :—

	Total Amount Available.	Lapsed on 30th September, 1883.	Expended in Fiscal Year 1883-84.
Public buildings.....	\$2,680,747 59	131,575 02	\$1,682,068 93
Harbours and rivers.	1,305,320 26	75,256 88	923,852 84
Dredges and dredging	274,397 78	6,389 09	252,112 57
Slides and booms.....	151,824 42	20,102 92	112,189 25
Roads and bridges....	38,476 72	4,000 00	33,985 79
Telegraph lines.....	179,775 00	9,031 04	127,364 21
Miscellaneous	74,427 41	2,885 46	43,367 19
	<u>\$4,704,969 18</u>	<u>249,240 41</u>	<u>\$3,179,950 78</u>

In addition to this expenditure the following amounts have been paid under the authority of Special Acts of Parliament for works not performed under the immediate supervision of this Department :—

Ship Channel between Quebec and Montreal.....	\$110,000 00
Quebec Harbour Improvement.....	200,529 00
Lévis Graving Dock.....	137,000 00
Esquimalt Graving Dock.....	394,288 26
Total.....	<u>\$841,817 26</u>

Below will be found details with reference to expenditure on Public Buildings, Harbours and Rivers, &c.

PUBLIC BUILDINGS.

The amount granted by the Act 46, Victoria, Chapter 2, for the construction, repairs and maintenance of Public Buildings was \$2,021,600.85, and by the Act 47 Victoria, Chapter 2, the further sum of \$274,685.00 was voted for the same purpose.

In addition to these sums, there was carried forward the unexpended balance of appropriation for 1882-83, \$328,461.74; the sum of \$26,000.00 was transferred from the Department of Indian Affairs, and \$30,000.00 were contributed by the Provincial Government of Quebec and the City of Quebec (\$15,000.00 each) towards the erection of the Quebec Drill Hall. The total amount, therefore, available for Public Buildings during the fiscal year was \$2,680,747.59. Of this the sum of \$1,682,068.93 was spent, \$131,575.02 lapsed on 30th September, 1883, and the balance remained unexpended on 30th June, 1884. By the Act 47 Vic., chap. 17, assented to on the 19th April, 1884, the control, management, maintenance and repairs of military works and buildings, is transferred from the Department of Public Works to that of Militia and Defence, from 1st July, 1884. The following table gives the total amount available, amount lapsed and the amount spent, by Provinces; and below will be found details of expenditure with description of buildings, &c. :—

	Total Amount Available.	Lapsed on 30th September, 1883.	Expended in Fiscal Year, '83-84.
Nova Scotia.....	\$131,863 38	\$9,230 60	\$35,394 10
Prince Edward Island...	25,839 14	5,609 62	7,361 89
New Brunswick.....	204,910 14	23,672 07	124,191 71
Quebec.....	554,095 76	23,651 22	340,571 31
Ontario.....	1,153,964 40	47,222 12	797,957 74
Manitoba.....	336,315 20	17,267 71	242,285 23
North-West Territory...	120,832 86	1,338 45	43,622 37
British Columbia.....	95,926 71	3,583 23	36,744 73
Public Buildings Generally	15,000 00	.....	11,940 52
England.....	42,000 00	.....	41,999 33
	<u>\$2,680,747 59</u>	<u>\$131,575 02</u>	<u>\$1,682,068 93</u>

PROVINCE OF NOVA SCOTIA.

AMHERST.

PUBLIC BUILDING.

At the Session of 1883 the sum of \$10,000.00 was voted towards the erection of a Public Building, to accommodate the Postal, Customs and Inland Revenue services. A site was granted by the town, on what is known as the Court House lot, and plans were prepared by this Department; but tenders had not been called for at the close of the fiscal year. Since then, however, a contract has been entered into with

Messrs. Rhodes, Curry & Co., for the erection of the building, and work was being proceeded with this fall. Expenditure, \$34,52.

ANTIGONISH.

PUBLIC BUILDING.

At the Session of 1883 the further sum of \$3,500.00 was voted towards altering the building mentioned in last year's report as having been purchased, so as to accommodate the Customs, Postal and other services; and during the year the alterations have been made and the building occupied. Expenditure, \$3,279.53. Total expenditure, \$5,351.87.

ARICHAT.

PUBLIC BUILDING.

At the Session of 1883 the sum of \$1,200.00 was voted for the purchase of a site on which to erect a building to accommodate the Postal, Customs and other services. On 27th August, 1883, a site, bounded by Lower Water street, Maria street, the harbour and the lands of Mrs. E. E. Birch, was purchased from Mrs. S. Ballam for the sum of \$1,000.00; and at the close of the fiscal year plans were being prepared by this Department. Expenditure, \$1,074.45.

BADDECK.

PUBLIC BUILDING.

At the Session of 1883, the sum of \$8,000.00 was voted towards the erection of a Public Building to accommodate the Postal and other offices; but up to the close of the fiscal year a site had not been selected, and no expenditure had taken place.

HALIFAX.

DOMINION BUILDING.

During the fiscal year, the sum of \$2,231.64 was expended for necessary repairs. Total expenditure on this building, \$86,363.37 for construction, and \$58,917.86 for repairs.

DRILL SHED.

During the fiscal year the sum of \$1,451.22 was expended in making necessary repairs. Total expenditure on this building \$3,969.10.

 PENITENTIARY.

At the Session of 1883 the sum of \$1,400.00 was voted for the purpose of repairing the wharf, fence and outbuildings; but only a small portion of the work had been done up to the close of the fiscal year. Expenditure \$105.95. Total expenditure on this building, \$2,267.50.

QUARANTINE STATION.

At the Session of 1883 the sum of \$5,000.00 was voted for the establishment of a cattle quarantine at Halifax; but up to the close of the fiscal year a suitable site had not been secured, and no expenditure had taken place.

 LUNENBURG.

 MARINE HOSPITAL.

During the fiscal year the sum of \$170.00 was expended on necessary repairs. Total expenditure on this building, \$6,502.25 for construction, and \$286.00 for repairs.

 NEW GLASGOW.

 PUBLIC BUILDING.

At the Session of 1883 the sum of \$12,000.00 was voted towards the erection of a building at this place, on the site mentioned in last year's report as having been purchased for that purpose. Plans were prepared by this Department, and approved by the different Departments which will occupy the building; and, on the 23rd June, 1884, a contract was entered into with Mr. James Strachan for erecting the building, for the sum of \$29,175.00. The building will be situated at the corner of Dalhousie and Provost streets, from both of which there will be entrances to the Post Office, and an entrance to the Custom House from Provost street. The main building will be 47 by 61 feet, comprising basement, two stories and attic; with an annex 25 by 22 feet, one story high. The external walls are to be of stone; the partitions partly wood and partly brick. The floors and roof to be of wood, the latter covered with galvanized iron. A fuller description of the building will be found in Appendix No. 2, page 22. Expenditure, \$125.15. Total expenditure on this building, \$4,893.15.

 NORTH SYDNEY.

 PUBLIC BUILDING.

At the Session of 1883 the sum of \$5,000.00 was voted towards the erection of a Public Building at this place, to be used as a Post Office, Custom House, &c.; but up

to the close of the fiscal year a site had not been selected, and only an expenditure of \$50.50 made.

PICTOU.

CUSTOM HOUSE.

During the year the sum of \$638.46 was expended on necessary repairs. Total expenditure on this building, \$25,060.05 for construction, and \$2,982.23 for repairs.

MARINE HOSPITAL.

At the Session of 1883 the further sum of \$4,700.00 was voted to continue the construction of this building, a full description of which will be found in the Annual Report for 1881-82; which sum, added to \$2,960.17, carried forward from 1882-83, made a total of \$7,660.17 available for this purpose. During the year the building has been completed and occupied. Expenditure \$6,952.51. Total expenditure on this building, \$11,668.23, including \$21.25 for minor repairs.

SYDNEY.

QUARANTINE STATION.

At the Session of 1883 the further sum of \$2,000.00 was voted to continue the construction of these buildings, a full description of which appeared in last year's report; and during the year they have been completed and occupied. Expenditure, \$4,367.00. Total expenditure on these buildings, \$4,829.75.

TRURO.

PUBLIC BUILDING.

At the Session of 1883 the further sum of \$21,000.00 was voted towards the construction of a Public Building to accommodate the Post Office, Custom House, &c., on the site at the corner of Lorne and Prince streets, mentioned in last year's report as having been purchased. On 12th September, 1883, a contract was entered into with Messrs. Townsend & McKay, for the erection of the building for \$21,000.00; and the work has been carried on so that the building was covered in this autumn, and tenders for heating apparatus have been called for. The main building, is 56 by 41 feet, basement, two stories and attic, with an annex 42 by 22 feet, one story high. The buildings are on stone foundations, the exterior walls of red brick, with grey sandstone dressings, and partitions, floors, stairways and roofs of wood. The roofs

will be covered with slate and galvanized iron. The main features of the elevation on Princess street are the centre, comprising groups of windows in a recessed arch, surmounted by a lofty gable, and the bold entrance to the Post Office and Custom House in the angles; the red brick facing, relieved by the grey sandstone dressings and string courses, presenting a pleasing and harmonious appearance. For further description of this building see Appendix No. 2, page 22. Expenditure, \$3,494.13. Total expenditure on this building, \$7,512.13.

WINDSOR.

PUBLIC BUILDING.

At the Session of 1883 the sum of \$10,000.00 was voted towards the construction of a building to be used as Post Office, Custom House, &c., on the site on Gerrish street, mentioned in last year's report as having been purchased. On the 15th October, 1883, a contract for the erection of the building was entered into with Mr. J. Macintosh for the sum of \$19,800.00, and the work has been carried on in such a manner that the building has been covered in, and tenders for heating apparatus have been called for. The main building is 51 by 41 feet, comprising basement, two stories and attic, with an annex 25 by 30 feet, and one story high, which will be used as an Examining Warehouse and for Weights and Measures. The ground floor will be used as the Post Office, the first floor for Customs and Inland Revenue offices, and the attic will be occupied by the caretaker. The foundation and basement walls are of rubble stone; the exterior walls of brick, with cut grey sandstone dressings; the partitions, floors and roofs of wood, the latter covered with slates and galvanized iron. The features of the elevation on the main street are the entrance doorways and the windows, in groups of three, to light the Post Office on the ground floor, and Customs on first floor. These windows are in a recess, which is arched over on attic floor and surmounted by a lofty gable, all treated with simplicity in the mouldings, the whole forming an imposing elevation. For full description of this building see Appendix No. 2, page 23. Expenditure during fiscal year, \$1,727.64. Total expenditure on this building to 30th June, \$4,301.09.

YARMOUTH.

PUBLIC BUILDING.

At the Session of 1883 the sum of \$15,000.00 was voted towards the construction of a Public Building to accommodate the Postal, Customs and Inland Revenue offices; and, on 27th June, 1884, a site having a frontage of 42 feet 6 inches on Main street, by a depth of 140 feet 4 inches on John street, was purchased from Mr. Joseph Bingay for the sum of \$6,000.00. At the close of the fiscal year plans for the building were being prepared. Expenditure \$6,000.00.

 PROVINCE OF PRINCE EDWARD ISLAND.

 CHARLOTTETOWN.

DOMINION BUILDING.

This building, which was erected by the Local Government of Prince Edward Island and transferred to the Dominion on the entrance of the Province into Confederation, on payment of \$69,000.00, was destroyed by fire on the night of the 20th February, 1884. Instructions have been given to have the necessary drawings prepared for another building to occupy the same site; and it is expected that tenders will shortly be invited by advertisement. Expenditure during fiscal year, \$3,117.05. Total expenditure on this building, \$69,000.00 on construction, and \$23,478.98 for repairs.

 MONTAGUE.

PUBLIC BUILDING.

At the Session of 1883 the sum of \$5,000.00 was voted towards the erection of a Public Building to accommodate the Postal, Customs and other offices; but up to the close of the fiscal year a site had not been obtained, and no expenditure had taken place.

 SUMMERSIDE.

PUBLIC BUILDING.

At the Session of 1883 the sum of \$9,000.00 was voted towards the erection of a Public Building for the accommodation of the Postal, Customs and other offices, on the site mentioned in last year's report as having been purchased at the corner of Fitzroy and Tanner streets. On the 16th October, 1883, a contract was entered into with Mr. Pierce Doyle for the erection of the building, for the sum of \$21,125.00 and such progress has been made that it is expected the building will be roofed in before the end of the year. The foundation and basement walls are of rubble stone, the exterior walls above ground of red brick with cut grey sandstone dressings, and the floors and roofs of wood, the latter covered with slates and galvanized iron. The main building, 68 by 39 feet, comprises basement, two stories and attic, to accommodate the Post Office on the ground floor, the Customs and Inland Revenue on the first floor, and the caretaker in the attic. Attached is a building 30 by 24 feet, comprising basement and ground floor, which will be occupied by the Gas Inspector, Weights and Measures, and as an Examining Warehouse, and the basement as fuel, furnace and storerooms. Expenditure during fiscal year, \$2,053.03. Total expenditure on this building, \$2,871.00.

 PROVINCE OF NEW BRUNSWICK.

 BATHURST.

PUBLIC BUILDING.

At the Session of 1883 the sum of \$10,000.00 was voted towards the erection of a Public Building to accommodate the Postal, Customs and other offices. Plans were being prepared at the close of the fiscal year, since which time a contract has been entered into with Mr. John Black for the erection of the building. Expenditure, \$1,070.95.

 CARLETON (ST. JOHN).

POST OFFICE.

At the Session of 1883 the further of \$10,000.00 was granted for the completion of this building, which was fully described in last year's report; and during the year the work has been finished. The plan of the building was changed so as to admit of a clock turret being placed on the main roof, which adds to the appearance of the building. Expenditure during the fiscal year, \$9,728.91. Total expenditure on this building, \$10,725.34.

 CHATHAM.

PUBLIC BUILDING.

The repairs to this building, which were mentioned in last report as being in progress, have been completed. Expenditure, \$733.07. Total expenditure on this building, \$18,554.40, including \$4,772.63 for repairs.

 DORCHESTER.

PENITENTIARY.

At the Session of 1883 the further sum of \$30,000.00 was voted to continue the new cell-wing referred to in last year's report as being under contract with Mr. D. A. Duffy, which sum, added to \$8,881.50 unexpended from appropriation of 1882-83, made a total of \$38,881.50 available for the purpose. Work on the new cell-wing and new boiler-house chimney was carried on steadily during the year; but, owing to necessary demolition and rebuilding at the commencement, the cell-wing could not be roofed in this fall. The boiler-house was completed and furnished with three new

boilers, which have a sufficient capacity to heat the existing building as well as the new cell-wing. The new tank and tank-house, referred to in last year's report, are completed. The machinery lately in use at the St. John Penitentiary has been removed to Dorchester, and, where suitable, is being set up in the workshop building. Expenditure during fiscal year, \$34,381.27 for construction and \$100.00 for repairs. Total expenditure on these buildings, \$379,459.50 for construction, and \$120.00 for repairs.

FREDERICTON.

MILITARY SCHOOL.

At the Session of 1884, the sum of \$8,100.00 was included in the vote of \$44,000.00 for Military Schools, for the purpose of fitting up the barracks at Fredericton for use as a School of Infantry Instruction; and during the fiscal year extensive alterations and repairs have been made. Expenditure, \$12,783.93.

POST OFFICE.

Some trifling repairs were made to this building during the year. Expenditure, \$50.21. Total expenditure on this building, \$30,521.57 for construction, and \$421.14 for repairs.

MIDDLE ISLAND.

QUARANTINE STATION.

During the fiscal year the sum of \$112.85 was expended on repairs. Total expenditure on these buildings, \$4,286.55.

MONCTON.

PUBLIC BUILDING:

At the Session of 1883 the sum of \$15,000.00 was voted towards the erection of a Public Building to accommodate the Postal, Customs and other offices, on the site at the corner of Main and Telegraph streets, mentioned in last year's report as having been purchased. On the 29th August, 1883, a contract for the building was entered into with Mr. Geo. J. O'Doherty, for the sum of \$21,480.00; and during the year the work has been proceeded with. The building will be of red brick, with grey sandstone dressings, on a stone foundation, having a main portion 52 by 43 feet, comprising basement, two stories and attic, and a one-story annex, 85 by 18 feet. The

main building will accommodate the Post Office on the ground floor, the Customs and Inland Revenue on the first floor, the caretaker on the attic floor, and the heating apparatus and fuel in the basement. The annex will be used for Examining Warehouse, Weights and Measures, &c. The main features of the design are the three bold entrances on Main street, the central gable on Main street, and the clock tower on the street corner, the last mentioned being carried up two stages higher than the main building. Expenditure during fiscal year, \$4,331.59. Total expenditure on this building, \$9,142.69.

NEWCASTLE.

CUSTOM HOUSE.

During the fiscal year some trifling repairs were made. Expenditure, \$4.75. Total expenditure on this building, \$4,830.00 for construction, and \$548.95 for repairs.

PUBLIC BUILDING.

At the Session of 1883 the sum of \$10,000.00 was voted towards the construction of a Public Building to accommodate the Postal and other services. On the 12th October, 1883, two lots of land fronting on Water street were purchased from the Bank of Montreal for \$3,000.00. Tenders were called for and a contract for the erection of the building entered into shortly after the close of the fiscal year. Expenditure, \$3,200.13.

PORTLAND.

POST OFFICE.

At the Session of 1883 the sum of \$9,000.00 was voted for the acquisition of the building formerly used as a Post Office; and on 20th November, 1883, the property was purchased from the Williams estate, for the sum of \$9,000.00. The building is of brick, on a stone foundation, and comprises three stories, basement and attic. The floors and roof are of wood. Expenditure, \$9,102.80.

ST. JOHN.

CUSTOM HOUSE.

At the Session of 1883 the sum of \$700.00 was voted for alterations to stairway and other improvements to this building, and during the year the work has been executed. Expenditure during fiscal year, \$2,790.45 for construction, and \$150.68

for repairs. Total expenditure on this building, \$321,273.99 for construction, and \$1,991.58 for repairs.

DRILL SHED.

During the fiscal year necessary repairs were made to this building, at a cost of \$641.15.

FORT DUFFERIN.

Fort Dufferin is situated on the extremity of Negro Point, at the western entrance to the harbour of St. John. At the Session of 1883 the further sum of \$3,000.00 was voted to continue the protection of this place. Owing to the nature of the soil of which the point is composed, and the action of the sea at its base during easterly gales, undermining took place, causing several slides, damaging the fort and endangering its stability. In June, 1882, a contract for the construction of a retaining wall, 430 feet in length, at the foot of the cliff, re-sloping the glacis and draining the fort, was entered into, and these works were completed in the spring of 1883, as mentioned in the report of last year. During the winter of 1882-83 a land-slide took place to the eastward of and adjoining the fort, injuring to some extent the work done in 1882, and necessitating the construction of further protection works. On the 3rd March, 1884, a contract was entered into with Mr. J. T. Kennedy for the construction of a further length of 303 feet of retaining wall, for the sum of \$3,000.00, and at the close of the fiscal year about three-fifths of the work were done, and it has since been completed. Expenditure during fiscal year, \$1,430.46. Total expenditure at this place, \$6,338.74 for construction, and \$48.38 for repairs.

MARINE HOSPITAL.

At the Session of 1883 the further sum of \$12,500.00 was voted towards the completion of this building, which was fully described in Annual Report for 1881-82. The contractor for this building, Mr. Wm. Lawlor, having failed to perform the work, possession was taken by the Department, and on 28th June, 1883, a contract was entered into with Messrs. Bond & Mildon for the completion of the building, for the sum of \$7,444.00, and the works are now being carried on at such a rate as to warrant the expectation of their completion at an early date. On 14th September, 1883, a contract was entered into with Messrs. Campbell & Ellis, for the erection of a hot water heating apparatus, for the sum of \$4,825.00. Expenditure during the fiscal year, \$10,332.57. Total expenditure on this building, \$33,281.25.

PENITENTIARY.

During the fiscal year the sum of \$225.74 was spent on necessary repairs to this building. Total amount expended on repairs, \$3,760.09.

POST OFFICE.

With the unexpended balance of appropriation carried forward from 1882-83, the works referred to in last year's report were completed. Expenditure during the fiscal

year, \$2,328.22 for construction and \$65.66 for repairs. Total expenditure on this building, \$174,228.78 for construction, and \$2,052.15 for repairs.

SAVINGS BANK.

During the fiscal year the small sum of \$50.17 has been expended on necessary repairs. Total expenditure on this building, \$45,022.03 on construction, and \$1,308.34 on repairs.

ST. STEPHEN.

PUBLIC BUILDING.

At the Session of 1883 the sum of \$5,000.00 was voted towards the erection of a Public Building to accommodate the Postal, Customs and other offices. On 28th November, 1883, a site, having a frontage of 80 feet on Water street, was purchased from Mr. N. Marks, for the sum of \$3,000.00; and at the close of the fiscal year drawings and specifications were being prepared in order that tenders for the construction of the building may be called for. Expenditure, \$3,119.46.

SUSSEX.

PUBLIC BUILDING.

At the Session of 1883 the further sum of \$9,000.00 was voted for the completion of this building, which was fully described in Annual Report of 1881-82; and during the fiscal year the work has been finished and the building occupied. Expenditure during fiscal year, \$5,297.63. Total expenditure on this building, \$22,898.08.

WOODSTOCK.

PUBLIC BUILDING.

At the Session of 1883, the further sum of \$15,000.00 was voted towards the completion of this building, a description of which appeared in last year's report. During the fiscal year the work has been steadily prosecuted, and it is expected that the building will be ready for furnishing before the close of the year. A contract for heating apparatus has been entered into since the close of the fiscal year. Expenditure, \$12,818.68. Total expenditure on this building, \$20,345.46.

 PROVINCE OF QUEBEC.

 CHAMBLY.

OLD FORT.

During the fiscal year some further work has been done, with a view to the preservation of this historic fort, a description of which will be found in Appendix No. 3, page 43. Expenditure, \$1,807.13. Total expenditure on this place, \$3,672.86.

 CHICOUTIMI.

MARINE HOSPITAL.

At the Session of 1883 the further sum of \$5,750.00 was voted towards the completion of this building, which was fully described in Annual Report for 1881-82. During the fiscal year the building was completed, and fitted with hot water apparatus. Furniture and bedding were supplied this fall, and the building occupied. Expenditure, \$4,001.32. Total expenditure on this building, \$11,137.73.

 GROSSE ILE.

QUARANTINE STATION.

At the Session of 1883 the sum of \$1,000.00 was re-voted for the purpose of making an addition to the residence of the Protestant Chaplain, but up to the close of the fiscal year nothing had been done, and no expenditure had been made.

 HULL.

POST OFFICE AND INLAND REVENUE OFFICE.

At the Session of 1883 the further sum of \$14,700.00 was voted towards the completion of this building, which, together with \$5,220.00, carried forward from 1882-83, made a total of \$19,920.00 for that purpose. During the fiscal year the building, which was fully described in Annual Report for 1881-82, was completed and occupied. Expenditure, \$18,830.12. Total expenditure on this building, \$27,245.15.

 ILE AUX NOIX.

LENNOX BARRACKS.

During the fiscal year the sum of \$144.67 was expended on necessary repairs. Total expenditure on these buildings for repairs, \$304.42.

LÉVIS.

FORTS AND MILITARY WORKS.

During the year a roof similar to that of Forts Nos. 2 and 3 was erected over the casemates, &c. of Fort No. 1, a contract for the work having been entered into on 10th May, 1883, with Mr. P. Samson, for the sum of \$3,117.50. Expenditure, \$3,954.23. Total expenditure, \$13,175.30 for construction, and \$24,091.39 for repairs.

IMMIGRANT SHED.

At the Session of 1883 the further sum of \$15,650.00 was voted towards the erection of buildings to replace those destroyed by fire on 3rd June, 1882, which sum added to \$56,997.58, carried forward from 1882-83, made a total of \$72,647.58 available for that purpose. Part of this grant was for the acquisition of a wharf from the St. Lawrence Steam Navigation Company; but up to the close of the fiscal year the purchase had not been completed.

MONTREAL.

CHAMP DE MARS.

Extensive improvements, which were not completed until after the close of the fiscal year, have been made. New fences and gates were constructed at St. Gabriel, Craig and Gosford streets; drains were laid from the upper slope to the city drain on Craig street; the embankments throughout were graded and sodded; the retaining wall was repaired, pointed and re-coped, and new stairs built from Craig street to the promenade. Expenditure during fiscal year, \$131.75.

DRILL HALL.

At the Session of 1883 the sum of \$40,000.00 was voted towards re-roofing this building, and at the Session of 1884 a further sum of \$16,000.00 was granted. As mentioned in last year's report, a contract for rebuilding the walls, to enable them to carry an iron roof, was entered into with Messrs. J. B. St. Louis & Bros., on 27th June, 1883, for the sum of \$29,897.00. When, however, the contractors had taken down that portion of the walls required by their contract, the remaining masonry

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was found to be in such a condition that it was considered unsafe to build upon it. A portion of it was then taken down to the foundation piles, so that they could be examined; and a careful examination made it apparent that the foundations were so badly laid that it would be highly dangerous to build on them the walls necessary to carry the roof. The foundation piles were found to have been irregularly driven, and not to a solid bearing; the concrete between them had settled, and the footing stones were small and bore irregularly on the piles. It was, therefore, decided to take down the old walls, remove the piles, and excavate to a depth sufficient to ensure a good foundation; and in doing so the piling was found to be in a worse condition than was anticipated. The hall is of the same size as the old building, 125 by 316 feet, inside measurement. It is constructed of local limestone, the street fronts in courses with cut stone dressings. A contract for the roof, which is of iron, was entered into on the 16th of August, 1883, with Mr. Wm. Hendrie, for the sum of \$32,000.00, and it was completed this fall. Expenditure during the fiscal year, \$40,404.13. Total expenditure on this building, \$40,685.33.

CUSTOM HOUSE.

At the Session of 1883 the further sum of \$3,000.00 was voted to continue the alterations and repairs mentioned in last year's report, which sum, added to \$5,698.72, carried forward from 1882-83, made a total of \$3,693.72 available for the purpose. During the year various alterations to and fitting up of offices, repairs to roof, &c., have been executed. Expenditure, \$12,207.67 for construction and \$416.31 for repairs. Total expenditure on this building, \$236,690.71 for construction, and \$46,949.66 for repairs.

EXAMINING WAREHOUSE.

At the Session of 1883 the sum of \$45,000.00 was voted towards the reconstruction of the floors of this building, by substituting wrought rolled iron beams and brick arches for the wooden floors, which had become decayed and dangerous; and also for building a one-story addition at the corner of McGill and Common streets, for the storage of bulky goods, oils, &c. On the 27th November, 1883, a contract was entered into with Messrs. Cousineau & Valiquette, for reconstructing the floors, for the sum of \$56,249.00. The work, which had to be done in sections, in order to prevent interruption of public business, was carried on so satisfactorily that it was completed this autumn. On 2nd November, 1883, a contract was entered into with Mr. John Black, for the construction of the extension, for the sum of \$6,954.00, and the work has been completed. Expenditure during fiscal year, \$28,997.96 for construction, and \$204.76 for repairs. Total expenditure on this building, \$254,618.71 for construction, and \$15,155.79 for repairs.

IMMIGRANT BUILDING.

At the Session of 1883 the sum of \$15,000.00 was voted towards providing additional accommodation for immigrants at Montreal; but up to the close of the fiscal year nothing had been done, and no expenditure had taken place.

INLAND REVENUE BUILDING.

At the Session of 1833 the further sum of \$11,200.00 was voted to continue the alterations and additions to this building, mentioned in last report as being in progress, and to provide furniture. During the year painting, glazing, &c., have been done and furniture supplied. Expenditure during fiscal year, \$3,754.20. Total expenditure on this building, \$49,603.87 for construction, and \$8,605.15 for repairs.

POST OFFICE.

At the Session of 1833 the sum of \$12,900.00 was voted for Montreal Dominion Buildings, part of which was intended for various alterations and improvements in the Post Office, and during the fiscal year the following works have been performed; altering skylights, addition to screen main lobby, enlarging registered letter office, new winter porches to front entrance, hydraulic passenger and goods hoist from basement to attic, hydraulic letter elevator from basement to ground floor, painting and coloring, &c. Expenditure, \$10,790.50 for construction and \$469.00 for repairs. Total expenditure on this building, \$516,411.53 for construction, and \$8,122.57 for repairs.

QUEBEC.

ARTILLERY BARRACKS.

During the fiscal year the small sum of \$10.43 was spent on repairs. Total expenditure on this building, \$4,659.81 on construction, and \$1,126.54 for repairs.

CARTRIDGE FACTORY.

The works in progress last year have been completed. Expenditure, \$1,962.19. Total expenditure on these buildings, \$19,590.35.

CITADEL.

At the Session of 1883 the further sum of \$22,500.00 was voted towards rebuilding and repairing certain portions of the walls, &c. On the 5th September, 1883, contracts were entered into with Messrs. Costolow & Lortie for repairs to Diamond Bastion, for \$5,722, and Richmond Bastion for \$965.64; and on same day a contract was entered into with Mr. Charles Jobin for building a roof over Dalhousie Bastion, for \$3,380.00. During the fiscal year these works were carried on, and a new well-house was constructed, new porches built at officers' quarters, and various repairs executed. Expenditure during fiscal year, \$19,920.51. Total expenditure on these works, \$53,645.12.

CITADEL BUILDINGS.

During the fiscal year the repairs to His Excellency's quarters and other buildings referred to in last year's report have been completed. Expenditure, \$3,717.22.

Total expenditure on these buildings, \$6,428.60 for construction, and \$68,571.34 for repairs.

CITADEL CLIFF.

At the Session of 1883, the sum of \$4,500.00 was voted towards the extension of the new retaining wall along Champlain street, a distance of 254 feet. On 27th September, 1883, a contract was entered into with Messrs. Costolow & Lortie for the construction of the wall for \$3,476.00; and during the fiscal year the work has been carried on. Expenditure, \$3,736.30. Total expenditure on this work, \$43,256.85.

CULLER'S OFFICE.

During the fiscal year extensive repairs were made to this building, part of which was in a dilapidated condition. Expenditure, \$316.45. Total expenditure on this building, \$3,216.56.

CUSTOM HOUSE.

During the fiscal year necessary repairs were made at a cost of \$862.15. Total expenditure on this building, \$303,488.41 for construction, and \$20,996.53 for repairs.

DRILL HALL.

At the Session of 1883 the sum of \$30,000.00 was voted towards the construction of a new Drill Hall, on the Government property at the Cove Fields, in the rear of the old Drill Shed. In consideration of the building being used for exhibition purposes, the Provincial Government and the City of Quebec have each contributed \$15,000 towards its erection; and these sums have been placed to the credit of the Hon. the Receiver-General. On the 26th May, 1884, a contract was entered into with Messrs. Costolow & Lortie for the erection of the building, for the sum of \$62,000.60, and work was commenced just prior to the close of the fiscal year and prosecuted until the end of the building season, when the foundations were completed and covered for the winter. The building will be 266 feet long by 96 feet wide, and 30 feet in height, from the floor to the wall-plate, and 70 feet from the floor to the apex of the roof; a gallery, 7 feet wide and 18 feet above the floor, supported on iron brackets, will extend around the entire interior of the hall. On the western side, and returning around both ends half-way, will be a lean-to 25 feet wide, with a raking ceiling, averaging 23 feet in height, to be used as armories. At the northern and southern ends, respectively, are to be the caretaker's apartments and the officers' quarters, each 40 feet by 55 feet, and two stories in height. The walls are to be of brick, on stone foundation, the eastern front being faced with stone; the roof is to be of wood, covered with galvanized iron, and crowned by an ornamental iron ridge cresting. The main entrance to the hall is to be in the middle of the eastern side, flanked by two circular towers, containing the stairs leading to the galleries, and having conical roofs, terminating in ornamental iron finials. On each side of the main entrance the wall is to be divided by buttresses into six bays, each of

which is to contain a narrow light, with a large window over, extending through the cornice into the roof, and having pilasters, architrave, frieze, cornice and ornate and carved roof. The windows at the ends are to be similar; but those on the western side will be plainer in character. Expenditure during fiscal year, \$587.82.

DUFFERIN TERRACE.

At the Session of 1883 the further sum of \$2,500.00 was voted to complete the wall under Dufferin Terrace, and during the fiscal year the work was finished. Expenditure, \$2,024.82. Total expenditure, \$48,201.65.

EXAMINING WAREHOUSE.

At the Session of 1883 the further sum of \$30,000.00 was voted towards the completion of this building, which was fully described in last year's report, and during the year the work has been so carried on that the building was roofed in before the close of the season. Expenditure during the fiscal year, \$27,533.06. Total expenditure on this building, \$28,819.13.

FORTIFICATIONS.

At the Session of 1883 a further sum of \$19,000.00 was voted towards repairs to the walls, &c., which was supplemented at the Session of 1884 by an additional grant of \$5,000.00. On 5th September, 1883, contracts were entered into with Messrs. Costolow & Lortie for repairs to military stores on Palace Hill, \$900.00, and repairing rampart walls, \$1,412.21; with Mr. Charles Jobin, for repairs to St. Valier street wall, \$1,500.00, for repairs to d'Auteuil street wall, \$650.00, and for repairs to Mount Carmel wall \$1,900.00; with Mr. E. Larose for building wall at St. John's Bastion, \$300.00; and on 12th December with Mr. Thomas Pampalon, for repairs to section three, fortification walls, part nine, below St. John's Gate, \$4,780.00. During the fiscal year work has been well carried on and several of the contracts were completed. Expenditure, \$26,318.76 for construction. Total expenditure on these works, \$142,161.46 for construction, and \$97,231.37 for repairs.

GAS INSPECTOR'S OFFICE.

During the fiscal year some repairs were made, at a cost of \$86.01. Total expenditure for repairs to this office, \$1,297.97.

MARINE HOSPITAL.

During the fiscal year the basement has been floored, and some repairs made to the roof. Expenditure, \$730.00. Total expenditure on this building, \$167,501.25 for construction, and \$12,233.80 for repairs.

POST OFFICE.

At the Session of 1883 the sum of \$2,020.00 was included in the vote of \$3,000.00 for Quebec Dominion Buildings, for the purpose of putting a new floor in

the public lobby of the Post Office, providing a shed for Mail Carriers' teams, re-flooring the sorting room, &c. ; and during the fiscal year the improvements have been carried out. Expenditure \$1,460.67 for construction and \$159.20 for repairs. Total expenditure on this building, \$95,364.12 for construction, and \$14,200.38 for repairs.

WEIGHTS AND MEASURES OFFICE.

During the fiscal year the sum of \$52.00 was spent in repairs. Total expenditure for repairs to this office, \$368.30

SHERBROOKE.

PUBLIC BUILDING.

At the Session of 1883 the further sum of \$18,500.00 was voted towards the completion of this building, which is being erected to accommodate the Customs, Postal and Inland Revenue offices. A full description of this building was given in the Annual Report for 1881-82. Messrs. Robillard & Murphy, the contractors for the building, having failed to carry on the work with due diligence, it was taken from them, and tenders for the completion of the building called for. On 25th May 1884, a contract was entered into with Mr. G. G. Bryant, for finishing the building, for the sum of \$1,991.00, and the work has been proceeded with in such a manner that the building was covered in this autumn, and heating apparatus is now being placed in it. Expenditure during the fiscal year, \$14,651.06. Total expenditure on this building, \$40,699.21.

SOREL.

PUBLIC BUILDING.

At the Session of 1883 the sum of \$10,000.00 was voted towards the erection of a building suitable for the Postal, Customs and other offices, on a site at the corner of Prince and George streets, 110 by 104 feet, which was deeded to the Crown, free of cost, by the Mayor and Corporation of Sorel, under date 13th March, 1884. At the close of the fiscal year plans for the building had been prepared and tenders called for; and since that date a contract has been entered into, under which work has been proceeded with in such a manner that the foundations were completed before the close of the building season. Expenditure during the fiscal year, \$302.61.

ST. HELEN'S ISLAND.

MILITARY BUILDINGS.

During the fiscal year some trifling repairs were made, at a cost of \$5.52. Total expenditure on these buildings, \$10,546.80 for construction, and \$398.02 for repairs

ST. JOHN'S.**BARRACKS.**

At the Session of 1884 the sum of \$11,000.00 was included in the vote of \$44,000.00 for Military Schools, for the purpose of adapting these buildings for use as a School for Infantry Instruction; and during the fiscal year the necessary alterations were made. The roofs generally were re-covered with slate, new floors were put down where necessary, a system of water works and drainage provided, a new drill shed built, and the old kitchen and magazine taken down. Expenditure, \$14,814.89.

POST OFFICE.

During the fiscal year the sum of \$217.95 was expended on necessary repairs. Total expenditure on this building, \$16,224.21 for construction, and \$293.95 for repairs.

ST. VINCENT DE PAUL.**PENITENTIARY:**

At the Session of 1883 the sum of \$35,000.00 was voted to continue the construction of the new dining hall and other works at this place, and at the Session of 1884 a further sum of \$2,900.00 was granted for the purpose of renewing some of the cement floors, &c. During the fiscal year the stone dining hall, referred to in last year's report, has been roofed and covered with galvanized iron, the windows glazed and fixed in position, the basement paved with cut limestone flagging, and the basement ceiling vaulted with brick. Of the main sewer, referred to in last year's report, a length of 100 yards was completed during the fiscal year, and it is expected that the whole length of 662 yards will be finished before the close of 1884. A wooden store building, a woodshed and an additional guard's cottage were built, and some general repairs, painting, &c., done. Expenditure during the fiscal year, \$20,357.22 for construction, and \$60 for repairs. Total expenditure on these buildings, \$222,636.28 for construction, and \$120.00 for repairs.

THREE RIVERS.

CUSTOM HOUSE.

During the fiscal year the alterations to the Old Barracks so as to make them available as a Custom House and Inland Revenue office, to which reference was made in last year's report, have been completed. Expenditure during fiscal year, \$541.20 for construction, and \$1,194.32 for repairs. Total expenditure on this building, \$17,141.24 for construction, and \$1,866.61 for repairs.

POST OFFICE.

At the Session of 1883 the sum of \$5,000.00 was voted towards the conversion of the old Custom House into a Post Office, and on 1st December, 1883, a contract was entered into with Messrs. J. Durocher & Son, for the sum of \$1,300.00. During the fiscal year the principal story of the old building has been raised and a lower or ground floor story of stone built beneath. The work was completed this autumn, and a heating apparatus is now being placed in the building, which will probably be occupied by 1st January, 1885. Expenditure during fiscal year, \$6,452.20. Total expenditure on this building, \$16,936.88 for construction, and \$1,285.82 for repairs.

PROVINCE OF ONTARIO.

AMHERSTBURG.

PUBLIC BUILDING.

At the Session of 1883 the sum of \$10,000.00 was voted towards the erection of a building on the lot at the corner of Dalhousie and Richmond streets, mentioned in last year's report as having been purchased. On the 3rd of October, 1883, a contract was entered into with Mr. P. Nairn for the erection of the building, for the sum of \$17,909.00; and the work has been proceeded with in such a manner that the building was roofed in this autumn. The building is 60 by 42 feet, and comprises a basement, two stories and attic. The external walls of the basement are of rubble masonry, and the partitions of brick; the walls of the superstructure are of red brick, with cut stone plinth, string courses, copings and dressings of windows and doors; the floors and roof of wood, the latter covered with slates and galvanized iron. On the Dalhousie street or principal front, the centre projects slightly and contains two groups of three windows each, the lower lighting the Post Office public lobby, and the upper lighting the Custom's long room. Over these is a gable containing a small triplet to light the caretaker's quarters. On either side of this projection are the public entrances—one to the Post Office and the other to the Customs and Inland Revenue offices, above which are coupled windows lighting the offices on the

first floor. The remaining elevations are similarly but more plainly treated. Expenditure during the fiscal year, \$6,673.92. Total expenditure on this building, \$9,013.68.

BARRIE.

PUBLIC BUILDING.

At the Session of 1883 the sum of \$12,000.00 was voted towards the erection of a suitable building to accommodate the Postal, Customs and other offices, on a site on Dunlop street, donated to the Crown by the Corporation. On the 12th September, 1883, a contract was entered into with Mr. Wm. Toms, for the construction of the building, for \$25,000.00; and work has been carried on in such a manner that it was expected the roof would be on before the close of the building season. The building is 94 by 45 feet, and consists of basement for Examining Warehouse, Weights and Measures office, &c.; ground floor for Post Office, first floor for Customs and Inland Revenue offices, and an attic for caretaker. The basement walls are of stone, and those of the superstructure of red brick, with brown sandstone dressings; the floors and roof are of wood, the latter covered with slates and galvanized iron. There are three entrances—two for Post Office and one for Customs and Inland Revenue. The building has an extended front. The north and south angles contain the principal entrances. The front is formed into three compartments by brick pilasters, with triplet windows between, on each floor, terminated by pediment. The remaining elevations are treated in a plainer manner. Expenditure during fiscal year, \$4,316.06.

BELLEVILLE.

EXAMINING WAREHOUSE.

At the Session of 1883 the sum of \$4,000.00 was voted towards the purchase of a site and erection of a building suitable for an Examining Warehouse. On 5th January, 1884, a site comprising $\frac{119}{1000}$ of an acre, adjoining the Customs House, was purchased from Mr. A. E. Falkiner for \$3,500.00. Expenditure during fiscal year, \$3,561.02.

PUBLIC BUILDING.

At the Session of 1883 the further sum of \$20,100.00 was voted towards the completion of the building, which was described in Annual Report for 1881-82. During the fiscal year the contracts for heating apparatus and interior fittings, referred to in last report, were completed, and the building occupied. Expenditure, \$12,129.16. Total expenditure on this building, \$59,783.38 for construction, and \$55.45 for repairs.

BERLIN.

PUBLIC BUILDING.

At the Session of 1883 the sum of \$20,000.00 was voted towards the erection of a Public Building, for the accommodation of the Postal, Customs and other offices. On the 20th October, 1883, Lot No. 3, at the corner of Benton and King streets, containing 13,680 square feet, was purchased from Mr. Caspar Heller, for the sum of \$3,000.00. On the 10th January, 1884, a contract was entered into with Mr. W. H. Lewis, for the construction of the building, for the sum of \$23,900.00, and work has been prosecuted in such a manner that the roof was put on this autumn. The main building, at the street corner, is 60 by 38 feet, built of brick, with dressings and foundations of stone, and comprises basement for furnace, &c., ground floor for Post Office, first floor for Customs and Inland Revenue offices, and attic for caretaker. There is a one-story extension on Benton street, 42 by 20 feet, for Examining Warehouse, Gas Inspector and Weights and Measures offices. The entrance to the Post Office is on King street, and to upper flats on street corner. Expenditure, \$3,704.67.

BRANTFORD.

PUBLIC BUILDING.

During the fiscal year some necessary repairs were made, at a cost of \$149.35. Total expenditure on this building, \$32,772.48 for construction, and \$2,175.16 for repairs.

BROCKVILLE.

PUBLIC BUILDING.

At the Session of 1883 the further sum of \$10,000.00 was voted towards the construction of a building suitable for Post Office, Custom House, &c., which sum, added to \$16,347.17, carried forward from 1882-83, made a total of \$26,347.17 available for the purpose. A description of the building was given in last year's report. Work has been carried on continuously, but, on account of some difficulty in obtaining stone, not so rapidly as could be desired, and the building was only roofed in this autumn. Expenditure during the fiscal year, \$15,056.59. Total expenditure on this building, \$21,799.42.

CHATHAM.

PUBLIC BUILDING.

At the Session of 1883 the further sum of \$20,100.00 was voted towards the construction of this building, which sum, added to \$11,734.04, carried forward from 1882-83, made a total of \$31,834.04 available for this purpose. On 9th November, 1883, a contract for heating apparatus was entered into with Messrs. J. & J. Blackmore, for the sum of \$1,800.00; and during the fiscal year the building has been completed and occupied. Expenditure, \$31,637.45. Total expenditure on this building, \$48,041.29.

CLIFTON.

PUBLIC BUILDING.

At the Session of 1883 the further sum of \$12,000.00 was voted towards the completion of this building, and at the Session of 1884 an additional grant of \$5,000.00 was made, which sums, added to \$2,147.33, carried forward from 1882-83, made a total of \$19,147.33. During the fiscal year the building, which was fully described in last year's report, has been completed, and tenders for heating apparatus have been called for. Expenditure, \$18,205.23. Total expenditure on this building, \$20,057.90.

COBOURG.

PUBLIC BUILDING.

At the Session of 1883 the sum of \$7,000.00 was voted for the purpose of altering the building mentioned in last year's report as having been purchased, so as to accommodate the Postal, Customs and other offices; and at the close of the fiscal year the work was in progress. Expenditure during the fiscal year, \$273.86. Total expenditure on this building, \$12,379.16.

CORNWALL.

PUBLIC BUILDING.

At the Session of 1883 the further sum of \$20,000.00 was voted towards the construction of this building, which sum, added to \$8,558.99, carried forward from 1882-83, made a total of \$28,558.99 available for this purpose. During the fiscal year work has been steadily carried on; and the building, which was fully described in last year's report, was roofed in this autumn, and a contract let for putting in heating

apparatus. Expenditure during fiscal year, \$19,901.75. Total expenditure on this building, \$39,576.73.

GALT.

PUBLIC BUILDING.

At the Session of 1883 the sum of \$8,000.00 was granted towards the erection of a suitable building to accommodate the Postal, Customs and other offices. On the 8th April, 1884, a site, having a frontage of 110 feet on South Water street, and an average depth of 62 feet, extending back to the Grand River, was deeded to the Crown by the Corporation of the City free of charge; and shortly after the close of the fiscal year a contract was let for the construction of the building. Expenditure during the fiscal year, \$174.05.

GANANOQUI.

CUSTOM HOUSE.

At the Session of 1883 the sum of \$3,000.00 was granted towards the erection of this building, a description of which appeared in last year's report, and at the Session of 1884, a further sum of \$4,000.00 was voted for the same purpose. On the 23rd July, 1883, a contract was entered into with Mr. George J. Wilson, for the construction of the building, for the sum of \$9,000.00; and during the fiscal year the contract has been completed, and the building is now occupied. Designs for a hot water heating apparatus are being prepared. Expenditure during the fiscal year, \$11,582.95. Total expenditure on this building, \$12,712.58.

GUELPH.

PUBLIC BUILDING.

During the fiscal year alterations and repairs have been made to this building, at a cost of \$916.22. Total expenditure on this building, \$31,641.82 for construction, and \$1,738.35 for repairs.

HAMILTON.

CUSTOM HOUSE.

During the fiscal year some trifling repairs were made, at a cost of \$75.70. Total expenditure on this building, \$46,188.45 for construction, and \$5,608.57 for repairs.

IMMIGRANT BUILDING.

At the Session of 1883 the further sum of \$500.00 was voted towards the construction of this building, which, added to \$1,454.06 carried forward from 1882-83, made a total of \$1,954.06 available for the purpose. During the fiscal year the building, which was fully described in last year's report, has been completed and occupied. Expenditure, \$2,065.15. Total expenditure on this building, \$6,061.09.

PUBLIC BUILDING.

At the Session of 1883 the further sum of \$125,000.00 was voted towards the construction of this building, intended to accommodate the Postal, Customs and other offices. During the fiscal year, work on this building, a full description of which appeared in last report, has been vigorously carried on, and before the close of the season the building was roofed in. Expenditure during the fiscal year, \$91,288.70. Total expenditure on this building, \$161,315.54.

KINGSTON.

CUSTOM HOUSE.

During the fiscal year the small sum of \$42.50 was expended for repairs. Total expenditure on this building, \$11,805.52 for construction, and \$8,253.75 for repairs.

FORTIFICATIONS AND MILITARY BUILDINGS.

During the fiscal year the alterations and repairs referred to in last Report as being in progress at Fort Frederick and Tête de Pont Barracks, have been completed. Expenditure \$4,956.71. Total expenditure on these works, \$111,480.79 for construction, and \$57,793.48 for repairs.

PENITENTIARY.

At the Session of 1883 the sum of \$15,000.00 was voted towards rebuilding the northern portion of the west wharf, and other services. During the fiscal year the reconstruction of the wharf was commenced, and it will be completed in the spring of 1885. The construction of heating apparatus, referred to in last report, was continued, and the heating service of the rotunda and three cell-wings is completed. The heating service is now being extended to the north wing. A Worthington steam pump was placed in the boiler house and attached to the new system of water works to be completed by the end of the calendar year. A boiler-plate cistern of 10,000 gallons capacity, supported on stone piers 20 feet in height, has been placed in rear of the Warden's residence, and the water service generally has been extended. The laundry and the storehouse in the female prison being dilapidated, were taken down and replaced by stone buildings, and other repairs and improvements made. Expenditure, \$13,899.39 for construction, and \$180.00 for repairs. Total expenditure on these buildings, \$288,896.95 for construction, and \$17,654.79 for repairs.

 POST OFFICE.

At the Session of 1883 the sum of \$300.00 was appropriated for the removal of some of the fittings which had become obsolete, and replacing them with others of more recent pattern, and at the close of the fiscal year the work of alteration had commenced. Expenditure, \$45.00. Total expenditure on this building, \$18,547.12 for construction, and \$6,337.30 for repairs.

ROYAL MILITARY COLLEGE.

At the Session of 1883 the sum of \$12,600.00 was voted for the purpose of supplying apparatus for the manufacture of naphtha gas, for lighting the building; for extending the water service, and for other improvements, and during the fiscal year the works have been carried out. Expenditure, \$7,417.78 for construction, and \$10,878.34 for repairs. Total expenditure on this building, \$109,474.08 for construction, and \$17,012.18 for repairs.

 LONDON.

CUSTOM HOUSE.

At the Session of 1883 the sum of \$5,000.00 was voted for the purchase of the two strips of land adjoining the Custom House, so as to admit of its enlargement to accommodate the Inspectors of Gas and Weights and Measures. On 2nd September, 1884, the land was purchased from the Churchwardens of St. Paul's Church, for the sum of \$5,000.00. During the year the sum of \$976.08 was spent on repairs. Total expenditure on this building, \$58,583.46 for construction, and \$9,030.94 for repairs.

DRILL SHED AND MILITARY BUILDINGS.

During the fiscal year the sum of \$913.73 was spent on repairs. Total expenditure on these buildings, \$4,800.97.

POST OFFICE.

At the Session of 1883 the further sum of \$3,600.00 was voted to continue the alterations to this building, mentioned in last report as being under contract, and at the Session of 1884 an additional grant of \$1,600.00 was made for the same purpose. During the fiscal year the yard has been paved with cedar blocks, a new platform added to caretaker's house, the walls of rooms and corridors painted, and other repairs made. Expenditure during the fiscal year, \$5,523.64. Total expenditure on this building, \$53,350.66 for construction, and \$10,744.86 for repairs.

 NIAGARA.

MILITARY BUILDINGS.

During the fiscal year general repairs, principally to roofs, were made, at a cost of \$92.63. Total expenditure on these buildings, \$2,519.52 for repairs.

ORANGEVILLE.

PUBLIC BUILDING.

At the Session of 1883 the sum of \$6,000.00 was voted towards the construction of a Public Building at this place, the town agreeing to furnish the site; but up to the close of the fiscal year the site had not been furnished, and no expenditure had taken place. Since that date, however, a site, known as the "McAdam" or "Old Kirk" property, has been deeded to the Crown, free of cost, and a contract has been entered into for the erection of the building.

OTTAWA.

CARTIER SQUARE.

During the fiscal year this square has been levelled, partly sodded, a new drive laid out and other improvements made. Expenditure, \$867.76.

DRILL SHED.

In the vote for Military Buildings, at the Session of 1883, the sum of \$1,600.00 was included for the construction of a caretaker's residence on Cartier Square, and on 2nd November, 1883, a contract was entered into with Mr. John Black, for erecting the building, for the sum of \$1,958.00, and the work was completed this autumn. Expenditure during the fiscal year, \$457.23. Total expenditure, \$28,017.83 for construction, and \$511.63 for repairs.

GEOLOGICAL MUSEUM.

During the fiscal year the sum of \$229.61 was expended for necessary repairs. Expenditure on this building, \$50,741.80 for construction, and \$7,407.80 for repairs.

MILITARY STOREHOUSE.

During the fiscal year the sum of \$5,297.67 was spent in repairing and fitting up the building situated on the Canal Basin, purchased for use by the Militia Department as a storehouse.

 MONUMENT TO SIR GEORGE E. CARTIER.

At the Session of 1883 the sum of \$9,000.00 was granted towards paying for the statue of the late Sir George E. Cartier, a contract for which had been entered into with Mr. L. P. Hébert, as mentioned in last year's report, and also to provide a pedestal for the same. During the fiscal year the statue was completed and delivered. The work of erecting the pedestal is now being proceeded with, and it is expected that the statue will be placed in position before the close of the calendar year. Expenditure during fiscal year, \$733.45. Total expenditure on this work, \$2,052.58.

NEPEAN POINT.

Included in the vote for Military Buildings was the sum of \$800.00 for a caretaker's residence on Nepean Point, the old building being so dilapidated as to be useless. On 23rd November, 1883, a contract was entered into with Messrs. Neville & Askwith for the sum of \$373.50, and the building has been completed and occupied. Expenditure during fiscal year, \$673.50.

NEW DEPARTMENTAL BUILDING, WELLINGTON STREET.

At the Session of 1883 the sum of \$207,000.00 was voted towards the erection of the new Departmental Block on Wellington street, referred to in last report. The site fronts on the south side of Wellington, extending about half-way through to Sparks street, and it is bounded on the east and west by Elgin and Metcalfe streets. The total cost of the site was \$88,136.84; and a statement of the vendors, &c., will be found in Appendix No. 23, page 225. On the 20th September, 1883, a contract was entered into with Mr. A. Charlebois, for the erection of the building, for the sum of \$295,000.00; and work has been carried on in such a manner that the foundations were put in before the close of the building season, and covered for the winter. The contractor expresses the intention of getting out and dressing a large quantity of stone for the superstructure during the winter, so that the work of construction may be rapidly proceeded with in the spring. The building is to be faced with sandstone, backed with brick, on a very solid stone foundation. The floors and ceilings are to be constructed with wrought iron girders, and rolled iron joists, with brick arches between, and concrete on top. The entrance halls and corridors will be laid in encaustic tiles, set in cement. The roofs are to be constructed of wrought iron, covered with slates. The Wellington street elevation is 280 feet long, the Elgin street 110 feet, and the Metcalfe street 99 feet. There will be sub-basement, basement, and ground, first, second and attic floors. The Wellington street elevation will include basement, three stories and attic, and will be broken by a central projection, and two angle pavilions projecting 12 feet. The general height of this elevation from level of sidewalk to deck of roof, will be 96 feet, the central projection being, however, carried up 112 feet, and the angle projections 104 feet above level of sidewalk. A full description of the building is given in Appendix No. 2, pages

36-38. Expenditure during the fiscal year, \$45,184.22. Total expenditure on the building, \$115,604.17.

POST OFFICE.

At the Session of 1883 the sum of \$1,700.00 was voted towards the completion of the alterations mentioned in last report as being in progress, and at the Session of 1884 a further sum of \$1,550.00 was granted for the same purpose. During the year the alterations to the Money Order and Registered Letter offices have been completed, and some necessary repairs made. Expenditure during the fiscal year, \$3,424.70 for construction and \$503.45 for repairs. Total expenditure on this building, \$246,281.43 for construction, and \$3,281.11 for repairs.

PUBLIC BUILDINGS.

At the Session of 1883 the sum of \$98,400.00 was voted for the heating and general maintenance of the Parliamentary and Departmental Buildings and grounds, in addition to which there was the usual vote of \$175,000.00 for rents and repairs to Public Buildings generally. During the fiscal year the necessary repairs, furnishing, fitting and cleaning were done in the Eastern and Western blocks, and the grounds were efficiently maintained. In the House of Commons gallery two new stained windows of more appropriate glass were placed. The glass in the ceilings of both the Senate and Commons Chambers was replaced with glass of uniform strength and color. The north-western entrance to the apartments of the Speaker of the House of Commons was altered and a stone porch built over the landing of the outside steps. A further extension of the ventilating system of the House of Commons was made, by the addition of a powerful exhaust fan and pipe connections to the corridors surrounding the Commons Chamber and some of the basement and restaurant apartments, and the result has been satisfactory. Prior to the opening of the last Session, it was decided to have an experimental trial of incandescent electric lighting in the Parliament Building, and for that purpose two installations were constructed for the lighting of the vestibule and corridors of the Senate and Commons, the Speaker's apartments, the basement corridors, the restaurant, the official reporters' room and the press room. All the lighting on the Commons side was done by the United States Electric Lighting Company of New York, and the main vestibule and all the lighting on the Senate side was done by the Edison Electric Lighting Company of Hamilton, Ont. Expenditure during the fiscal year, \$17,201.54 for construction, and \$134,300.96 for repairs, &c. Total expenditure on these buildings, \$1,205,052.08 for construction, and \$1,307,002.91 for repairs.

RIDEAU HALL.

The usual annual cleaning, partial re-painting, re-papering, whitewashing, minor alterations and repairs were done, together with repairs to furniture. Total expenditure on this building, \$236,785.40 for construction, and \$512,041.96 for repairs.

SUPREME COURT.

During the fiscal year the sum of \$380.50 was spent on necessary furniture and repairs. Total expenditure on this building, \$64,212.39 for construction, and \$2,211.85 for repairs.

PETERBOROUGH.

PUBLIC BUILDING.

At the Session of 1883 the sum of \$15,000.00 was voted towards the erection of a suitable building to accommodate the Postal, Customs and other offices; but up to the close of the fiscal year a site had not been obtained, and no expenditure had taken place.

PORT ARTHUR.

IMMIGRATION BUILDING.

At the Session of 1883 the sum of \$600.00 was voted towards the erection of this building, and at the Session of 1884 an additional grant of \$7,500.00 was made. During the fiscal year the building, which was fully described in last report, has been completed and occupied. Expenditure, \$7,335.05. Total expenditure on this building, \$9,378.55.

PORT HOPE.

PUBLIC BUILDING.

At the Session of 1883 the further sum of \$12,000.00 was voted towards the completion of this building, and at the Session of 1884 an additional grant of \$5,000.00 was made, which sums, added to \$2,924.11, carried forward from 1882-83, gave a total of \$19,924.11 available for this purpose. During the fiscal year work on this building, which was fully described in last year's report, was steadily carried on, and it is now roofed in, and tenders for heating apparatus have been called for. Expenditure during the fiscal year, \$19,442.40. Total expenditure on this building, \$24,518.29.

SARNIA.

IMMIGRANT BUILDING.

With the unexpended balance carried forward from 1882-83, this building, which was fully described in last year's report, has been completed, and it is now occupied. Expenditure during the fiscal year, \$1,881.77. Total expenditure on this building, \$3,052.27.

 ST. CATHARINES.

PUBLIC BUILDING.

At the Session of 1883 the further sum of \$17,000.00 was voted towards the completion of this building, which was described in last report. During the fiscal year the fitting and furnishing have been completed, and the building occupied. Expenditure during fiscal year, \$16,977.07. Total expenditure on this building, \$55,421.99.

ST. THOMAS.

PUBLIC BUILDING.

At the Session of 1883 the further sum of \$23,000.00 was voted towards the completion of this building, which was fully described in last year's report. Owing to the difficulty in obtaining stone from the quarries, this building has not progressed very rapidly; but it is probable that it will be roofed in before the end of the calendar year, and completed during the winter. Expenditure during the fiscal year, \$19,094.42. Total expenditure on this building, \$35,952.15.

STRATFORD.

PUBLIC BUILDING.

At the Session of 1883 the further sum of \$13,000.00 was voted towards the completion of this building, and at the Session of 1884 an additional grant of \$1,000.00 was made. This building, which was fully described in the Annual Report for 1881-82, was completed during the fiscal year, and occupied. Expenditure, \$14,088.25. Total expenditure on this building, \$43,479.60.

TORONTO.

ASSISTANT RECEIVER-GENERAL'S OFFICE.

During the fiscal year the sum of \$44.84 has been expended for repairs. Total expenditure on this office for repairs, \$1,522.54.

CUSTOM HOUSE.

At the Session of 1883 the sum of \$1,163.00 was included in the vote of \$7,800.00 for Dominion Buildings, Toronto, for the purpose of covering the steam pipes, extending the counter in the long room and making other alterations and repairs to the Custom House; and during the year the works have been carried out. Expenditure,

\$1,901.55. Total expenditure on this building, \$235,713.30 for construction, and \$6,567.77 for repairs.

DRILL SHED.

At the Session of 1883 the sum of \$8,000.00 was granted for the purpose of enlarging this building; but the question having been raised as to the advisability of selling this building and erecting a new Drill Hall in another part of the city, nothing has been done, and only the small sum of \$72.00 spent. Total expenditure on this building, \$539.95 for repairs.

EXAMINING WAREHOUSE.

At the Session of 1883 the sum of \$50,000.00 was voted towards the erection of an addition to this building on the Government lot adjoining; and the sum of \$2,775.00 was included in the vote to the Dominion Buildings, Toronto, for the purpose of repairing the old building. On 19th October, 1883, a contract for the addition was entered into with Messrs. Brown & Love, for the sum of \$72,967.00; and work has been carried on in such a manner that the building was completed this fall. The new wing is 105 feet long, 70 feet wide and four stories high. It is a massive structure of white brick, with stone dressings, harmonizing with the original building, but the detail is of a simple character. The floors and roof are constructed with iron girders, iron beams and brick arches. This addition is intended for use as a Bonded Warehouse, and it is so arranged as to admit of a further extension of 150 feet westward. In the old building a new iron stairway, from the ground to the first story, was constructed, and various essential repairs executed. Expenditure during the fiscal year, \$49,474.48 for construction, and \$395.85 for repairs. Total expenditure on this building, \$273,189.63 for construction, and \$14,502.29 for repairs.

FORTS.

At the Session of 1884 the sum of \$24,900.00 was included in the vote of \$44,000.00 for Military School, for the purpose of having the buildings in the new fort altered, repaired, fitted, furnished, drained and supplied with water and gas services, to render them suitable for the use of the Dominion School of Infantry Instruction, and during the fiscal year the work has been carried out. General repairs were made to the building, fence and bridge at the old fort, and a new fence built at the Military Cemetery. Expenditure, \$20,872.79 for construction, and \$2,551.55 for repairs. Total expenditure on these forts, \$20,872.79 for construction, and \$8,594.41 for repairs.

IMMIGRATION OFFICE.

During the fiscal year \$130.14 was expended on repairs to this office, and \$195.11 on repairs to Immigrant Shed. Total expenditure on office, \$130.14, and on shed, \$11,834.18, for construction, and \$4,112.70 for repairs.

 INLAND REVENUE OFFICES.

At the Session of 1883 the sum of \$525.00 was included in the vote for Dominion Public Buildings, Toronto, for the purpose of doing some necessary painting, glazing, &c., to the Inland Revenue offices; and at the close of the fiscal year the work had been commenced. Expenditure, \$44.65. Total expenditure on this building, \$32,716.07 for construction, and \$27,557.20 for repairs.

MILITARY BUILDINGS.

During the fiscal year some repairs were made to these buildings, at a cost of \$274.86. Total expenditure for repairs, \$298.86.

POST OFFICE.

At the Session of 1883 the sum of \$2,770.00 was included in the vote for Dominion Public Buildings, Toronto, for the purpose of altering and re-arranging the internal fittings of the Post Office so as to reduce the area of the public lobby and increase the working space. On 20th November, 1883, a contract was entered into with Mr. Thomas Pells, for the sum of \$4,900.00, and during the fiscal year the work has been carried out. Expenditure, \$5,723.38. Total expenditure on this building, \$148,653.25 for construction, and \$15,173.02 for repairs.

PUBLIC BUILDINGS.

During the fiscal year the sum of \$151.68 was expended on repairs to Public Buildings in Toronto generally. Total expenditure, \$1,419.07.

 TRENTON.

 DRILL SHED.

During the fiscal year the sum of \$317.80 was spent for necessary repairs to this building.

 WINDSOR.

 PUBLIC BUILDING.

During the fiscal year the sum of \$1,153.62 has been spent on plumbing and other necessary repairs. Total expenditure on this building, \$67,368.90 for construction, and \$2,220.16 for repairs.

PROVINCE OF MANITOBA.

BRANDON.

IMMIGRATION BUILDING.

During the fiscal year some alterations and repairs were made to this building, at a cost of \$251.00. Total expenditure, \$21,142.12 for construction, and \$131.00 for repairs.

STONY MOUNTAIN.

PENITENTIARY.

At the Session of 1883 the sum of \$40,000.00 was voted towards additions and improvements to this prison; and during the fiscal year the following works have been carried out; strengthening cells in prison wing, changing penal into ordinary cells, construction of ten temporary wooden cells within north end of prison wing, construction of a detached stone building containing six penal cells, veneering guards' cottages with brick, erecting two brick-veneered cottages for guards, boring five wells, building five well-houses, and other works. Expenditure, \$32,528.82 for construction, and \$20.00 for repairs. Total expenditure, \$230,401.67 for construction, and \$5,034.01 for repairs.

WINNIPEG.

ASSISTANT RECEIVER-GENERAL'S OFFICE.

During the fiscal year, the sum of \$139.55 was expended for repairs. Total expenditure on this office, \$5,025.00 for constructing vault, and \$1,745.21 for repairs.

CUSTOM HOUSE.

During the fiscal year the sum of \$280.13 was spent on necessary repairs. Total expenditure on this building \$33,642.88 for construction, and \$5,773.95 for repairs.

DOMINION LANDS OFFICE.

At the Session of 1883 the sum of \$10,000.00 was voted for building an extension to this office, but up to the close of the fiscal year nothing had been done, beyond some alterations and repairs. Expenditure, \$1,430.44. Total expenditure on this building, \$16,426.41 for construction, and \$2,930.55 for repairs.

FORT OSBORNE BARRACKS.

At the Session of 1883 the sum of \$5,590.85 was voted to pay the claim of Mr. W. J. Macaulay, in connection with the erection of these barracks, and payment
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has been made. During the year some repairing to the buildings has been done. Expenditure, \$6,304.25. Total expenditure on these buildings, \$31,304.25 for construction, and \$6,126.05 for repairs.

LIEUTENANT-GOVERNOR'S RESIDENCE.

At the Session of 1883 the further sum of \$33,000.00 was voted towards the completion of this building, and at the Session of 1884 an additional grant of \$5,000 was made. During the fiscal year, the building, which was fully described in the Annual Report of 1880-81, was completed and occupied. Expenditure during the year, \$42,423.81. Total expenditure on this building, \$80,633.80.

PARLIAMENT BUILDING.

At the Session of 1883 the further sum of \$10,000.00 was voted towards the erection of this building, a full description of which will be found in the report of 1880-81, and at the Session of 1884 an additional grant of \$100,000.00 was made. The Provincial Government of Manitoba having represented that the building, as originally planned, would not be large enough to accommodate the Government offices, an Order in Council was passed authorizing the addition of a wing, to be used as an Assembly Chamber, the portion of the building originally designed for that purpose being utilized for offices. An agreement was entered into with Messrs. J. E. Gelley & Co., the contractors for the main building, for the construction of this wing for the sum of \$36,000.00; and a contract was let to the American Plumbing Company, on 4th February, 1884, for putting in a heating apparatus, for the sum of \$12,980.00. The entire building is nearly completed, and it was in a sufficiently advanced state to allow the last Session of the Manitoba Legislature, which opened on 13th March, 1884, to be held in it. Expenditure during the fiscal year, \$127,916.58. Total expenditure on this building, \$170,478.07.

POST OFFICE (NEW).

At the Session of 1883 the sum of \$50,000.00 was voted towards the erection of a new Post Office on the site of the old one, at the corner of Main and Owen streets. On 28th September, 1883, a contract was entered into with Mr. J. G. McDonald for removing the old Post Office and erecting the new one, for the sum of \$122,900.00. The progress made under this contract not being satisfactory, it was cancelled, and new tenders invited; and on 10th October, 1884, a contract was entered into with Messrs. J. E. Gelley & Co., for the sum of \$135,130.00, who have pushed the work with such vigor that the foundations were finished before the close of the building season. The building will be 120 feet long by 60 feet wide, with a basement and four full stories; and in addition to the Post Office and Savings Bank will contain the Public Works and other offices. The building will be faced with pressed brick and masonry of red sandstone from Nipigon. As a precaution against fire, a brick wall will divide the portion containing the Saving's Bank from the offices in the rear, and the roof

over the former will be constructed of rolled iron posts and brick arches; the remaining portion of the roofs and the partitions to be wood, the former covered with galvanized iron. There are to be three public entrances to the Post Office, two on Main and one on Owen street. The entrance to the Savings Bank and other offices will be in the centre bay of the elevation on Owen Street, on which street will also be the mail entrance to Post Office. The Main street front will be vertically divided into three bays, by four pilasters, extending from plinth to cornice. The two outer bays will contain, on the ground floor, public entrances to the Post Office, and the centre bays three large window openings, with segmental heads. The three upper stories have the same number of windows, but with square heads in alignment with the openings of the ground floor. The Owen street elevation will be similarly treated, but in five bays, the centre of which has groups of four windows. The stories will be marked horizontally between the ground and first floor by a moulded and dentiled cornice, and between first and second floor by a stone belt, with carved panels, and between the second and third floors by a heavily moulded cornice with carved corbels, &c. The frieze will consist of a series of brick arches, with stone archivolt, and carved panels placed in alignment with the windows below, and will be protected by a moulded stone cornice with stone pediments in the centre of each elevation, in the tympana of which will be appropriate carving. A return of 20 feet on the rear elevation will be carried out in the same manner as the street fronts, but the remainder of the elevations are to be devoid of ornament. Expenditure, \$14,037.93.

POST OFFICE (TEMPORARY).

This building, which was fully described in last year's report, and which is intended to be used while the new Post Office is being built, has been completed and occupied. Expenditure during the fiscal year, \$11,082.33. Total expenditure on this building, \$11,082.33.

POWDER MAGAZINE.

At the Session of 1883 the sum of \$5,000.00 was voted towards the erection of a Powder Magazine on the Government Reserve at Fort Osborne. On the 24th September, 1883, a contract was entered into with Messrs. Rourke & Cass for the construction of the building, for the sum of \$5,600.00, and at the close of the fiscal year the building was almost completed. It is 40 feet long by 30 feet wide, and 12 feet high, from footings to wall plate, and is built of brick on a stone foundation, and covered with galvanized iron. It contains a small-arm ammunition store, an artillery ammunition store and a spare room. Outside, at a distance of 12 feet from the buildings, is a fence wall of brick. Expenditure, \$3,838.45.

NORTH-WEST TERRITORIES.

BATTLEFORD.

PUBLIC BUILDINGS.

At the time of the erection of these buildings, 1875-78, some of the accounts of the then Paymaster in the North-West were held in abeyance, balances being due him on certain works, while on others balances were due the Government. During the last fiscal year all these outstanding accounts have been satisfactorily adjusted, and in doing so the amount of \$1,850.41 became chargeable to these buildings. Total expenditure, \$151,697.96 for construction, and \$6,808.65 for repairs.

DOMINION LUNATIC ASYLUM.

At the Session of 1883 the sum of \$20,000.00 was voted towards the establishment of a Dominion Lunatic Asylum or Hospital in the North-West; but up to the close of the fiscal year a site had not been selected, and no expenditure had taken place.

FORT PELLY.

BARRACKS.

At the time of the erection of these barracks, 1875-77, some of the accounts of the then Paymaster in the North-West were held in abeyance, balances being due him on some works, while balances were due by him on others. During the last fiscal year these outstanding accounts have been satisfactorily adjusted, and in doing so the sum of \$4,179.46 became chargeable to Fort Pelly Barracks. Total expenditure on these buildings, \$67,467.31.

HIGH RIVER.

INDIAN INDUSTRIAL SCHOOL.

During the fiscal year the sum of \$26,000.00 was transferred, by Order in Council, from the appropriations of the Department of Indian Affairs to the Department of Public Works, for the purpose of erecting Industrial Schools for the education of the Indians at High River and Qu'Appelle. Plans were prepared by this Department, and approved of by that of Indian Affairs; and on 9th July, 1884, a contract was signed by Messrs. Williams & Murphy, for the erection of the school at High River

for the sum of \$11,720.00. Work has been steadily carried on, and the contract was completed before the close of the building season. Expenditure during the fiscal year, \$3,602.50.

IMMIGRANT STATIONS, WEST OF QU'APPELLE.

At the Session of 1883 the sum of \$12,600.00 was voted towards the construction of immigrant stations west of Qu'Appelle, but up to the close of the fiscal year no site had been selected, and no expenditure had taken place. Since that date, however, it has been decided to erect buildings at Medicine Hat and Calgary, and contracts for their construction have been entered into.

PRINCE ALBERT.

COURT HOUSE.

At the Session of 1883 the sum of \$10,000.00 was voted for new jails and lock-ups in the North-West; but up to the close of the fiscal year the only expenditure made was \$275.50 for preliminary expenses in connection with the Court House at Prince Albert.

PUBLIC BUILDINGS GENERALLY, N. W. T.

At the Session of 1883 the sum of \$5,000.00 was voted for Public Buildings Generally in the North-West; and during the fiscal year the sum of \$4,668.00 has been expended.

QU'APPELLE.

COURT HOUSE.

During the fiscal year the sum of \$353.00 was spent for furniture, &c.

IMMIGRANT STATION.

At the Session of 1883 the sum of \$13,500.00 was voted towards rebuilding the Immigrant Station at Qu'Appelle, which was destroyed by fire on 13th May, 1883, immediately after its completion. On 10th July, 1883, a contract was entered into with Mr. C. H. Logan, for the construction of the building, for the sum of \$5,839.00. Mr. Logan having abandoned his contract, the building was completed under contract by Mr. M. P. Zindord, and is now occupied. Expenditure, \$11,586.58.

INDUSTRIAL SCHOOL.

On 24th June, 1884, a contract was signed by Mr. M. Zindord for the construction of the building, for the sum of \$8,500.00, and the work has been prosecuted in such a manner that this contract was finished before the close of the building season. Expenditure during the fiscal year, \$2,862.50.

REGINA.

PUBLIC BUILDINGS.

At the Session of 1883 the sum of \$27,000.00 was granted towards the erection of Public Buildings; and during the fiscal year new offices and outbuildings have been put up for the Indian Department; and the Lieutenant Governor's residence, the Court House and the Judge's and Sheriff's offices fitted up and furnished. Expenditure during fiscal year, \$14,097.42. Total expenditure on these buildings, \$20,427.55.

PROVINCE OF BRITISH COLUMBIA.

NANAIMO.

PUBLIC BUILDING.

At the Session of 1883 the further sum of \$24,750.00 was voted towards the completion of this building, a full description of which appeared in last report; and during the fiscal year it has been completed, and is now being fitted up for occupation. Expenditure, \$19,580.98. Total expenditure on this building, \$29,643.59.

NEW WESTMINSTER.

PENITENTIARY.

At the Session of 1883 the sum of \$40,000.00 was voted towards the erection of a new cell-wing, boiler house, &c. Plans and specifications were prepared and tenders invited; but the only offer received was so greatly in excess of the Chief Architect's estimates that it was not accepted. During the fiscal year certain necessary repairs have been made to the old building, and closets placed in the Warden's quarters and in the basement of the prison wing. Expenditure during the fiscal year, \$2,685.32. Total expenditure on these buildings, \$167,352.23 for construction, and \$3,125.40 for repairs.

PUBLIC BUILDING.

At the Session of 1883 the further sum of \$11,500.00 was granted towards the completion of this building, which was fully described in Annual Report for 1881-82; and during the fiscal year the building has been completed, fitted up and occupied. Expenditure, \$10,131.36. Total expenditure on this building, \$25,418.18 for construction, and \$88.50 for repairs.

VICTORIA.

CUSTOM HOUSE.

During the fiscal year the sum of \$254.25 has been expended on necessary repairs. Total expenditure on this building, \$39,164.76½ for construction, and \$384.07 for repairs.

POST OFFICE.

During the fiscal year the interior of this building has been re-arranged to meet the requirements of the postal service, and extensive repairs made. Expenditure, \$1,537.06 for construction and \$1,833.02 for repairs. Total expenditure on this building, \$40,701.81 for construction and \$4,373.78 for repairs.

QUARANTINE STATION.

At the Session of 1883 the sum of \$7,500.00 was voted towards the establishment of a Quarantine Station for Vancouver Island; but up to the close of the fiscal year nothing had been done, and only an expenditure of \$46.00 made. Since that date, however, a site has been selected at Albert Head, and a contract for the construction of the buildings entered into, and it is expected that the buildings will be completed before the close of the calendar year.

E N G L A N D.

LONDON.

HIGH COMMISSIONER'S RESIDENCE.

At the Session of 1884 the sum of \$42,000.00 was voted for the purpose of purchasing a permanent residence in London, England, for the High Commissioner for Canada, and for altering and furnishing the same. The house known as No. 97 Cromwell Road, has been purchased for £5,125.0.0 stg., subject to a ground rent of £70.0.0 per annum, on a lease having 90 years to run. During the year the building has been altered, furnished and occupied. Expenditure, \$41,999.33.

PUBLIC BUILDINGS GENERALLY.

At the Session of 1883, the usual sum of \$15,000.00 was voted to pay salaries, travelling expenses, &c., in connection with the Chief Architect's staff; and during the fiscal year the sum of \$11,565.33 has been expended.

CIVIL SERVICE EXAMINATIONS.

During the fiscal year examinations of candidates for admission to the Civil Service were held in various cities of the Dominion, as required by the Civil Service Act of 1882; and the following small expenses incurred in connection with the buildings in which examinations were held were paid by this Department:—

Hamilton	\$ 32 00
Kingston.....	18 50
Montreal.....	35 00
St. John, N.B.	14 00
Toronto.....	176 35
	<hr/>
	\$275 85

HEATING DOMINION BUILDINGS.

At the Session of 1883, the sum of \$26,000.00 was voted for heating Dominion Buildings generally, and the unexpended balance of \$260.32 was carried forward from 1882-83. The appropriation and expenditure by Provinces was as follows:—

	Appropriation.	Expenditure.
Nova Scotia.....	\$ 1,600 00	\$ 1,074 57
Prince Edward Island.....	900 00	638 66
New Brunswick.....	3,200 00	4,977 84
Quebec	8,000 00	9,647 99
Ontario.....	10,000 00	8,245 90
Manitoba	2,000 00	2,832 59
North-West Territories		96 00
British Columbia.....	300 00	273 74
Generally		285 19
	<hr/>	<hr/>
	\$26,000 00	\$28,112 39
	<hr/> <hr/>	<hr/> <hr/>

SALARIES OF ENGINEERS, FIREMEN, &c.

At the Session of 1883, the sum of \$22,000.00 was voted for the payment of the salaries of engineers, firemen and caretakers employed in Public Buildings throughout the Dominion. The following is a statement of appropriation and expenditure by Provinces:—

	Appropriation.	Expenditure.
Nova Scotia.....	\$ 1,472 00	\$ 2,616 83
Prince Edward Island.....	1,218 00	1,553 15
New Brunswick.....	5,070 00	4,297 03
Quebec.....	4,760 00	4,964 48
Ontario.....	8,482 00	8,441 19
Manitoba	1,000 00	.....
British Columbia. ....	.....	385 00
Generally .....	.....	90 00
	<u>\$22,000 00</u>	<u>\$22,347 68</u>

HARBOURS AND RIVERS.

At the Session of 1883 the sum of \$915,850.00 was voted for the improvement of harbours and rivers throughout the Dominion, and at the Session of 1884 a further sum of \$102,814.60 was granted for the same purpose. In addition to these sums there was carried forward the unexpended balance of appropriations for 1882-83, \$241,953.39, and \$44,702.27 were contributed by Municipal and other Corporations. The total amount, therefore, available from all sources, was \$1,305,320.26. The sum of \$928,852.84 was spent; \$75,256.88 lapsed on 30th September, 1883, and the balance remained unexpended on 30th June, 1884. The following table gives the total amount available, the amount lapsed and the amount expended, by Provinces; and below will be found details of the work done:—

	Total amount available.	Lapsed on 30th September, 1883.	Expenditure Fiscal year '83-84.
Nova Scotia.....	\$124,225 79	23,202 99	70,325 15
Prince Edward Island.....	93,336 49	17,005 67	15,382 90
New Brunswick.. ..	154,972 65	9,738 02	85,865 45
Maritime Prov. generally...	13,581 52	.....	4,676 80
Quebec.....	276,885 69	6,794 15	207,592 52
Ontario.....	581,341 05	15,855 55	492,013 74
Manitoba	16,958 00	935 60	14,650 31
North-West Territories.....	14,176 77	.....	14,000 00
British Columbia.....	23,842 30	1,724 90	18,202 91
Harbours generally.....	6,000 00	.....	6,143 06
	<u>\$1,305,320 26</u>	<u>\$75,256 88</u>	<u>\$928,852 84</u>

 PROVINCE OF NOVA SCOTIA.

ARISAIG,

In the County of Antigonish, on the Straits of Northumberland, 14 miles westward from Cape George.

During the fiscal year some slight repairs were made to the piers at this place at a cost of \$9.00. Total expenditure since Confederation, \$4,092.00.

BEAR RIVER,

In Digby County, empties into the southern side of Annapolis Basin, about 10 miles east of the town of Digby.

The removal of boulders, which impeded navigation, referred to in last year's report, was continued. Expenditure, \$320.68. Total expenditure at this place since Confederation, \$399.93.

BENACADIE POND,

On North-east side of Great Bras d'Or Lake, Cape Breton County.

At the Session of 1883 the further sum of \$7,000 00 was voted to continue the work of improving the entrance to this harbour, which, added to \$1,354.10, carried forward from 1882-83, made \$8,254.10 available for this purpose. During the fiscal year the work of protecting with piles the entrance from Bras d'Or Lake to the Pond was proceeded with, and some dredging was done. Expenditure, \$5,772.96. Total expenditure at this place since Confederation, \$10,518.86.

CATALONE.

Catalone Gut is in the County of Cape Breton, and connects Catalone Lake with Mira Bay.

At the Session of 1883 the sum of \$1,500.00 was voted for the purpose of improving this channel, and during the fiscal year the amount has been expended. The Gut is about 800 feet in length, and from 70 to 80 feet wide, but was so shallow that boats could not pass even at high water. The work done has given present relief, but it is believed that, owing to the shifting nature of the materials forming the beach, there is little chance of the improvement remaining permanent. Total expenditure at this place since Confederation, \$1,500.00.

CHEVERIE,

In Hants County, on the southern shore of the Basin of Minas, and east of the mouth of the River Avon.

At the Session of 1883 the sum of \$7,500.00 was voted for the purpose of building a breakwater at the end of the pier at this place, so as to form a small harbour of refuge, having from 14 to 22 feet depth at high water. On the 12th March,

1884, a contract was entered into with Messrs. Sandford & Burgess, for the construction of a breakwater 130 feet in length, the contract price being \$8,888.00, and at the close of the fiscal year about one-third of the work had been completed. Expenditure during the year, \$1,736.24. Total expenditure at this place since Confederation, \$9,073.09.

CHIPMAN'S BROOK,

In King's County, on the south-eastern coast of the Bay of Fundy.

At the Session of 1883 the sum of \$1,500.00 was voted for repairing a pier at this place, built by the Local Government some years ago, and extended by the Department in 1877; and during the fiscal year a portion of the retaining wall has been rebuilt and repairs executed on the outer portion of the pier, at a cost of \$1,498.21. Total expenditure at this place since Confederation, \$4,248.21.

COFFIN'S ISLAND,

At the entrance of Liverpool Harbour, Queen's County, on the coast of the Atlantic Ocean.

At the Session of 1883 the sum of \$2,900.00 was voted for the purposes of building a breakwater 300 feet in length, to protect the harbour in the centre of the Island, During the fiscal year the work has been carried out, and has proved beneficial in arresting and retaining the sand on the seaward side. Expenditure, \$2,890.19. Total expenditure at this place since Confederation, \$4,990.14.

COW BAY,

On the Atlantic, on the north-east side of Cape Breton County.

At the Session of 1883 the sum of \$12,000.00 was voted for the purpose of repairing the breakwater, which was greatly damaged by storms in the early part of 1883; and during the year three breaches of 150 feet in length, in the seaward face, were repaired, close piling driven over a distance of 150 feet, 1,800 cubic yards of ballast placed where required and repairs made to the covering and to the mooring piers on the inside. Expenditure, \$7,184.66. Total expenditure at this place since Confederation, \$137,628.76.

CRANBERRY HEAD.

Cranberry Head, also called Sanford, is in Yarmouth County, about 6 miles to the northward of Yarmouth.

During the fiscal year the sum of \$100.00 was expended in repairing the pier, which was built some years ago by the local authorities, and extended by the Department in 1876 and in 1878-79. Total expenditure at this place since Confederation, \$3,600.03.

DIGBY,

The shire town of Digby County, situated at the western end of Annapolis Basin.

During the fiscal year new fender piles and braces were placed along the whole face of the inclined landing at the pier at this place, the roadway was reconstructed, and general repairs executed. Expenditure, \$1,266.50. Total expenditure on this pier since Confederation, \$15,636.26.

EAST BAY,

An arm of the Bras d'Or Lake, in Cape Breton County.

In 1881 a wharf was built by the inhabitants of the locality, and in 1882-83 a block 70 feet in length was built by the Department to obtain a greater depth of water. During the fiscal year the inshore or original portion was placed in a thorough state of repair, at a cost of \$246.30. Total expenditure at this place since Confederation, \$2,045.22.

GRAND NARROWS, BARRA STRAIT,

Between Great Bras d'Or and Little Bras d'Or Lakes, Victoria County.

At the Session of 1883 the sum of \$3,000.00 was voted for the purpose of extending, for a distance of 142 feet, a pier built some years ago by the Local Government, so as to obtain a depth of 14 feet at low water, and during the year the work has been carried out. Total expenditure at this place since Confederation, \$3,000.00.

GREAT VILLAGE RIVER (LONDONDERRY),

Near the head of Cobequid Bay, in Colchester County, 18 miles from Truro.

At the Session of 1883 the sum of \$5,000.00 was voted for the purpose of straightening this river, which, for some distance from its mouth, flows by a very circuitous course through a dyked marsh. The locality agreed to furnish \$4,000.00; and the work of cutting a channel 1850 feet in length was commenced and was about half finished at the close of the fiscal year. Total expenditure at this place since Confederation, \$4,250.00.

HARBOURVILLE,

In King's County, on the south eastern coast of the Bay of Fundy.

At the Session of 1883 the sum of \$1,500.00 was voted for the purpose of repairing the piers which form this harbour, and which were built on each side of a small stream some years ago by the Local Government. The western pier was extended 40 feet by the Department in 1876; and during the fiscal year the seaward side of this pier has been newly faced and other repairs made. Expenditure, \$1,499.95. Total expenditure at this place since Confederation, \$3,499.95.

HAVRE BOUCHÉ,

In Antigonish County, on the southern shore of St. George's Bay, to the westward of the northern entrance to the Strait of Canso.

During the fiscal year a large boulder which obstructed the channel in the harbour was removed. Expenditure, \$205.97. Total expenditure at this place, \$2,704.45.

INGONISH SOUTH,

In the County of Victoria, Cape Breton, on the Atlantic coast.

At the Session of 1883 the sum of \$10,000.00 was voted towards thoroughly repairing the breakwater built by the Department in 1876; but up to the close of the fiscal year very little had been done, and only \$759.82 expended. Total expenditure at this place since Confederation, \$87,556.54.

JORDAN BAY,

In Shelburne County.

Some slight repairs were made during the year to the pier at this place built by the Department in 1876. Expenditure, \$102.50. Total expenditure at this place since Confederation, \$29,894.74.

KINGSFORT.

Kingsfort, formerly Oak Point, is in King's County, on the western shore of the Basin of Minas, between the mouth of Cornwallis River and Cape Blomidon.

During the year the sum of \$96.30 was spent in repairing the pier which was built by the Department in 1873-76. Total expenditure at this place since Confederation, \$24,673.50.

L'ARDOISE,

In the County of Richmond, on St. Peter's Bay.

At the Session of 1883 the sum of \$5,000.00 was voted towards the protection of the breakwater built in 1876; but up to the close of the fiscal year only \$215.69 had been spent for preliminary expenses. Total expenditure at this place since Confederation, \$10,545.69.

LITTLE HOPE ISLAND,

In the Atlantic, on south-eastern coast of Queen's County.

At the Session of 1883 the sum of \$1,250.00 was voted for the purpose of repairing the sea wall which was built some years ago to protect this island from destruction, and during the fiscal year the necessary repairs were made. This island is only 280 feet in length by 180 feet in width. It lies about midway between Port Moreton and Port Joli, directly in the track of vessels bound to and from Liverpool and Halifax, and has long been established as a most important lighthouse station. Expenditure, during fiscal year \$1,250.00. Total expenditure on sea wall, \$13,545.09.

MABOU,

In Inverness County, on the western coast of Cape Breton, Gulf of St. Lawrence.

The work of raising and repairing the crib work protection wall on the southern side of the channel, referred to in last Annual Report, was completed in the early part of the fiscal year, and paid out of the unexpended balance of appropriation for 1882-83 carried forward. Expenditure, \$698.27. Total expenditure at this place since Confederation, \$101,948.67.

MAITLAND,

At the mouth of the River Shubenacadie, Hants County.

At the Session of 1883 the sum of \$750.00 was granted for the purpose of repairing the pier built by the Department at this place in, 1873-76, and during the year that sum was expended in necessary repairs. Total expenditure at this place since Confederation, \$7,091.99.

METEGHAN COVE,

In Digby County, on the southeastern side of St. Mary's Bay, 3 miles south-west from Meteghan River.

During the year some repairs were made to the flooring at the outer end of the breakwater, and the fenders secured. Expenditure, \$32.00. Total expenditure at this place since Confederation, \$15,734.79.

MILITIA POINT,

On the north shore of the Great Bras d'Or Lake, Inverness County.

At the Session of 1883 the sum of \$2,000.00 was voted for the construction of a landing pier, 150 feet in length, having 12 feet depth at its outer end, for the accommodation of the steamers plying on Great Bras d' Or Lake, and during the year the work has been completed. Total expenditure at this place since Confederation, \$2,000.00.

MCNAIR'S COVE,

On west side of St. Georges Bay, County of Antigonish.

At the Session of 1883 the sum of \$5,000.00 was voted for repairing the breakwater built by the Department in 1872; and during the fiscal year \$1,995.89 was expended for that purpose. Total expenditure at this place since Confederation, \$38,123.34.

OYSTER POND,

In Guysborough County, on north-west side of Chedabucto Bay.

At the Session of 1883 the sum of \$2,000.00 was voted for the purpose of extending for a distance of 100 feet the protection work on the eastern side of the chan-

nel leading to this pond, in order to retain the sand and gravel of which the beach is composed; and the work has been prosecuted during the fiscal year. Expenditure, \$1,472.51. Total expenditure at this place since Confederation, \$3,722.52.

PARKER'S COVE,

On south-eastern coast of the Bay Fundy, Annapolis County.

At the Session of 1883 the sum of \$2,000.00 was voted for the purpose of building a small breakwater for the accommodation of coasting vessels and fishing boats. During the year a breakwater, 165 feet in length, has been built at a cost of \$1,999.97, which is the only expenditure made at this place since Confederation.

PARRSBORO', OR PARTRIDGE ISLAND RIVER,

County of Cumberland, on north side of the Basin of Minas.

At the Session of 1883 the further sum of \$2,500.00 was voted to continue the improvement of the channel of Partridge Island River, and during the fiscal year that amount was expended and the work completed. Total expenditure at this place since Confederation, \$5,000.00.

PORT HOOD,

In Inverness County, on western coast of Cape Breton, Northumberland Strait.

At the Session of 1883 the further sum of \$12,500.00 was voted to continue the work of repairing the breakwater which was built by the Local Government in 1865-66, and which was very seriously damaged by storms in 1881. On 12th December, 1883, a contract was entered into with Mr. J. McKeen for the sum of \$11,400.00, for covering the slope to the landing pier with "rip-rap," and during the fiscal year good progress was made with the work. Expenditure, \$9,539.40. Owing to the exposed position of this breakwater, and the ravages of the sea-worm, it is in need of constant repair; and a further sum has been granted for the year 1884-85. Total expenditure at this place since Confederation, \$34,933.12.

PORT LORNE,

On south-eastern coast of the Bay of Fundy, Annapolis County.

At the Session of 1883 the further sum of \$500.00 was voted for the completion of the extension of the breakwater at this place 100 feet, work on which was commenced in 1882-83. A balance of \$3,971.46 was carried forward from appropriation for 1882-83, making the amount available to finish the work \$4,471.46. Expenditure, \$4,374.15. Total expenditure at this place since Confederation, \$9,648.45.

THREE FATHOM HARBOUR,

Halifax County, on south-eastern coast of Nova Scotia, Atlantic Ocean.

At the Session of 1883 the sum of \$1,000.00 was voted to continue, for a distance of 230 feet, the breakwater built by the Department in 1879, to protect the beach

which forms the harbour from the encroachments of the ocean, and during the fiscal year the work has been carried out. Expenditure, \$1,000.00. Total expenditure at this place since Confederation, \$3,999.94.

WEST ARICHAT,

In Richmond County, on north side of Chedabucto Bay.

At the Session of 1883 the sum of \$1,200.00 was voted for the purpose of strengthening and repairing the breakwater, 1,235 feet in length, which connects the end of Creighton Island with the mainland of Ile Madame. This work was commenced by the Local Government prior to Confederation, and was completed by the Department in 1879. During the year the work was close fendered, and a quantity of ballast which had been washed out replaced. Expenditure, \$1,600.00. Total expenditure at this place since Confederation, \$11,294.29.

WHITE POINT,

In Queen's County, on the Atlantic, 8 miles south-eastward of the entrance to the harbour of Liverpool.

At the Session of 1883 a further sum of \$1,000.00 was voted to complete the repairs to the pier at this place, which was built many years ago by the inhabitants of the locality, assisted by the Local Government, and extended by the Department in 1879. During the year the work has been completed. Expenditure, \$1,000.00. Total expenditure at this place since Confederation, \$6,997.98.

YARMOUTH,

In Yarmouth County, at the western extremity of the Province.

At the Session of 1883 a further sum of \$4,600.00 was voted to continue the repairs to the breakwater between Cape Forchu and the mainland, which was commenced by the Local Government and completed by the Department in 1873-74. As the work had become decayed in parts, and had received damage, extensive repairs were made during the fiscal year. Expenditure, \$4,457.99. Total expenditure at this place since Confederation, \$37,062.31.

PROVINCE OF PRINCE EDWARD ISLAND.

CAMPBELL'S COVE,

Is situated in King's County, on the north side of the Island.

The breakwater mentioned in last Annual Report was completed in the fiscal year, with the balance of appropriation brought forward from 1882-83. Expenditure, \$530.30. Total expenditure at this place since Confederation, \$13,071.76.

CASCOMPEC,

On the north side of the Island.

At the Session of 1883 the sum of \$5,000.00 was granted towards deepening the channel through the river bar of sandstone, to a depth of 14 feet; but up to the close of the fiscal year no work had been done and no expenditure had taken place.

COLVILLE BAY,

On the east coast of King's County, 16 miles to the westward of East Point, is the eastern terminus of the Prince Edward Island Railway.

The breakwater, which is 1,160 feet in length, and was built by the Department, is liable to damage on account of its exposed position, and will require an annual expenditure for its maintenance, as upon its permanence depends the safety of the railway wharves. Expenditure during the fiscal year, \$939.55. Total expenditure at this place since Confederation, \$105,024.07

LOCAL GOVERNMENT PIERS.

At the Session of 1883 the sum of \$53,222.19 was voted for the purpose of paying the Provincial Government of Prince Edward Island for certain piers and wharves which were deemed to be of general importance; the amount has not yet been paid.

MALPEQUE,

Situated within the entrance to Richmond Bay, Prince County, on the northern side of the Island.

At the Session of 1883 the sum of \$4,000.00 was voted for the purpose of extending the breakwater built by the Department in 1878-79; and on 15th November, 1883, a contract was entered into with Mr. J. A. Beairsto for the sum of \$3,000.00, and at the close of the fiscal year the work was about half done. Expenditure, \$3,584.77. The breakwater built by the Department at the end of the Royalty Sands has proved of great benefit to vessels seeking shelter, as well as to the inhabitants of the locality, who are enabled to ship their produce much later in the fall than they previously could. Since it was built, however, the sand between it and the high land at Royalty Point has been wearing away, and the object of the present works is to prevent a breach being made in the beach. Total expenditure since Confederation, \$18,923.20.

MURRAY HARBOUR—SOUTH RIVER,

King's County, south-eastern end of Island.

At the Session of 1884 the sum of \$3,250 was voted for the purpose of straightening the channel of this river; no expenditure has yet taken place.

RUSTICO HARBOUR,

In Queen's County, on the northern side of the Island, about midway between North and East Points.

The works commenced in 1882 and referred to in last report were continued during the fiscal year, with the balance of appropriation brought forward from 1882-83, and were completed in January last. Expenditure \$4,135.50. The works consist of a breakwater, 1,200 feet in length, on the western side of the harbour, and another of 450 feet on the eastern side. The harbour is of good size and well situated, but the entrance was rendered difficult by the existence of a bar of shifting sand. The object of the works was, by contracting the entrance and increasing the velocity of the water, to scour this bar, so as to gain a greater depth of water, and in this they have been successful, there now being 9 feet where formerly there was only 7 feet. Total expenditure at this place since Confederation, \$18,362.40.

SOUTH-WEST RIVER (NEW LONDON),

In Queen's County, on the northern side of the Island, about 10 miles to the eastward to the entrance of Richmond Bay.

The works referred to in last year's report as being in progress were completed with balance of appropriation brought forward from 1882-83. These works were for the purpose of confining and increasing the current of South-West River, so as to scour out the bar at the entrance to the harbour, and they have proved most successful, the depth of water over the bar having been increased from 6 feet to 14 feet. Expenditure during the year \$1,874.70. Total expenditure at this place since Confederation, \$4,386.12.

ST. PETER'S BAY,

In King's County, on the northern coast of the Island, 35 miles eastward of East Point.

The works referred to in last report as being in progress for the purpose of contracting the channel at the entrance to the harbour, and so increasing its depth, were abandoned by the contractors after about three-fifths of the work had been done. Expenditure during the fiscal year, \$309.60. Total expenditure at this place since Confederation, \$8,207.16.

WOOD ISLANDS (VICTORIA HARBOUR),

In Queen's County, on the south coast of the Island, about 35 miles south-east from Charlottetown.

At the Session of 1883 the further sum of \$2,000.00 was voted for repairing and extending the breakwater at this place, which, added to \$3,000.00, carried forward from 1882-83, made a total of \$5,000.00 available for this purpose. During the fiscal year the eastern breakwater, built in 1859 by the Local Government, was repaired,

and an addition of 80 feet made to the western breakwater, built by the Department., Expenditure, \$4,008.53. Total expenditure at this place since Confederation \$9,881.46.

PROVINCE OF NEW BRUNSWICK.

ANDERSON'S HOLLOW, (ROCHER BAY.)

In Albert County, on the eastern side of Salisbury Bay, which lies between Cape Enragé and Matthew's Head, on the northern side of the Chignecto channel, the north-eastern arm of the Bay of Fundy.

At the Session of 1883 the sum of \$4,000.00 was voted for the purpose of commencing the connection with the shore of an isolated block 100 by 25 feet, which was built by the Department in 1879-80. On the 12th September, 1883, a contract was entered into with Messrs. Brewster & Peck, for an extension of 90 feet shoreward, for the sum of \$3,450.00, and at the close of the fiscal year the work was brought to completion. Expenditure, \$3,652.50. Total expenditure at this place since Confederation, \$6,782.50.

BAIE VERTE.

At the Session of 1883 the sum of \$500.00 was voted for the construction of a ballast wharf at this place, but up to the close of the fiscal year nothing had been done, and no expenditure had taken place.

BUCTOUCHE,

In the County of Kent, on a river of the same name, which empties into the Strait of Northumberland, about 20 miles north-west of Shediac.

At the Session of 1883 the sum of \$4,000.00 was granted towards the construction of a wharf, 300 feet in length, and having from 9 to 25 feet depth of water. On the 31st March, 1884, a contract was entered into with Mr. Venant Bourque, for the sum of \$3,290.00, and at the close of the fiscal year the work was about half done. Expenditure, \$2,060.55, which is the only expenditure since Confederation.

CARAQUETTE,

In Gloucester County, on the southern shore of the Baie des Chaleurs, about 42 miles to the east of Bathurst.

At the Session of 1883 the sum of \$3,000.00 was voted for the construction of an arm, 100 feet in length, to the pier built by the Local Government, and the unexpended balance of \$945.66 was carried forward from the appropriation for 1882-83. During the year the work has been satisfactorily completed. Expenditure, \$4,205.70. Total expenditure at this place since Confederation, \$4,260.04.

. CARLETON,

In the County of St. John, situated on the western side of the harbour of St. John.

At the Session of 1883 the sum of \$10,000.00 was voted for the purpose of improving the railway wharf accommodation; but up to the close of the fiscal year nothing had been done.

GRANDE ANSE,

In Gloucester County. A small indent on the southern shore of the Baie des Chaleurs, about midway between Bathurst and Shippegan.

At the Session of 1883 the sum of \$2,000.00 was voted for the purpose of extending the breakwater commenced by the Department in 1875, and during the fiscal year an addition of 60 feet was built, making a total length of 260 feet. Expenditure, \$2,755.44. Total expenditure at this place since Confederation, \$9,911.72.

GRAND LAKE AND JEMSEG,

In Queen's County. Jemseg Creek, which is the outlet of Grand Lake, empties into the St. John River, about 50 miles above the City of St. John.

At the Session of 1883 the sum of \$5,000.00 was voted towards dredging portions of the channel in the creek and lake to a depth of 11 feet; but up to the close of the fiscal year work had not been commenced, and no expenditure had taken place.

HOPEWELL CAPE,

In Albert County, on the western side of the Peticodiac River, about 7 miles below Hillsboro'.

At the Session of 1883 the sum of \$4,000.00 was voted towards the construction of a ballast wharf 330 feet long, with an arm 100 feet long. On the 18th September, 1883, a contract was entered into with Messrs. Dowling, Condon, Curry & Palmer, for the sum of \$2,780.00, for the construction of the inner portion of the wharf; and at the close of the fiscal year the work was about two-thirds completed. Expenditure, \$3,212.17, which is the only expenditure at this place since Confederation.

MADAWASKA RIVER,

A tributary of the St. John, into which it empties at Edmundston, the shire town of Madawaska County.

At the Session of 1883 the further sum of \$1,000.00 was voted for completing the glance pier at Little Falls and improving the towpath, and during the year the work was carried out. Expenditure, \$999.79. Total expenditure at this place since Confederation, \$2,636.85.

MISPEC,

In St. John County, at the mouth of Mispec Stream, about 10 miles eastward of the city of St. John.

At the Session of 1883 the sum of \$4,000.00 was voted towards the construction of a breakwater 300 feet in length. On the 1st of March, 1884, a contract was entered into with Mr. G. S. Mayes, for the sum of \$9,000.00, and the work was in progress at the close of the fiscal year. Expenditure, \$2,825.21, which is the only expenditure at this place since Confederation.

POINTE DU CHENE (SHEDIAC),

In Westmoreland County. It is the eastern terminus of the New Brunswick division of the Intercolonial Railway, and is the objective point on the Strait of Northumberland, from and to which shipments are made to the Gulf of St. Lawrence, Prince Edward Island, &c.

The railway wharf having on several occasions been damaged during easterly gales, a breakwater has been built on the seaward side, its northern end being connected with the wharf; and in the space thus enclosed vessels deposit their ballast. The face of this breakwater was damaged by ice and the ravages of the sea-worm; and during the fiscal year it has been close-piled and thoroughly secured and repaired. Expenditure, \$817.59. Total expenditure at this place since Confederation, \$35,243.26.

RICHIBUCTO,

In the County of Kent, on the Strait of Northumberland, 40 miles north of Shediac Harbour.

Out of the vote for harbours generally, in the Maritime Provinces, the sum of \$1,000.00 was taken for the purpose of extending the works referred to in last year's report a further distance of 250 feet, for the better protection of the breakwater built in 1872-75; but on examination of this work it was found to be in such urgent need of repairs that the money was expended for that purpose. Expenditure during fiscal year, \$1,000.00. Total expenditure at this place since Confederation, \$40,446.77.

ROBBY'S POINT,

In the County of Westmoreland, on the southern side and near the mouth of the Little Shemogue River, which empties into the Strait of Northumberland about 30 miles to the south-east of the harbour of Shediac.

At the Session of 1883 the sum of \$1,500.00 was voted towards the construction of a landing pier at this place; but up to the close of the fiscal year work had not been commenced, and no expenditure had taken place.

ROCHER BAY,

In Albert County, on the Northern shore of Chignecto Channel.

At the Session of 1883 the sum of \$4,000.00 was granted towards making an addition to the pier built some years ago by the Local Government. On 13th July, 1883, a contract was entered into with Messrs. Anderson & Cannon, for the sum of \$3,000.00, for the extension of the pier 80 feet; and during the year the work was completed. Expenditure, \$3,574.06. Total expenditure at this place since Confederation, \$3,578.58.

SHIPPEGAN,

In Gloucester County, at the southern extremity of Shippegan Sound, an arm of the Baie des Chaleurs.

At the Session of 1883 the further sum of \$4,000.00 was granted to continue the work of repairing the breakwater and dam at this place, which, added to the \$492.37 brought forward from 1882-83, made a total of \$4,492.37 available for this purpose. During the year the outer ends and sides of the breakwater have been close-piled for a distance of 50 feet, and the body of the work generally repaired. Portions of the dam across the gully have been close-planked where breaches had been made in former years, and parts of it raised. A noticeable improvement has taken place in the depth of water in the channel. Expenditure, \$4,491.64. Total expenditure at this place since Confederation, \$30,084.24.

ST. JOHN,

Situated on the river of the same name, which empties into the Bay of Fundy.

At the Session of 1883 the further sum of \$71,000.00 was granted for the purpose of continuing the work of rebuilding the portion of the breakwater extending from Negro Point, at the western entrance to the harbour, which was damaged during a gale in January, 1879. During the year the work was actively prosecuted, although much delay was experienced by the contractors, from unfavorable weather and the difficulty of procuring labor. Expenditure during the fiscal year, \$41,715.05. Total expenditure at this place since Confederation, \$328,601.30.

ST. JOHN RIVER,

Counties of Victoria and Madawaska.

At the Session of 1883 the further sum of \$2,000.00 was granted to continue the improvement of the navigation of this river. During the fiscal year the tow-paths between Grand Falls and the mouth of the St. Francis have been improved. On the eastern side of the Grand Falls and at the mouth of Little River a sheer dam, 230 feet in length, has been constructed, for the purpose of preventing logs and timber during the times of freshets from being stranded, and to direct them in their passage over the falls. A portion of rock projecting over the falls has been removed to

destroy the eddy in the basin below, in which a large amount of timber gathers every year and remains. Boulders, rocks and sand-bars have been removed out of the navigable channel between Edmundston and the St. Francis; and also at Little River Rapids, Dibblee's Bar, Belvizor's Bar, Eel River, Meductic Falls and Nackawic. Expenditure, \$3,049.95. Total expenditure since Confederation, \$8,077.85.

ST. MARY'S,

On the Big Buctouche River, about 7 miles above the Village of Buctouche, in the County of Kent.

At the Session of 1883 the sum of \$1,500.00 was voted towards the construction of a wharf at the highway bridge crossing the Big Buctouche River at St. Mary's; and during the year a wharf, 120 feet long, has been built. Expenditure, \$1,500.00, which is the only expenditure made at this place since Confederation.

TOBIQUE RIVER.

A tributary of the St. John, into which it empties about 22 miles below Grand Falls, and 2 miles above Andover, the shire town of Victoria County.

At the Session of 1883 the further sum of \$5,000.00 was voted to continue the improvement of this river, and the St. John above Grand Falls; and during the year a quantity of ledge rock and numbers of boulders have been removed from the channel at the Narrows and at the Red Rapids. Expenditure, \$735.15. Total expenditure since Confederation, \$3,523.56.

SALMON RIVER,

In Albert County. It empties into Salisbury Bay, at the head of the Bay of Fundy.

At the Session of 1883 the sum of \$4,000.00 was voted for the construction of a breakwater at this place. On 16th October, 1883, a contract was entered into with Mr. D. Cleveland for the construction of a breakwater, 180 feet in length, and during the fiscal year the work has been completed. Expenditure, \$4,268.76, which is the only expenditure made at this place since Confederation.

TYNEMOUTH CREEK.

Empties into the north side of the Bay of Fundy, about 25 miles to the eastward of the harbour of St. John.

During the fiscal year the sum of \$500.00 was expended on further works in connection with the breakwater referred to in last report, to prevent an erosion of the sea wall separating the inner basin from the bay. Total expenditure at this place since Confederation, \$4,500.00.

MARITIME PROVINCES GENERALLY.

At the Session of 1883 the sum of \$10,000.00 was voted for staff and maintenance of harbours and rivers in the Maritime Provinces generally; and during the fiscal year the expenditure has been \$4,676.80.

PROVINCE OF QUEBEC.

ANSE ST. JEAN,

In the County of Chicoutimi, on the south-west side of the River Saguenay, 25 miles above its mouth.

During the year the freight shed on the pier at this place, referred to in last report, has been completed with the balance of appropriation brought forward from 1882-83. Expenditure, \$485.20. Total expenditure at this place since Confederation \$6,681.45.

BAGOTVILLE (ST. ALPHONSE),

In the County of Chicoutimi, at the head of Ha! Ha! Bay, River Saguenay.

With the balance of appropriation brought forward from 1882-83, the block placed at the outer end of the pier for the purpose of strengthening it, which was referred to in last year's report, was brought to completion, and the pier itself was raised from 2 to 3 feet over its whole length, thus bringing the flooring well above high water mark. Expenditure, \$3,586.03. Total expenditure at this place since Confederation, \$17,080.06.

BAIE ST. PAUL,

In the County of Charlevoix, on the north shore of the St. Lawrence, 60 miles below Quebec.

At the Session of 1883 the further sum of \$12,000.00 was voted for the purpose of continuing the construction of the pier at Pointe Rouge, Cap aux Corbeaux, which was mentioned in last report. During the fiscal year the pier was extended a further distance of 160 feet, and an abutment 170 feet long was built at the shore end to facilitate the approach. The portion of the work left unfinished during the previous year was completed. A further amount having been appropriated for the year 1884-85, it was expected that the pier would be completed before the close of navigation. Expenditure, \$12,228.38. Total expenditure at this place since Confederation, \$56,595.96, of which \$30,974.93 was for the pier at Cap aux Corbeaux, and \$25,621.03 for an isolated pier built on the west side of the bay in 1874-75, for the accommodation of lightships, and not connected with the shore.

BARACHOIS DE LA MALBAIE,

In the County of Gaspé, on the north shore of the Baie des Chaleurs.

At the Session of 1883 the sum of \$1,000.00 was voted for the purpose of improving the channel to the inner harbour, and during the fiscal year a quantity of stones and boulders have been removed. Expenditure, \$986.04, which is the only expenditure made at this place since Confederation.

BERTHIER (EN BAS),

In the County of Bellechasse, on the south shore of the St. Lawrence.

At the Session of 1883 the sum of \$7,500.00 was voted towards the extension of this pier (which was built prior to Confederation at a cost of \$37,724.14), 100 feet in length by 25 feet wide, with an arm 80 feet long by 30 feet wide, standing in a depth of 14 feet at low water. On 28th February, 1884, a contract was entered into with Mr. A. Guerard for the extension, for the sum of \$9,700.00, and work was commenced towards the close of the fiscal year. Expenditure, \$522.93. Total expenditure at this place since Confederation, \$9,547.08.

BIC,

In the County of Rimouski, on the south shore of the St. Lawrence, 130 miles below Quebec.

At the Session of 1883 the sum of \$7,500.00 was voted towards the construction of a pier to the eastward of the small group of islets which lie in the mouth of the Bic River. It will be 430 feet long, consisting of piers 20 feet square, placed about 30 feet apart and connected with stringers, and have a depth of 15 feet at its outer end at low water. On 2nd April, 1884, a contract, amounting to \$6,637.54, was entered into with Mr. W. E. Butchard for the supply of timber, but very little had been done up to the close of the fiscal year. Expenditure, \$226.41, which is the only expenditure made at this place since Confederation.

BLACK RIVER,

In the County of Wolfe. A tributary of the St. Francis, which it joins about a mile below the town of Drummondville.

Cuts have been made through the Lussier and Lafond Rapids, a distance of 2,830 feet, to facilitate the descent of timber and prevent the flooding of adjacent lands during rainy seasons and times of freshet. Expenditure, \$681.17.

CAP A L'AIGLE,

In the County of Charlevoix, Murray Bay, on the north shore of the St. Lawrence.

At the Session of 1884 the sum of \$345.00 was voted to pay for fenders and posts for the pier at this place, and the amount was expended for that purpose. Total expenditure at this place since Confederation, \$3,541.25.

CARLETON,

In the County of Bonaventure, on the north side of the Baie des Chaleurs.

With the unexpended balance brought forward from 1882-83 some minor works on this pier were completed. Expenditure, \$167.02. Total expenditure at this place since Confederation, \$7,226.33.

CHENAL DU MOINE,

In the County of Yamaska, on the south-east shore of the St. Lawrence, about 3 miles below Sorel.

At the Session of 1883 the sum of \$3,000.00 was voted for the construction of two more ice piers at the entrance to the Chenal du Moine, and during the fall and winter of 1883-84 the work was carried out. These piers, as well as those built in 1880-81, are intended to prevent the ice, at the breaking-up of the river in the spring, being swept over and damaging the low-lying lands along the shore. Both of the new piers were very badly damaged during the breaking up of the ice in the spring of 1884, but prevented damage to the farms, thus proving their usefulness. Expenditure, \$3,499.45. Total expenditure at this place since Confederation, \$5,494.35.

CHICOUTIMI,

In the County of Chicoutimi, on the south side of the River Saguenay, at the head of navigation, and 71½ miles from Tadoussac.

At the Session of 1883 the sum of \$1,500.00 was voted for the purpose of building an addition to the pier, on which to place a freight shed, required to accommodate the increasing trade of the place. During the year a quantity of slabs have been placed between the head of the pier and the shore, for a distance of 210 feet by a width of 70 feet, and on this extension a freight shed has been built. Expenditure, \$2,145.84. Total expenditure at this place since Confederation, \$19,314.30.

ETANG DU NORD,

In the County of Gaspé, situated at the western end of Grindstone Island, one of the Magdalen Islands, Gulf of St. Lawrence.

At the Session of 1883 the sum of \$9,000.00 was voted to continue the construction of the breakwaters at this place, which, added to \$1,568.46, carried forward from 1882-83, made a total of \$10,568.46 available for this purpose. At the close of 1883 a further length of 225 feet had been added to the length of the breakwater; but during a heavy gale in December the stone forming the slopes was washed away, together with the superstructure over the whole length mentioned. Owing to the

geological formation of the Magdalen Islands, stone fit for ballast cannot be obtained in any of the group, and it has, therefore, to be brought from points on the mainland, and late in the fall it becomes a very difficult matter to land a cargo at Etang du Nord. Expenditure, \$10,506.87. Total expenditure at this place since Confederation, \$34,938.41.

HARBOURS AND RIVERS GENERALLY, QUEBEC.

At the Session of 1883 the sum of \$10,000.00 was voted for repairs, &c., to harbours and rivers generally, in the Province of Quebec, and during the fiscal year the sum of \$3,390.18 was expended.

ILE AUX COUDRES,

In the County of Charlevoix, on the north-west side of the St. Lawrence, about 12 miles from Baie St. Paul.

At the Session of 1883 the sum of \$1,000.00 was voted for the purpose of raising the outer end of the pier built by the Department in 1881-82, which had settled about 3 feet. During the fiscal year the pier was raised and the outer face, which had been damaged by ice, repaired. Expenditure, \$1,167.78. Total expenditure at this place since Confederation, \$5,135.78.

ILE AUX GRUES,

In the County of Montmagny, opposite Cap^s St. Ignace, on the south side of the St. Lawrence, 30 miles below Quebec.

At the Session of 1883 the sum of \$5,000.00 was voted towards connecting the block of cribwork on which the lighthouse stands, and which was referred to in last year's report, with the shore, by the means of cribwork 440 feet long, 25 feet wide, and from 7 to 15 feet high. On 30th January, 1884, a contract was entered into with Messrs. Normand & Duclos, for the sum of \$8,250.00, and at the close of the year the work was well under way. Expenditure, \$1,145.73. Total expenditure at this place since Confederation, \$12,861.90.

LANORAIE,

In the County of Berthier, on the north-west shore of the St. Lawrence.

At the Session of 1883 the sum of \$5,000.00 was granted for the purpose of building a pier at this place, which is the terminus of the Joliette branch of the North Shore Railway; and on the 10th April, 1884, a contract was entered into with Messrs. Normand & Dusablon for its construction, for the sum of \$4,500.00. At the close of the fiscal year the work was well under way. The pier will be 265 feet in length, 30 feet wide, on blocks of cribwork, connected by stringers to carry the roadway, with a head 60 feet by 30 feet at outer end, and extending to 9 feet depth at extreme low water. Expenditure, \$208.15, which is the only expenditure at this place since Confederation.

LES EBOULEMENTS,

On the north shore of the St. Lawrence, 69 miles below Quebec, in the County of Charlevoix.

Needed repairs, in the renewal of iron plating on the corners of the pier, carried away by the ice, and re-laying new flooring, were executed during the summer of 1883. Expenditure, \$498.65. Total expenditure at this place since Confederation, \$16,198.96.

LOURDES,

In the County of Compton, at the south-eastern corner of Lake Megantic.

At the Session of 1883 the further sum of \$1,500.00 was voted toward the construction of piers in Lake Megantic. During the year a pier 190 feet long has been built at Lourdes. Expenditure, \$1,194.71, which is the only expenditure at this place since Confederation.

MALBAIE (OR MURRAY BAY),

In the County of Charlevoix, on the north shore of the St. Lawrence, 84 miles below Quebec.

During the year the iron plates on the corners of the wharf which were carried away by the ice, have been replaced. A shed, covering the landing slip and a portion of the head of the wharf, was built, and a hand-rail placed to separate the waggon and foot traffic. Expenditure, \$1,099.11. Total expenditure at this place since Confederation, \$19,484.21.

MATANE,

In the County of Rimouski, on the south shore of the St. Lawrence, 240 miles below Quebec.

At the Session of 1883 a further sum of \$5,000.00 was granted towards the improvement of this harbour, which, added to the \$90.65 carried forward from 1882-83, made a total of \$5,090.65 available for this purpose. During the fiscal year pile protection works were commenced on the eastern side of the harbour, and the damage done to the pier by ice last spring repaired. Expenditure, \$5,199.19. Total expenditure at this place since Confederation, \$20,629.98.

NEW CARLISLE,

In the County of Bonaventure, on the north side of the Baie des Chaleurs.

At the Session of 1883 the further sum of \$6,000.00 was granted to continue work on this pier, which, added to the \$3,026.65, carried forward from 1882-83, made a total of \$9,026.65 available for that purpose. During the year the further work of construction was prosecuted, but owing to the insufficiency of the amount available, a further quantity of work remains to be done. Expenditure, \$9,026.53. Total expenditure at this place since Confederation, \$19,220.08.

NEWPORT RIVER,

In the County of Gaspé, at the entrance to, and on the north side of, the Baie des Chaleurs.

At the Session of 1883 the sum of \$400.00 was voted for the improvement of this river, but up to the end of the fiscal year work had not been commenced, and only a small expenditure of \$7.70 made.

PERCÉ,

In the County of Gaspé, east end, at entrance to Baie des Chaleurs.

At the Session of 1883 the sum of \$10,000.00 was voted for the construction of a landing pier 200 feet long and having 12 feet depth of water at its outer end at low spring tide. On 21st March, 1884, a contract was entered into with Mr. C. H. Burman for supplying the timber, for \$3,347.25, and at the close of the fiscal year some of it had been delivered. Expenditure during the year, \$1,515.00. Total expenditure at this place since Confederation, \$2,014.43.

PHILLIPSBURGH,

In the County of Missisquoi, on the east side of Lake Champlain.

At the Session of 1883 the sum of \$4,000.00 was voted for the construction of a pier 600 feet long, and having 8 feet depth of water, at Phillipsburgh Harbour, Missisquoi Bay, the locality to contribute \$4,000.00; but up to the close of the fiscal year no action had been taken. Expenditure, \$32.79. Total expenditure at this place since Confederation, \$218.54.

PORT AU SAUMON,

In the County of Charlevoix, on the north shore of the St. Lawrence, 12 miles to the eastward of Murray Bay.

During the fiscal year the further sum of \$499.59 was expended in completing the work of removing boulders obstructing navigation, and the entrance to the harbour has been made easier of access than in past years. Total expenditure at this place since Confederation, \$961.67.

PORT DANIEL,

In the County of Bonaventure, on the north side of the Baie des Chaleurs.

At the Session of 1883 the sum of \$6,000.00 was re-voted towards the construction of a landing pier at Port Daniel, Bay des Chaleurs, the Municipality having agreed to furnish the timber; but up to the close of the fiscal year no action had taken place, and there had been no expenditure.

QUEBEC MARINE HOSPITAL WHARVES.

At the Session of 1883 the further sum of \$2,000.00 was voted to continue the repairs to the wharf forming the eastern boundary of the Marine Hospital, built

many years ago by the Provincial Government, and during the fiscal year the work was carried on. Expenditure, \$2,039.72. Total expenditure at this place since Confederation, \$5,333.49.

QUEBEC QUEEN'S WHARF.

At the Session of 1883 the sum of \$8,200.00 was voted towards repairing this wharf and the buildings on it, occupied by the Department of Marine and Fisheries. On the 31st October, 1883, a contract was entered into with Mr. T. E. Normand, for the sum of \$8,048.60, for taking down and rebuilding from low water mark the faces of the wharf; but work had not commenced at the close of the fiscal year. Expenditure \$190.85, which is the only expenditure at this place since Confederation.

RIVIÈRE BATISCAN,

In the County of Champlain. Empties into the St. Lawrence, on its north shore, about 57 miles above Quebec.

At the Session of 1883 the sum of \$2,000.00 was voted for the purpose of dredging a channel 100 feet wide, and having a depth of 5 feet at low water, through the shoal at the mouth of the river; and during the fiscal year the work was carried out at a cost of \$1,999.97, which is the only expenditure at this place since Confederation.

RIVIÈRE BLANCHE

Flows through the County of Rimouski, and empties into the St. Lawrence on its southern shore, about 25 miles east of the River Métis and 9 miles from Matane.

At the Session of 1883 the further sum of \$5,000.00 was voted for the purpose of continuing the work of connecting with the shore the isolated block built by the Department in 1876; and during the fiscal the work was completed. Expenditure \$5,186.65. Total expenditure at this place since Confederation, \$12,445.06.

RIVIÈRE AU LIÈVRE,

In the County of Ottawa, on the north side of the River Ottawa.

At the Session of 1883 the further sum of \$4,000.00 was voted for the purpose of further improving the navigation of this river; and during the year a floating stage, carrying a double geared winch, has been placed in the river above the Little Rapids, to facilitate the passage of barges engaged in the phosphate industry. Expenditure, \$548.50. Total expenditure at this place since Confederation, \$5,732.55.

RIVIÈRE DU LOUP (EN BAS),

In the County of Temiscouata, on the south-east shore of the St. Lawrence.

At the Session of 1883 the further sum of \$11,000.00 was voted to continue the repairs to this pier (which was built by the Provincial Government in 1855, at a cost of \$170,129.35), and to build an extension of 100 feet from the eastern end. On

15th December, 1883, a contract for the extension was entered into with Messrs. Aikman & Wardle, for the sum of \$21,950.00; and at the close of the fiscal year the work was well under way. Expenditure, \$10,098.18 Total expenditure at this place since Confederation, \$27,242.97.

RIVER NICOLET,

In the County of Nicolet, on the south-east side of Lake St. Peter.

At the Session of 1883 the further sum of \$15,000.00 was voted to continue the work of forming a harbour of refuge at this place, which, added to the \$11,311.85, carried forward from 1882-83, made a total of \$26,311.85 available for the purpose. During the fiscal year dredging the channel to the main channel of the St. Lawrence was completed, and pile protection work on the western side of the harbour was commenced. Expenditure, \$30,995.76. Total expenditure at this place since Confederation, \$42,064.40.

RIVER OTTAWA—BRISTOL TO PORTAGE DU FORT,

On the north shore of the river, in the County of Pontiac.

At the Session of 1883 the sum of \$2,000.00 was voted to continue the work of removing the bars of sand, gravel and clay obstructing the approaches to Bristol wharf and Portage du Fort, so as to give 8 feet depth at low water; and during the year the work has been carried on. Expenditure, \$2,007.50. Total expenditure at this place since Confederation, \$5,052.55.

RIVER OTTAWA—CALUMET,

In the County of Argenteuil, on the north side of the river, about 60 miles below the City of Ottawa.

With the appropriation of \$1,000.00 carried forward from 1882-83, dredging at this place was done by the "Nipissing" from 18th to 26th July, 1883, and from 3rd to 10th November, deepening to a depth of 7 feet the entrance from the main channel of the Ottawa. Expenditure, \$454.67, which is the only expenditure at this place since Confederation.

RIVIÈRE OUELLE,

In the County of Kamouraska, on the south shore of the St. Lawrence, 75 miles below Quebec.

At the Session of 1883 the further sum of \$4,500.00 was voted to continue the work of raising the outer end of the pier at this place, which was built by the Provincial Government in 1856, at a cost of \$225,229.87. During the year the work was continued, and provision was made for completing it in the fiscal year 1884-85. Expenditure, \$4,547.16. Total expenditure at this place since Confederation, \$19,895.71.

RIVER RICHELIEU.

At the Session of 1833 the sum of \$3,000.00 was voted for the purpose of building a wharf on the eastern bank of the Richelieu River, on the road between Lacolle and Clarenceville. On the 30th January, 1884, a contract was entered into with Mr. R. H. Rogers, for the sum of \$3,000.00; and during the year the work has been completed. Expenditure, \$3,516.44, which is the only expenditure at this place since the Confederation.

RIVER SAGUENAY—CHANNEL BELOW CHICOUTIMI,

County of Chicoutimi.

At the Session of 1883 the further sum of \$7,000.00 was granted toward continuing the improvement of the channel of the River Saguenay below Chicoutimi, by the removal of boulders and dredging, so as to obtain a navigable depth of 10 feet for sea-going vessels during low tide. During the year 1,050 cubic yards of boulders, &c., were removed, and 5,200 cubic yards of earth, sand and gravel dredged. Expenditure, \$7,082.97. Total expenditure at this place since Confederation, \$25,633.23.

RIVER SAGUENAY—LA GRANDE DÉCHARGE,

In the County of Chicoutimi. The larger of the two outlets through which the waters of the Lake St. John flow into the Saguenay.

At the Session of 1833 the further sum of \$5,000.00 was voted to continue the work of improving this outlet, so as to increase its off-take capacity and prevent the shores of the lake being flooded in the spring; and during the year the work was prosecuted. Expenditure, \$4,996.29. Total expenditure at this place since Confederation, \$13,427.67.

RIVER SAGUENAY—LAKE ST. JOHN SURVEY,

In the County of Chicoutimi.

At the Session of 1833 the sum of \$4,000.00 was appropriated for the purpose of making a survey of Lake St. John, and during the year the survey was made. Expenditure, \$3,938.23.

RIVER ST. FRANCIS,

Rises in the County of Wolfe, and after a course of about 100 miles, empties into Lake St. Peter, on its southern shore.

At the Session of 1883 a further sum of \$1,500.00 was granted for the improvement of this river, so as to facilitate the descent of timber. At Spicer's Rapids and Drummondville Falls the channel of the river has been improved by the removal of points of rock and boulders, thus greatly facilitating the descent of timber, &c. Dredging at the mouth of the river was carried on until the close of the fiscal year. Expenditure, \$4,154.33. Total expenditure at this place since Confederation, \$21,303.20.

 RIVER ST. LAWRENCE—REMOVAL OF CHAINS, &c.

At the Session of 1883 the further sum of \$5,000.00 was voted to continue the work of removing chains, boulders, &c., from the St. Lawrence, which, added to the \$9,722.54 carried forward from 1882-83, made a total of \$14,722.54 available for that purpose. The lifting barge, which was constructed in 1875 especially for this service, and which was operated for several years by the Harbour Commissioners at Quebec, was removed to Three Rivers, and during the season was engaged in removing the large boulders from the shoal opposite that place. Expenditure, \$14,246.61. Total expenditure in connection with the removal of chains, &c., \$108,341.05 (including \$35,000.00, cost of sifting barge), of which \$93,816.98 was for services performed in the harbour of Quebec, and \$14,524.07 for services at Three Rivers.

RIVER ST. LAWRENCE—DORVAL.

A large boulder, which impeded the navigation of the Dorval channel, has been removed. Expenditure, \$209.54.

RIVER ST. LOUIS,

In the County of Beauharnois. Empties into the St. Lawrence at the Town of Beauharnois.

At the Session of 1883 the sum of \$10,000.00 was voted towards the improvement of the St. Louis River, and during the year good progress has been made with the work. Expenditure, \$9,432.89, which is the only expenditure at this place since Confederation.

RIVER YAMACHICHE

Flows southerly through the County of St. Maurice, and empties into Lake St. Peter, about 16 miles above Three Rivers.

The river having become blocked by a land slide, which occurred at a point about 15 miles inland, a channel was partially cut through the obstruction to remove the flood which had taken place. Expenditure, \$3,000.00, which is the only expenditure on this river since Confederation.

RIVER YAMASKA,

In the County of Yamaska. Empties from the south into the head of Lake St. Peter, River St. Lawrence.

At the Session of 1883 a further sum of \$18,000.00 was voted for the continuance of the work referred to in last report, which, added to \$3,851.77, carried forward from 1882-83, made a total of \$21,851.77 available for this purpose. The work has been delayed by the abandonment of their contract by Messrs. Gaherty, Brecken & Davis. At the close of the fiscal year fresh tenders had been called for the completion of the work. Expenditure, \$11,070.24. Total expenditure at this place since Confederation, \$35,771.46.

SAULT AUX COCHONS,

In the County of Charlevoix, on the north shore of the St. Lawrence.

At the Session of 1883 the sum of \$4,000.00 was voted towards the construction of a pier at Sault aux Cochons, on the north shore of the St. Lawrence, about midway between Isle d'Orleans and Isle aux Coudres; but up to the close of the fiscal year work had not been commenced, and only some preliminary expenses incurred. Expenditure, \$161.80, which is the only expenditure at this place since Confederation.

STE. AGNES,

On Lake Megantic, in the County of Beauce.

During the fiscal year the pier referred to in last report has been completely filled with ballast, fenders have been placed, and a shed for the reception of goods has been constructed. Expenditure, \$1,227.43. Total expenditure at this place since Confederation, \$5,876.78.

ST. FRANCOIS (ILE D'ORLÉANS),

At the extreme eastern end of the Island. In the County of Montmorency.

At the Session of 1883 the further sum of \$6,000.00 was voted to continue the construction of a landing pier at this place, and during the year an additional length of 135 feet has been built and repairs made to the portion constructed last year, which had been damaged by ice in the spring. Expenditure, \$6,179.22. Total expenditure at this place since Confederation, \$10,226.83.

ST. JEAN (ILE D'ORLÉANS),

In the County of Montmorency. On the south-east side of the Island.

At the Session of 1883 the sum of \$6,000.00 was voted towards the purchase of a pier built by the Municipality, about twenty-five years ago, and on which the Department of Marine and Fisheries constructed a lighthouse in 1874. Up to the close of the fiscal year the purchase had not been completed. Expenditure, \$60.55. Total expenditure at this place since Confederation, \$531.48.

ST. JEAN PORT JOLI,

In the County of L'Islet, on the south shore of the St. Lawrence, 54 $\frac{3}{4}$ miles below Quebec.

With the unexpended balance of appropriation carried forward from 1882-83, the addition of 50 feet to this pier, referred to in last report, was completed. Expenditure, \$4,892.10. Total expenditure at this place since Confederation, \$8,509.92.

ST. TIMOTHÉE,

In the County of Beauharnois, on the south shore of the St. Lawrence, at the head of the Châte aux Bouleaux Rapids.

The landing pier referred to in last year's report as being completed, was damaged by ice during the breaking up of the St. Lawrence last spring, and during the fiscal year the sum of \$187.21 was spent in replacing it. Total expenditure at this place since Confederation, \$2,039.77.

ST. ZOTIQUE,

In the County of Soulanges, at the foot of Lake St. Francis, 3 miles from Coteau Landing.

At the Session of 1883 the further sum of \$4,500.00 was voted towards connecting with the shore—a distance of 1,150 feet—the isolated block mentioned in last report; and at the close of the fiscal year the work was nearly completed. Expenditure, \$4,708.18. Total expenditure at this place since Confederation, \$9,258.67.

THREE RIVERS

At the head of tide water in the St. Lawrence, 72 miles above Quebec.

With the balance of appropriation carried forward from 1882-83, the work of removing the top of the shoal in front of this harbour, so as to obtain a depth of about 5 feet at low water, which was mentioned in last report, was continued during the fiscal year. Expenditure, \$8,848.20. Total expenditure at this place since Confederation, \$25,727.58.

TROIS PISTOLES,

In the County of Temiscouata, on the south shore of the St. Lawrence, 148 miles below Quebec.

At the Session of 1883 the further sum of \$1,500.00 was voted towards the completion of the pier at this place, which was commenced by the Department, and during the fiscal year two of the blocks which had been damaged by ice were repaired and an additional portion of the work constructed. Expenditure, \$1,511.12. Total expenditure at this place since Confederation, \$7,556.71.

PROVINCE OF ONTARIO.

BELLEVILLE

Is situated at the mouth of the River Moira, on the Bay of Quinté, in East Hastings.

At the Session of 1883 the sum of \$6,000.00 was voted towards the dredging of a channel 1,875 feet by 100 feet wide, to a depth of 14 feet, the municipality contributing \$4,000.00 towards the cost. On the 26th October, 1883, a contract was entered into with Mr. C. A. Munson for dredging, at the rate of \$7.00 per hour, and
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during the year the work was proceeded with. Expenditure, \$5,015.92. Total expenditure at this place since Confederation, \$27,704.16.

BELLE RIVER,

In the County of Essex, empties into Lake St. Clair, midway between the mouths of the Thames and Detroit Rivers.

A small length of pile protection work has been built at the mouth of the river, with the view of protecting the shallow channel which has been formed, to permit boats and scows to enter and ascend the river. Expenditure, \$2,032.50.

CHANTRY ISLAND

Is situated in North Bruce, on the east coast of Lake Huron.

At the Session of 1883 the sum of \$5,000.00 was voted for the purpose of protecting the northern part of this island, which was in danger of being washed away, thus endangering the safety of the lighthouse which was built here by the Provincial Government in 1859, and protected by a breakwater in 1865, the total expenditure, prior to Confederation being \$31,910.95. Since Confederation, extensive works have been carried out to form a harbour of refuge. During the fiscal year a groyne, 277 feet in length, has been constructed. Expenditure, \$2,345.30. Total expenditure at this place since Confederation, \$237,815.11.

COBOURG

Is situated in West Northumberland, on the north shore of Lake Ontario.

At the Session of 1883 the further sum of \$20,000.00 was voted to continue the work of extending the piers at this place, which, added to \$6,811.84 carried forward from 1882-83, made a total of \$26,811.84 available for that purpose. On 10th March, 1884, a contract was entered into with Mr. J. W. Dinwoodie for a further extension of the eastern pier, the contract price being \$22,750.00; and at the close of the fiscal year the work was well under way. Owing to the failure of Mr. Waddell to proceed with his contract, which was referred to in last report, the work was taken in hand by his assignees, Messrs. J. W. Brown & Co.; but up to the close of the fiscal year very little progress had been made. Expenditure, \$14,850.24. Total expenditure at this place since Confederation, \$116,861.64.

COLLINGWOOD,

Is situated in North Simcoe, on the south shore of Georgian Bay, Lake Huron.

At the Session of 1883 the further sum of \$26,000.00 was voted towards continuing the extension of the breakwater on the eastern side of the harbour, and dredging to a depth of 16 feet, which, added to \$1,067.45, carried forward from 1882-83, made a total of \$27,066.45 available for this purpose. The contract for 600 feet of breakwater, referred to in last report, was completed on 18th September, 1883; and on

23rd November, 1883, a contract was entered into with Mr. Robert Reed, for the sum of \$18,613.00, for a further extension of 600 feet. At the close of the fiscal year about one-half of this work was finished; and a further grant having been made at the Session of 1884, the work was being prosecuted so as to have it completed, if possible, before the close of navigation. The work of dredging the channel, at the entrance of the harbour, was continued during the year, and the deepening of a basin at the southern end of the harbour was commenced. Expenditure, \$3,802.27. Total expenditure at this place since Confederation, \$139,371.64, including \$28,268.26 spent by the Northern Railway Company in 1874-75.

CONSECON

Is situated at the mouth of the Consecon River, in Prince Edward County, on Weller's Bay, on the north shore of Lake Ontario.

At the Session of 1883 the further sum of \$3,000.00 was voted to continue the dredging to a depth of 9 feet at low water the channel and approaches to the wharves at this place, which sum, added to \$1,910.06, carried forward from 1882-83, made a total of \$4,910.06 available for that purpose, and during the year further dredging was done. Expenditure, \$3,012.85. Total expenditure at this place since Confederation, \$8,178.23.

GODERICH,

At the mouth of the River Maitland, in West Huron, upon the east shore of Lake Huron.

At the Session of 1883 the further sum of \$5,000.00 was voted, which, together with the \$7,465.31, carried forward from 1882-83, made a total of \$12,465.31 available for the purpose of continuing the improvement of this harbour. During the fiscal year the works for the protection of the land between the north pier at the entrance, and the breakwater, which had been abandoned by the contractor, as mentioned in last report, were completed. Repairs were made to the breakwater, which had received damage during the high freshet in April, 1883, and to the pier on the south side of the entrance, it having been found that a large quantity of stone filling had disappeared, by sinking, it is surmised, into the sandy bottom underneath the structure. A quantity of planking was also renewed, and new guard timbers placed where required. The dredge "Challenge" was employed in dredging in the harbour to 14 feet, where required, from the 22nd August to 20th October, 1883. Expenditure, \$6,860.16. Total expenditure at this place since Confederation, \$505,614.70, including \$10,000.00 contributed by the Township of Goderich in 1875.

HARBOURS AND RIVERS GENERALLY, ONTARIO.

At the Session of 1883 the usual vote of \$8,000.00 was made for maintenance of staff connected with harbours and rivers in Ontario, and during the fiscal year the sum of \$6,616.78 was expended.

KINCARDINE.

The harbour of Kincardine is situated in West Bruce, at the mouth of the River Penetangore, which empties into Lake Huron, 31 miles north of Goderich.

At the Session of 1883 the further sum of \$7,000.00 was voted to continue the repairs mentioned in last report as being in progress. The face of the northern pier has been close piled from the lighthouse eastwardly, a distance of 655 feet, and sheeting placed on the north or outer sides of the north pier for a distance of 200 feet, to prevent the influx of sand into the channel. The outer end of the north pier, carried away by a vessel during a storm, has been repaired and strengthened. The dredge "Challenge" worked in the entrance to the harbour from the 10th to the 23rd July, 1883, making a depth of 13 feet of water. Expenditure, \$6,829.69. Total expenditure at this place since Confederation, \$90,021.20.

KINGSTON

Is situated at the outlet of Lake Ontario, 172 miles west of Montreal.

At the Session of 1883 a further sum of \$12,500.00 was voted to continue the work of removing the top of Point Frederic shoal, which, added to \$6,191.51, carried forward from 1882-83, made a total of \$18,691.51 available for that purpose. During the fiscal year the work of removing the top of the shoal, so as to give 15 feet depth at low water, was carried on, and was continued up to the close of navigation. Expenditure, \$3,169.13. Total expenditure at this place since Confederation, \$29,292.02.

KINGSVILLE,

In South Essex, on Lake Erie, between Point Pelee and the Detroit River about 25 miles east from Amherstburg.

At the Session of 1883 the further sum of \$32,500.00 was granted towards the construction of a harbour of refuge, and dredging it to 12 feet at low water. On 28th July, 1883, a contract for the work was entered into with Mr. Geo. J. Wilson, for the sum of \$33,500.00, and up to the close of the fiscal year about one-half of the work had been completed. The dredge "Challenge" operated here on account of the contractor, from 25th April to the close of the fiscal year. Expenditure, \$18,392.25. Total expenditure at this place since Confederation, \$22,721.39.

LITTLE BEAR CREEK

Is in the Counties of Kent and Bothwell, and empties into the Chenal Ecarté, on the eastern side of St. Anne's Island, Lake St. Clair, about 16 miles from Chatham and 7 miles from Wallaceburg.

At the Session of 1883 the sum of \$5,000.00 was granted towards dredging a channel 40 feet wide, and having a depth of 8 feet, from the Chenal Ecarté to the highway known as the "Bear Line," a distance of about a mile. During the fiscal

year dredging was proceeded with; and, as an additional sum was granted at the Session of 1884, it was expected that the work would be completed before the close of navigation. Expenditure, \$5,167.00, which is the only expenditure at this place since Confederation.

LITTLE CURRENT.

Little Current is the channel between La Cloche and Manitoulin Islands, on the route to Sault Ste. Marie from Georgian Bay ports, and is distant from Collingwood about 140 miles.

At the Session of 1883 a further sum of \$10,000.00 was voted to continue the work of blasting away the rock in this channel, which was commenced in 1880; and from 23rd May to 10th November, 1883, operations were carried on, during which time 4,266 cubic yards of rock have been removed. Work was resumed in May, 1884, and was well in hand at the close of the fiscal year. A further appropriation having been made in 1884, work will be continued until that sum is exhausted. Expenditure, \$10,421.06. Total expenditure at this place since Confederation, \$32,437.99.

LITTLE NATION RIVER,

In the County of Prescott.

At the Session of 1883 the sum of \$2,000.00 was voted for the removal of obstructions in this river; but up to the close of the fiscal year nothing had been done, and no expenditure had taken place. Expenditure since Confederation, \$235.66.

L'ORIGINAL.

L'Original is situated in the County of Prescott, on the south side of the Ottawa River, 6½ miles above Grenville.

At the Session of 1883 the sum of \$3,000.00 was voted for the purpose of repairing the pier at this place. It was built a length of 534 feet, under Local Commissioners of the Provincial Government, prior to the Union, 10th February, 1841; since the Union it was extended 800 feet further, or a total length of 1,354 feet up to 1867, by the Local Municipality, aided by a grant of \$2,000.00 from the Provincial Government. The Parliamentary vote of 1883-84 was supplemented by a grant of \$1,000.00 from the Municipality. In the the spring of 1883 the outer portion of the pier, was destroyed by ice; and during the fiscal year it has been rebuilt. The dredge "Nipissing" was engaged here from 8th October to 2nd November, dredging in front of the pier to a depth of 7 feet. Expenditure, \$5,331.90, which is the only expenditure made at this place since Confederation.

MEAFORD.

Meaford is situated in East Grey, on the south-west side of Georgian Bay, 18 miles from Collingwood and 20 miles east of Owen Sound.

At the Session of 1883 the further sum of \$5,000.00 was granted, which, together with \$5,750.05, carried from 1882-83, made a total of \$10,751.05 available for the purpose of continuing the work of repairing the older or inshore portion of the pier at this place. The contract referred to in last year's report was completed in October, 1883; but further repairs are necessary. Expenditure \$9,862.28. Total expenditure at this place since Confederation, \$40,326.36, including \$10,000.00 contributed by the Township of St. Vincent.

MIDLAND,

In East Simcoe, at the foot of Gloucester Bay, an arm of Georgian Bay, and the terminus of the Midland Division of the Grand Trunk Railway.

At the Session of 1883 the sum of \$10,000.00 was voted towards dredging to a depth of 17 feet at low water in front of the proposed new railway wharf; but up to the close of the fiscal year nothing had been done, and no expenditure had taken place.

MORPETH.

Morpeth is situated in West Elgin, on Lake Erie, about 10 miles east from Rondeau.

At the Session of 1883 the sum of \$4,000.00 was voted towards the erection of a pier 500 feet in length, and having a depth of 12 feet at low water at its outer end. This was supplemented by a grant of \$4,202.27 by the Municipality. On the 5th March, 1884, a contract was entered into with Mr. J. E. Askwith for the sum of \$17,400.00, and at the close of the fiscal year the work was well under way. Expenditure, \$5,768.03. Total expenditure at this place since Confederation, \$6,282.43.

NEWCASTLE.

Newcastle is situated in West Durham, on Lake Ontario, 47 miles eastward of Toronto.

At the Session of 1883 a further sum of \$8,000.00 was voted to continue the work of repairing the pier, which, together with \$2,500.00, contributed by the Newcastle Harbour Commissioners, and \$3,785.59 carried forward from 1882-83, made a total of \$14,285.59 available for this purpose. During the fiscal year the work under the contract with Messrs. Munson & Rowe, mentioned in last year's report, has been actively proceeded with. Expenditure, \$12,703.03. Total expenditure at this place since Confederation, \$19,417.44.

OTONABEE RIVER.

At the Session of 1883 the sum of \$1,200.00 was voted for the purpose of improving the navigation of this river, by dividing the steamboat from the saw-log channel; but up to the close of the fiscal year nothing had been done, and no expenditure had taken place.

OTTAWA RIVER.

At the Session of 1883 the sum of \$3,000.00 was voted for the purpose of improving the channel at the Little Narrows, $5\frac{1}{2}$ miles above Pembroke, so as to give a depth of 8 feet at low water; and during the fiscal year a quantity of boulders have been removed. Expenditure, \$1,207.90.

OWEN SOUND.

Owen Sound is situated in North Grey, at the mouth of the Sydenham River, which empties into Georgian Bay; and is the terminus of the Toronto, Grey and Bruce branch of the Canadian Pacific Railway, and the point of departure for lines of steamers plying to Port Arthur and ports in Georgian Bay.

At the Session of 1883 the further sum of \$5,000.00 was voted to continue the dredging of the harbour to a depth of 16 feet. During the fall of 1883 this depth was attained, but owing to the shifting nature of the bottom, shoaling took place, and soundings taken in March, 1884, showed an average depth of 14 feet only over the channel opened. Expenditure, \$6,583.05. Total expenditure at this place since Confederation, \$74,710.16.

PETERBORO'.

Peterboro', in the county of the same name, is situated on the Otonabee River, about $13\frac{1}{2}$ miles from its mouth.

At the Session of 1883 the further sum of \$3,000.00 was granted to continue the work of clearing the channel of the river and of Little Lake, which had become greatly obstructed with sawdust and other mill refuse. During the fiscal year the work referred to in last report was continued, and the relief asked for given. Expenditure, \$2,894.87. Total expenditure at this place since Confederation, \$3,782.35.

PORT ALBERT.

Port Albert is a small harbour in West Huron, and is formed by piers and dredging at the mouth of Nine Mile Creek, which empties into Lake Huron, about 19 miles north of Goderich.

With the balance of \$475.47, carried forward from 1882-83, the repairs referred to in last report were completed. During the winter of 1883 and spring of 1884, the older portions of the work were damaged. Expenditure, \$466.50. Total expenditure at this place since Confederation, \$11,712.34.

PORT ARTHUR.

On Thunder Bay, Lake Superior.

At the Session of 1883 the sum of \$50,000.00 was voted towards the construction of a breakwater at this place, and dredging the mouth of the Kaministiquia River; but very little was done before the close of the fiscal year. Since then contracts

have been entered into with Mr. C. S. Barker for dredging, and with Mr. Duncan McDonald for building the first section of the breakwater. Before the close of navigation the dredging was completed, and the breakwater was well under way. Expenditure during the fiscal year, \$1,698.72 at Port Arthur, and \$115.84 at the Kaministiquia River.

PORT ELGIN.

Port Elgin is situated in North Bruce, on the eastern shore of Lake Huron, 24 miles north of Kincardine.

At the Session of 1883 the further sum of \$6,100.00 was voted to continue the work of improving this harbour, which, added to \$1,466.05, carried forward from 1882-83, and \$5,000.00 contributed by the village, made a total of \$12,566.05 available for that purpose. During the year two groins of close pile-work with slopes of brush and stone have been built, with the view of preventing the washing in of sand into the harbour; and repairs have been made to the old breakwater. Expenditure, \$8,302.85. Total expenditure at this place since Confederation, \$23,336.80.

PORT HOPE.

Port Hope is situated in East Durham, on Lake Ontario, 63 miles east of Toronto.

At the Session of 1883 the further sum of \$14,000.00 was voted to continue the improvement of this harbour. The extension of the western pier, which was mentioned in last report as being under contract with Messrs. McNeely & Walters, was completed in September, 1883. During the winter and spring this pier was damaged by storms, and has since been repaired. Expenditure, \$13,526.45. Total expenditure at this place since Confederation, \$53,441.73.

RONDEAU.

Rondeau Harbour is in the County of Kent, on Lake Erie, 140 miles west from Port Colborne.

At the Session of 1883 a further sum of \$4,000.00 was voted to continue the improvement of this harbour, which, with \$1,105.72, carried forward from 1882-83, made a total of \$5,105.77 available for that purpose. During the year a further amount of dredging has been done to enlarge and deepen the basin immediately within the entrance from the lake, and extensive repairs were made to the eastern pier and breakwater in front of the Light-keeper's dwelling. Expenditure, \$5,649.32. Total expenditure at this place since Confederation, \$208,074.36.

SOUTHAMPTON.

Southampton is situated in North Bruce, at the mouth of the Saugeen River, which empties into Lake Huron.

At the Session of 1883 the sum of \$10,000.00 towards the extension of the pier at this place 250 feet to a depth of 14 feet at low water. On the 28th March, 1884,

a contract was entered into with Mr. D. Porter for the sum of \$9,750.00, and up to the close of the fiscal year, good progress had been made with the work. During the year a large amount was expended in repairing the breakwater, much of the damage to which is due to the careless manner in which masters of steamers bring their vessels alongside the structure. Expenditure, \$1,607.58. Total expenditure at this place since Confederation, \$10,167.18.

SYDENHAM RIVER.

The Sydenham River has its outlet in the Chenal Ecarté, the passage between St. Anne's Island and the mainland, Lake St. Clair. The river is navigable from its mouth to Wallaceburg, above which place it divides into two branches, north, to Wilkesport, 14 miles, and east, past Dresden, 15 miles. The navigation of these branches has been almost impossible, on account of obstructions, caused by sunken logs, &c.

At the Session of 1883 a further sum of \$5,000.00 was voted towards cleaning the channels of these branches, which, added to \$2,000.00 carried forward from 1882-83, made a total of \$7,000.00 available for the purpose. Work has been steadily carried on, and at the close of the fiscal year the east branch had been cleared for a distance of 11 miles, and the north branch for a distance of 6 miles, giving satisfaction to those using the river. Expenditure, \$6,604.10. Total expenditure on this river since Confederation, \$14,869.26.

THORNBURY.

Thornbury is situated in East Grey, at the mouth of Beaver River, which flows into Georgian Bay, 13 miles west of Collingwood.

With the unexpended balance of \$763.63 brought forward from 1882-83, and the grant of \$7,000.00 made by the township of Collingwood, the construction of protection works on the eastern side of the basin opened by the Department, was proceeded with during the year. Expenditure, \$7,050.15. Total expenditure at this place since Confederation, \$21,286.15, including \$7,000.00 from Township of Collingwood.

TORONTO.

The harbour of Toronto is on the north shore of Lake Ontario, 161 miles west of Kingston and 39 miles north-eastwardly from Hamilton.

At the Session of 1883 the sum of \$117,500.00 was voted for the continuance of the extensive harbour improvements in progress at this place, to which reference was made in last report, and at the Session of 1884, a further grant of \$40,000.00 was made, which sums, added to \$51,154.57 carried forward from 1882-83, made a total of \$208,654.57 available for the purpose. The works for the protection and improvement of this harbour are divided into two sections—Section 1, for the protection and preservation of the eastern side of the harbour, and the eastern end of Toronto

Island; and, Section 2, for the improvement of the western entrance and obtaining a greater depth of water than now exists and can be had in the present channel. Only the works comprised in Section 1, have, as yet, been undertaken. They consist of pile and stone protection works, extending along the eastern side of the harbour to the shore of Lake Ontario, at Ward's Island, so called, a distance of 4,170 feet, thence continuing in a south-westerly direction, a further distance of 2,330 feet, or a total length of 6,550 feet. Of this total length, 4,770 feet have been completed. On Toronto Island the whole of the piling has been completed. It extends from a point west of Mr. Gooderham's house to the channel in the "Eastern Gap," a distance of 6,500 feet. This work, although unfinished, proved to be of great benefit last spring, and prevented further washing away of the eastern end of the island. Expenditure during the fiscal year, \$253,363.15. Total expenditure by the Dominion Government on this harbour since Confederation, \$376,893.86.

WHITBY.

Whitby is situated in South Ontario, on the north shore of Lake Ontario, about 135 miles above Kingston, and 30 miles from Toronto.

With the unexpended balance of \$2,328.00 carried forward from 1882-83, the dredging referred to in last report as in progress to obtain a depth of 13 feet, was completed. Expenditure, \$2,350.50. Total expenditure at this place since Confederation, \$4,022.50.

WIARTON.

Wiarion is situated in North Bruce, at the head of Colpoys Bay, about 32 miles (by water) from Owen Sound, and is the terminus of the Grand Trunk, Georgian Bay and Lake Erie Railway.

At the Session of 1883 the further sum of \$5,000.00 was voted towards the completion of the wharf mentioned in last year's report as being under contract. With this amount added to \$1,104.00, carried forward from 1882-83, and \$21,000.00 contributed by the Municipality and the Grand Trunk, Georgian Bay and Lake Erie Railway Company, the work has been completed. This wharf is 1,040 feet in length, 20 to 25 feet wide, with a depth of from 14 to 18 feet at low water, along its face. Between it and the shore, a large amount of filling has been done, and one of the finest points, for shipment, on the Georgian Bay, completed. Expenditure, \$21,341.42. Total expenditure at this place since Confederation, \$55,232.42.

PROVINCE OF MANITOBA.

ASSINIBOINE RIVER.

At the Session of 1883 the sum of \$3,000.00 was voted to pay Mr. A. Tait, for the loss of the steamer *Adelaide*, and during the year the payment has been made.

Some repairs were made to the wing dam constructed in 1880. Expenditure during fiscal year, \$3,065.71. Total expenditure on this river, \$14,488.47.

HARBOURS AND RIVERS GENERALLY, MANITOBA.

At the Session of 1883 the sum of \$1,000.00 was voted for harbours generally in Manitoba; and during the year the sum of \$522.40.

RAINY RIVER.

During the fiscal year the sum of \$195.80 was expended in making an examination of this river.

RED RIVER.

This river which, taking its rise in the United States, flows past Emerson, Winnipeg and Selkirk, and empties into the southern end of Lake Winnipeg, is obstructed at its mouth by a large bar of sand.

At the Session of 1883 the sum of \$12,000.00 was voted towards dredging a channel to a depth of 12 feet at ordinary low water, through this bar. In 1883, some work was done with an extemporised drag. During the winter of 1883-84 a dredging plant was procured and set to work this spring. Expended during fiscal year, \$10,866.40. Total expenditure on this river, \$18,469.61.

NORTH-WEST TERRITORIES.

RIVER SASKATCHEWAN.

At the Session of 1883 the further sum of \$10,000.00 was voted to continue the improvements to this river, which are being carried out by the Hudson's Bay Company under an arrangement with this Department; which sum added to \$4,176.77 carried forward from 1882-83, made \$14,176.77 available for this purpose. During the fiscal year the work of removing obstructions between Edmonton and the mouth of the river were carried on under the direction of Mr. C. J. Brydges, and will be continued during the current year, an appropriation having been made for that purpose. Expenditure during the fiscal year, \$14,000.00. Total expenditure on the river, \$20,537.71.

PROVINCE OF BRITISH COLUMBIA.

COURTNEY RIVER.

At the Session of 1883 the sum of \$1,000.00 was voted for the removal of obstructions from this river; and during the fiscal year the sum of \$301.65 has been spent in cutting out and removing drift timber and snags which impeded navigation. Total expenditure in this river since Confederation, \$1,276.30.

COWICHAN RIVER.

At the Session of 1883 the sum of \$1,000.00 was voted for the improvement of this river. A channel has been made in two places, with the beneficial result of straightening the river, and thus reducing the undermining and wasting of its banks. Several heavy drift piles have also been cut out and burnt, by which means the facilities for driving timber have been improved, and the risk of the formation of timber dams lessened. Expenditure, \$1,041.89. Total expenditure on this river since Confederation, \$2,511.71.

FRASER RIVER.

At the Session of 1883 the sum of \$10,000.00 was voted towards the improvement of Cottonwood Canon, by the removal of certain rocks which impeded navigation; and during the year the work has been carried out under a contract with Mr. T. F. Sinclair, at a cost of \$9,854.42. Total expenditure on this river since Confederation, \$11,480.28.

HARBOURS AND RIVERS GENERALLY, BRITISH COLUMBIA.

At the Session of 1883 the sum of \$2,000.00 was voted for the improvement and maintenance of harbours and rivers generally in British Columbia, part of which vote has been expended in removing snags from the Nimpkisk river, under an arrangement with Messrs. Earle & Spencer, but payment had not been made at the close of the fiscal year. Expenditure for staff and maintenance \$599.17.

LILLOOET RIVER.

At the Session of 1883 the sum of \$500.00 was voted towards the improvement of this river, and during the fiscal year that amount has been spent in cutting out and removing drift timber.

NASSE RIVER.

The removal of snags, referred to in last report, was completed. Expenditure, \$113.00. Total expenditure on this river since Confederation, \$1,314.73.

STICKEEN RIVER.

At the Session of 1883 the sum of \$2,000.00 was voted towards the improvement of this river, but up to the close of the fiscal year no expenditure had taken place.

VICTORIA.

At the Session of 1883 the sum of \$3,000.00 was voted for the purpose of making a survey of Victoria Harbour, which has been done. During the year the sum of \$2,504.40, carried forward from 1882-83, was paid to the representatives of the late Thomas Spence, being the balance of his contract for the removal of "Beaver Rock." Expenditure during the year, \$5,292.78.

HARBOURS AND RIVERS GENERALLY.

At the Session of 1883 the usual sum of \$6,000.00 was voted for staff and maintenance of harbours and rivers generally, and during the fiscal year the sum of \$6,143.06 has been expended.

SURVEYS AND EXAMINATIONS.

At the Session of 1883 the sum of \$25,000.00 was voted for this service, and by Order in Council, of 28th May, 1884, the sum of \$3,000.00 was transferred from the appropriation for 1884-85 to that for 1883-84. During the fiscal year surveys and examinations were made at 193 places, a list of which will be found in Appendix No. 6, pages 90-94, and, with some exceptions, plans, reports and estimates have been submitted. Expenditure, \$28,982.61

DREDGING AND DREDGE VESSELS.

At the Session of 1883 the sum of \$253,600.00 was voted for new dredging plant, repairs and maintenance of plant, and dredging. At the Session of 1884 the further sum of \$8,000.00 was granted for dredging, and the unexpended balance of appropriation carried forward from 1882-83 was \$12,795.78, so that the total amount available was \$274,397.78. Of this sum \$6,389.09 lapsed on 30th September, 1883, \$252,112.57 were spent, and the balance remained unexpended on 30th June, 1884. The following is a statement of amount available, amount lapsed, and amount expended by Provinces:—

	Total amount available.	Lapsed, 30th September, 1883.	Expended, in present year, 1883-84.
New plant.....	\$116,654 35	.....	\$115,552 44
Dredge vessels, repairs	28,452 15	.....	24,714 71
Nova Scotia.....	} 60,000 00	.....	34,521 07
Prince Edward Island		.....	11,640 06
New Brunswick.....		.....	13,541 11
Quebec.....	20,335 26	.....	20,629 03
Ontario.....	25,511 37	3,539 75	12,875 56
British Columbia.....	15,198 92	.....	14,822 88
General service.....	8,245 73	2,849 34	3,815 71
	<hr/>	<hr/>	<hr/>
	\$274,397 78	\$6,389 09	\$252,112 57
	<hr/>	<hr/>	<hr/>

DREDGE VESSELS.

The dredging plant of this Department consists of two steam hopper dredges; one elevator dredge and six scows; ten dipper dredges and thirty-three scows; five steam tugs, and one stone lifter and scow; particulars of the cost of which, average working expenses, &c., will be found in Appendix No. 8, pages 125-28. The following is a general summary of the work performed by each dredge during the fiscal year, full details of which will be found in Appendix No. 6, pages 94-117.

THE "ST. LAWRENCE."

This dredge was at work at Little Glace Bay, N.S., at the commencement of the fiscal year, and remained there until the 12th July, when she was removed to the East River, Pictou, and worked there and at other places until 4th December, when she went into winter quarters. During the winter the engines, boiler, dredging machinery, winches and buckets were repaired, and the hull overhauled and painted inside. Work for 1884 was commenced in East River, Pictou, and at the close of the fiscal year the dredge was at work on the "outer bar," Miramichi River. The total quantity of material removed by this dredge, during the fiscal year, amounted to 42,700 cubic yards, at a cost of 34½ cents per yard.

THE "CANADA."

At the commencement of the fiscal year this dredge was working at Point du Chêne, Shediac, N.B., and continued there until 14th November, when she went into winter quarters. During the winter the engines and machinery were repaired, and the hull painted and scraped inside. On 19th May, 1884, work was resumed at Pointe du Chêne, and she worked there and at Mabou, N.S., until 28th June, when she was placed on the marine slip at Pictou, N.S., to be cleaned and painted, preparatory to commencing work at Rimouski, P. Q. The total quantity of material removed by this dredge, during the fiscal year, was 30,600 cubic yards, at a cost of 27 $\frac{18}{100}$ cents per yard.

THE "NEW DOMINION."

On the 1st July, 1883, this dredge was at work at Digby, N.S., and worked there and at Annapolis until 3rd November, when she went into winter quarters at St. John, N.B. During the winter necessary repairs were made to the dredge and scows. On 17th May, 1884, work was commenced in the River St. John, at St. Mary's Ferry, opposite Fredericton, and continued until 30th June, when it was completed. The total quantity dredged during the year was 19,985 cubic yards, at a cost of 57 $\frac{9}{100}$ cents per yard.

THE "CAPE BRETON."

This dredge was operating at Mabou, N.S., at the commencement of the fiscal year, and worked there and at the St. Peter's Canal until 17th November, when she

went into winter quarters on the marine slip at Port Hawkesbury, where extensive repairs were made to the dredge and scows. On 25th May, 1884, work was commenced at Benacadie Pond, where she was still working at the close of the fiscal year. The total quantity of material removed during the year was 43,265 cubic yards, at a cost of $33\frac{67}{100}$ cents per yard.

THE "PRINCE EDWARD."

From the 1st July to 15th September, 1883, this dredge was at work opening a channel at Rocky Point for the ferry service from Charlottetown, P.E.I., after which she worked at Southport Ferry wharf and Pownal wharf, until she went into winter quarters. During the winter the dredge and scows were repaired, and a house for the accommodation of the crew built on the dredge. Work was resumed in Charlottetown Harbour on 8th May, 1884, and the dredge was still working there at the close of the fiscal year. The total quantity of material removed during the fiscal year was 79,750 cubic yards, at a cost of $16\frac{3}{4}$ cents per yard.

THE "GEO. MCKENZIE."

At the commencement of the fiscal year this dredge was operating at the Deep-water Terminus of the Intercolonial Railway at Halifax, N.S., where she remained until 19th July, after which she worked at Jeddore and Lunenburg, until 21st December, when she went into winter quarters. During the winter a new crane was placed on the dredge, and extensive repairs were executed to the plant generally. On 7th May, 1884, work was resumed at Lunenburg, and was continued until the close of the fiscal year. The total quantity of material removed during the year was 62,607 cubic yards, at a cost of $23\frac{4}{100}$ cents per yard.

THE "CHALLENGE."

This dredge worked at Lion's Head, Kincardine, Bayfield and Goderich, from 1st July to 20th October, and wintered at Sarnia, where necessary repairs were executed. On 26th April, 1884, work was commenced at Kingsville, Lake Erie, and continued until the close of the fiscal year. The total quantity removed by this dredge during the year was 26,515 cubic yards, at a cost of $28\frac{4}{100}$ cents per yard.

THE "NIPISSING."

At the commencement of the fiscal year this dredge was at work at Hawkesbury, Ont., and worked there and at Calumet, P.Q., Rivière à la Graisse, P.Q., Vaudreuil, P.Q., and L'Original, Ont., until 10th November, when she went into winter quarters at Ottawa. On 24th April, 1884, work was resumed on the Rivière à la Graisse, and continued until the close of the fiscal year. The total quantity of material removed by this dredge was 33,028 cubic yards, at a cost of $21\frac{56}{100}$ cents per yard.

 THE "QUEEN OF CANADA."

At the beginning of the fiscal year this dredge was working at Laprairie, P.Q., where she remained until 30th September, when operations were suspended on account of the decayed state of her hull. During the winter the machinery of this dredge was removed to a new hull and placed in good working order. On 9th June, 1884, work was resumed at Laprairie and was being carried on at the close of the year. The total quantity of materials removed during the year was 9,346 cubic yards, at a cost of \$1.27 cents per yard.

THE "ST. LOUIS."

This dredge was built for the purpose of enlarging the feeder from Lake St. Francis, at Hungry Bay, to the St. Louis River; and up to the close of the fiscal year had removed 3,110 cubic yards of hard pan and clay, at a cost of $23\frac{7}{10}$ cents per yard.

THE "WINNIPEG."

This is a new dipper dredge, which, together with two scows, and the steam tug "Sir Hector," was built during the winter of 1883-84, at a cost of \$26,011.49 for the dredge and scows, and \$15,775.00 for the tug. This plant is intended for use in Manitoba; and at the close of the fiscal year had just commenced work at the mouth of the Red River.

THE "ONTARIO."

This is a new dipper dredge which, with two scows and the steam tug "Sir John," was built during the winter of 1883-84, at a cost of \$29,950.00 for the dredge and scows, and \$12,000.00 for the tug. This dredge was only completed at the close of the fiscal year, and had not yet been set to work.

"THE DREDGER."

At the commencement of the fiscal year this dredge was at work off Shoar Point, Victoria Harbour, B.C., and remained there until 19th October, when she was removed to the inner harbour and employed in dredging out a berth for ships in James' Bay, at which work she remained until 19th June, 1884, when operations were discontinued, in order to overhaul and repair the plant, preparatory to commencing this year's work. Total amount of material removed by this dredge, 67,123 cubic yards, at a cost of $24\frac{1}{2}$ cents per yard.

DREDGING.

PROVINCE OF NOVA SCOTIA.

ANNAPOLIS.

The "New Dominion" operated in front of the railway wharf from 1st August to 8th September, 1883, and cleaned off a portion of the clay and boulders overlying the rock, removing 2,825 cubic yards of stone and clay. Expenditure, \$1,379.30. Owing to the great rise and fall of the tide at this place, work could only be done for a few hours each day at and near low tide, which will account for the small quantity of material removed.

DIGBY.

Work on the southern side of the pier, and the shoal ground to the eastward, was continued by the "New Dominion" from the 1st July to the 1st of August, and from the 8th of September to the 3rd November, 1883. Quantity of material removed, 6,350 cubic yards of blue clay, mud and stone, at a cost of \$3,100.38. Owing to the great rise and fall of tide work, could only be carried on for a few hours at and near low tide, which will account for the small quantity of work done.

HALIFAX.

The work at the Deep-water Terminus of the Intercolonial, which was mentioned in last report as being in progress, was completed by the "George McKenzie" on 19th July, 1883. Quantity of material removed, 3,452 cubic yards of mud, stone, clay and old wharfing. Expenditure, \$646.07.

JEDDORE.

The dredge, "George McKenzie," operated at this place from 7th August to 22nd October, 1883, in opening a passage through the shoal separating the eastern and western channels in the harbour, and removed 21,515 cubic yards of sand. Expenditure, \$4,050.07.

LITTLE GLACÉ BAY.

Between the 1st and 12th July, 1883, the "St. Lawrence" removed 2,012 cubic yards of mud and stone from the entrance to the harbour, at a cost of \$483.10.

LUNENBURG.

The "George McKenzie" worked on the shoals in this harbour from the 27th October to 21st December, 1883, and from 7th May to 30th June, 1884, removing 37,660 cubic yards of mud and stone. Expenditure, \$7,089.31.

MABOU.

Between the 1st July and 21st August, 1883, the "Cape Breton" operated on the shoal off the entrance to this harbour; and the "Canada" worked at the same place from the 2nd to the 23rd June, 1884. Total quantity of material removed, 23,155 cubic yards of sand, clay and gravel. Expenditure, \$6,775.02.

PICTOU.

During the fiscal year the "St. Lawrence" operated in the channels of the East and Middle rivers, and also around the wharves and slip of the Intercolonial Railway at Pictou Landing, on the southern side of the harbour, removing 27,300 cubic yards of mud, clay and shells, at a cost of \$6,580.46.

ST. PETER'S.

Between the 17th September and 17th November, 1883, the dredge "Cape Breton" was engaged in dredging the foundation of the protection wall at the northern end of the canal, and in deepening a few points in the channel leading from the canal to the Bras d'Or Lake. Quantity of material removed, 13,425 cubic yards of clay and boulders. Expenditure, \$4,515.36.

 PROVINCE OF PRINCE EDWARD ISLAND.

CHARLOTTETOWN.

The channel leading to the ferry landing at Rocky Point was completed by the dredge "Prince Edward" on the 15th September, 1883. Between the 17th and 20th September, the 30th September and 24th November, 1883, and the 8th May and 16th June, 1884, dredging was done near and around the ferry wharf at Southport, on the southern side of the harbour. Between the 20th and 29th September, 1883, a quantity of material was removed from around Pownal wharf; and from the 17th to 30th June, 1884, the dredge worked at Princess Street ferry slip, Charlottetown. Total quantity removed, 79,750 cubic yards of mud. Expenditure, \$11,640.96.

 PROVINCE OF NEW BRUNSWICK.

MIRAMICHI RIVER.

The dredge "St. Lawrence" operated on the "Horse Shoe Shoal" and at the "Outer Bar," at the mouth of the river, from the 6th August to 1st November, 1883, and from the 18th to 30th June, 1884, removing 13,387½ cubic yards of sand, at a cost of \$3,226.95.

POINTE DU CHÊNE (SHEDIAC).

Between the 1st July and 14th November, 1883, and the 19th and 21st May, 1884, the dredge "Canada" operated in the channel in the harbour, and in increasing the depth of water to 16 feet around the head and sides of the Intercolonial Railway wharf, removing 22,860 cubic yards of mud and shells, at a cost of \$5,036.18.

ST. MARY'S.

Between the 17th May and 30th June, 1884, the "New Dominion" was employed opening a channel to the ferry landing, to allow the passage of boats during the lowest stage of water in the St. John River. Quantity of material removed, 10,810 cubic yards of sand and sawdust. Expenditure, \$5,277.98.

PROVINCE OF QUEBEC.

CHATEAUGUAY RIVER.

In 1876 the entrance to this river was improved by dredging; and in 1883 the work was continued, at a cost of \$4,290.03.

LAPRAIRIE.

The "Queen of Canada" worked at this place from 1st July to 30th September, 1883, and from 9th June, 1884, to the close of the fiscal year, to obtain a depth of 7 feet around the public wharf and in the channel leading thereto from the main channel of the St. Lawrence. Quantity of material removed, 9,346 cubic yards of hard pan, clay and gravel. Expenditure, \$3,684.92.

RIVIÈRE À LA GRAISSE.

The "Nipissing" operated from 27th July to 31st August, 1883, and from 24th May to the close of the fiscal year, in deepening the channel of the river below Rigaud to 6 feet at low water. Quantity of material removed, 16,985 cubic yards of gravel, clay and sand. Expenditure, \$2,657.50.

RIVIÈRE DU NORD.

The sum of \$290.20 was expended in removing boulders from the channel of this river, below the village of St. Andrews.

RIVER OTTAWA—CALUMET.

The "Nipissing" was engaged between the 18th and 20th July, and the 3rd and 10th November, 1883, in deepening the entrance from the Ottawa to 7 feet at low water, removing 4,200 cubic yards of clay. Expenditure, \$281.96.

ST. PLACIDE.

The dredging of the channel to the public wharf, referred to in last report, was completed during the fiscal year. Expenditure, \$4,563.65.

VAUDREUIL.

The "Nipissing" operated at this place from 3rd September to 6th October, 1883, opening a channel to 7 feet at low water in the Ottawa. Quantity of material removed, 5,943 cubic yards of clay. Expenditure, \$725.52.

PROVINCE OF ONTARIO.

BAYFIELD.

The entrance to the harbour having silted up to a considerable extent, the dredge "Challenge" worked here from 26th July to 10th August, removing 1,750 cubic yards of sand, and making 13 feet of water in the shallow part inside the piers. Expenditure, \$524.82.

GODERICH.

The "Challenge" was employed from the 22nd August to 20th October, 1883, in dredging the harbour to 14 feet, removing 8,400 cubic yards of sand and gravel. Expenditure, \$2,236.53.

HAWKESBURY.

The "Nipissing" worked here from 1st to 17th July, 1883, dredging the channel to 6 feet at low water, and removed 2,542 cubic yards of sand, clay and stone. Expenditure, \$267.77.

KINCARDINE.

The "Challenge" worked in the entrance to the harbour from the 10th to the 23rd July, 1883, making a depth of 13 feet of water. Material removed, 3,800 cubic yards of sand and mud. Expenditure, \$549.67.

LION'S HEAD.

In the first week in July, 1883, the "Challenge" completed the dredging through the gravel shoal, to which reference was made in last report. Expenditure, \$228.00.

L'ORIGINAL.

Between the 11th October and the 2nd November, 1883, the "Nipissing" worked off the end of the pier, dredging to a depth of 7 feet at low water in the Ottawa. Material removed, 3,350 cubic yards of clay. Expenditure, \$638.98.

SLIDES AND BOOMS.

At the Session of 1883 the sum of \$118,500.00 was voted for the construction, repairs and maintenance of the Dominion slides and booms; and at the Session of 1884 a further amount of \$2,000.00 was granted, which sums, added to \$31,324.42, carried forward from 1882-83, made a total of \$151,824.42 available. The sum of \$20,102.92 lapsed on 30th September, 1883, \$112,199.25 were spent, and the balance remained unexpended at the close of the fiscal year. The expenditure on each work has been as follows:—

District.	Construc- tion.	Repairs.	Staff and Main- tenance.	Total.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Saguenay District.....	3,360 57	5,368 90	1,023 68	9,753 15
St. Maurice do	12,268 70	5,008 37	15,160 55	32,437 62
Ottawa do	14,601 70	26,368 05	21,639 90	62,607 65
Newcastle do	674 31	4,371 49	2,130 10	7,175 90
Belœil Piers and Booms .....	.....	25 00	199 93	224 93
	30,905 28	31,139 81	40,154 16	112,199 25

SAGUENAY DISTRICT.

The slide and booms to facilitate the descent of timber from Lake St. John to the River Saguenay are situated on La Petite Décharge, the smaller of the two outlets from the lake to the river. The slide is 5,840 feet long, and the booms 1,344 feet. During the fiscal year 1,000 feet of slide have been reconstructed. Temporary repairs have been made to Dam No. 6, which should be rebuilt; and repairs have been made to other dams, to the main boom and to the Superintendent's house. 34,000 logs, from 14 to 30 feet in length, passed through the slide during the fiscal year.

ST. MAURICE DISTRICT.

The works on the St. Maurice are situated at seven stations, from the mouth of the river to La Tuque Falls, a distance of 100 miles; and there are also two stations on the Vermilion River, a tributary of the St. Maurice. The waters of the St. Maurice were not very high during the spring of 1884, and the floating of timber went on

satisfactorily. The quantity of logs coming down, however, was smaller than last year, only about 200,000 logs entering the booms. At Grande Piles, 30 miles above Three Rivers, the construction of piers and booms, mentioned in last report as being under contract, has been proceeded with, and has been completed since the close of the fiscal year. General repairs and renewals have been made at Cap aux Corneilles, Shawenegan, Grande Mère and Les Piles.

OTTAWA DISTRICT.

This district embraces the Ottawa River and its tributaries, the Gatineau, Madawaska, Coulonge, Black, Petewawa and DuMoine Rivers. There are in it, altogether, eighty-three stations, and the works for facilitating the descent of timber aggregate as follows:—

5,071	lineal feet of canal.
17,800	“ “ slides.
67,794	“ “ booms.
17,412	“ “ dams.
405	“ “ bulkheads.
2,313	“ “ bridges.
346	“ “ glance piers.
153	piers.
5	storehouses.
4	slide-keepers' houses.
1	boom-men's house.

The water in the Ottawa, which, during the spring and summer of 1833, had been at a favorable pitch for the passage of timber and saw logs, fell towards the end of the season of navigation, but not to the same low stages that it had reached within the past five or six years. The heavy snow-fall last winter in the Ottawa Valley made it apparent that there would be high water during the early spring in the tributaries of the river. This was the case; but, although logs, &c., on the remote creeks and streams were well started and under way, with fair prospects of reaching the main stream, the freshet on some of the rivers—such as the Coulonge—ran off without maintaining a sufficient depth of water to pass the tails of the drives; consequently quantities of logs and timber had to be abandoned for the season. This, however, was before the drives reached the Government works. The great bulk of the timber and logs passed the upper improvements on the tributaries without difficulty, and reached the Ottawa in good time. During the winter the works were overhauled as usual, and necessary repairs made, details of which will be found in Appendix No. 13, pages 147-52. The total number of pieces of square and flatted timber which passed through the Government slides on the Ottawa and its tributaries, during the fiscal year, was 217,548, and of saw logs, 2,943,804.

NEWCASTLE DISTRICT.

The works in this district are of two classes, those connected with navigation, which are under the control of the Department of Railways and Canals, and those constructed to facilitate the descent of timber down the River Trent and its tributary waters, which are under the control of the Department of Public Works. The water in the several stretches was maintained at a height of about six inches above the average, until the close of the season of 1883. Owing to the heavy fall of snow last winter, it was expected there would be a great flood; but although the water rose slightly above the average spring height in May, it passed off very gradually, and did nothing more than the usual amount of damage to the works under the control of this Department. With reference to a better regulation of the water supply, the Acting Superintending Engineer says:—

“ During the latter part of August and the months of September and October, the water falls very rapidly, and the want of such is severely felt by the owners of crafts, and mill owners. Especially is this the case if any of the saw-log drives coming down happen to be at all late in the season, when the surplus water has passed off; then they require a portion of the water that has been retained for the benefit of navigation and mill owners. It would obviate this difficulty if all “drives” were required to be down by a certain date, before the water had fallen to its ordinary height, and if the control of the store reservoirs and feeders that regulate these waters were assumed by the Government and put under the control of one person. If this were done, there need be no scarcity of water, even in the driest of seasons.”

During the winter months necessary repairs to the works were made, details of which will be found in Appendix No. 14, pages 153-59. The total number of saw-logs passing through the slides was 273,615, and of boom timber, &c., 206,801 pieces.

ROADS AND BRIDGES

At the Session of 1883 the sum of \$22,800.00 was voted for the construction, repair and maintenance of such roads and bridges as are under the control of this Department. The balance brought forward from 1882-83 was \$7,676.72, and the sum of \$8,000.00 was contributed by the Local Governments of Ontario and Quebec (\$4,000.00 each) towards the construction of the bridge across the Ottawa River at Des Joachims. The total amount available, therefore, was \$38,476.72. Of this sum \$4,000.00 lapsed on 30th September, 1883; the expenditure was \$33,985.79, and the balance was unexpended at the close of the fiscal year. The amount available, amount lapsed, and amount expended, by Provinces, was as follows:—

	Total Amount Available.	Lapsed on 30th September, 1883.	Expended in Fiscal Year 1883-84.
Quebec.....	\$11,338 36	.....	\$18,208 59
Ontario.....	11,338 36	.....	14,007 67
Manitoba.....	10,000 00	.....	.....
North-West Territories.	5,800 60	4,000 00	1,769 53
	<u>\$38,476 72</u>	<u>\$4,000 00</u>	<u>\$33,985 79</u>

ROADS.

TEMISCOUATA.

During the fiscal year twenty-five culverts were re-built and four bridges constructed. Expenditure, \$913.68.

TRAILS AND BRIDGES, N.W.T.

During the fiscal year the sum of \$1,769.53 has been expended on the trail through the Crow Nest Pass.

BRIDGES.

DES JOACHIMS.

Work on this Interprovincial bridge, connecting the Provinces of Ontario and Quebec, has been carried on during the year under the contract with Messrs. Starrs, Herbert & O'Hanly, mentioned in last report; and at the close of the fiscal year the whole of the piers and abutments had been completed. Expenditure, \$26,772.47.

ILE AUX NOIX.

During the past year the piers of the bridge over a dry gully were filled with stone, and the roadway raised and widened, the sides of which were protected by hand-railing. Expenditure, \$849.67.

ST. DAVID.

During the year the military bridge at St. David de Lévis, originally constructed by the Imperial Government, was rebuilt under a contract entered into with Mr. H. A. Carrier on 10th August, 1883. Expenditure, \$2,558.00.

UNION SUSPENSION.

The wires carrying the roadway have been renewed, and repairs executed on the toll house, roadway, &c. Expenditure, \$1,002.00.

 TELEGRAPHS.

At the Session of 1883 the sum of \$154,500.00 was voted for the construction, repairs, maintenance and working expenses of the Government telegraph lines under the control of this Department. At the Session of 1884 a further grant of \$7,347.37 was made, and the sum of \$17,927.63 was carried forward from 1882-83, making a total of \$179,775.00. Of this sum, \$9,031.04 lapsed on 30th September, 1883, the expenditure was \$127,364.21, and the balance remained unexpended on 30th June, 1884. The following statement shows the total amount available for each section, the amount lapsed, and amount expended:—

	Total Amount Available.	Lapsed on 30th September, 1883.	Expended in Fiscal Year 1883-84.
Gulf of St. Lawrence and Maritime Provinces	\$36,633.08	\$9,031.04	\$13,490.12
North Shore St. Lawrence.	28,561.06	.....	22,432.40
Manitoba and North-West Territories	44,744.95	.....	35,072.05
British Columbia.....	59,791.74	.....	45,415.35
Generally	10,044.17	.....	10,954.29
	<hr/>	<hr/>	<hr/>
	\$179,775.00	\$9,031.04	\$127,364.21
	<hr/>	<hr/>	<hr/>

 GULF OF ST. LAWRENCE AND MARITIME PROVINCES.

A line between Barrington and Cape Sable Island, Nova Scotia, 17 $\frac{1}{4}$ miles, was put in operation during the fall of 1883, and has since been effectively maintained. The cable between Meat Cove and the Magdalen Islands was injured by ice in May, 1884, and was repaired in the following month. Great damage was done to the land lines between the Magdalen Islands, by storms, during the winter of 1883-84, and temporary repairs made. Owing to the liability of the sand bars on which portions of these lines are erected being washed away, two knots of cable have been ordered, and will be laid through the gullies and across the most exposed portions of the sand bars. The other land and cable lines in this section have been maintained without any expense beyond ordinary maintenance. The receipts from this section were \$2,926.86, and expenditure for maintenance, \$6,410.46, as compared with receipts, \$2,387.33, and expenditure, \$6,249.05, in 1882-83.

NORTH SHORE OF THE ST. LAWRENCE.

During the fiscal year this line has been extended from Bersimis to Pentecost River, a distance of 113 miles, of which there are 38 miles of cables and 75 miles of land lines. These lines now extend 260½ miles below Murray Bay, with a branch line from Baie St Paul to Chicoutimi, 92 miles. The lines from Murray Bay to Bersimis, 147½ miles, and from Baie St. Paul to Chicoutimi, were maintained and operated under contract by the Great North Western Telegraph Company, at a cost of about \$1,000.00, plus revenue. The line from Bersimis to Pentecost River has been maintained by the Government at an expense of about \$900.00, including the cost of teaching operators. The receipts have been about \$40.00.

MANITOBA AND NORTH-WEST TERRITORIES.

The section of line, 433 miles, extending between Port Arthur and Winnipeg was, during the month of July, 1883, transferred to the Canadian Pacific Railway Company, and thus ceased to be included in the Government Telegraph Service. During the fiscal year that portion of the line between Clarke's Crossing, on the South Saskatchewan River, to Humboldt, 47½ miles, has been re-constructed; an extension from Clarke's Crossing to Prince Albert, 83 miles, built, and the line between Qu'Appelle and Humboldt, 141 miles, completed. At the close of the fiscal year the Government lines in operation in the North-West were:—

Qu'Appelle Station, <i>via</i> Humboldt, to Edmonton.....	537 miles.
Clarke's Crossing to Prince Albert.....	83 “
Total	620 “

The line between Clarke's Crossing and Battleford requires considerable repairs, and that between Battleford and Edmonton should be rebuilt. The Superintendent advises the adoption of a new route *via* Fort Pitt, and south of Victoria to Edmonton *via* Fort Saskatchewan, where spruce poles can be obtained at moderate cost. Revenue during the year, \$2,725.00, and expenditure \$18,000.00, as compared with \$659.82 revenue and \$7,306.85 expenditure in 1882-83.

BRITISH COLUMBIA.

During the fiscal year a line between New Westminster and Ladner's Landing, 17½ miles land line and ½ mile cable, has been completed; also a line from New Westminster to Port Moody, 7½ miles. Owing to the extensive forest fires which

prevailed during the summer of 1883, considerable portions of the lines between Victoria and Nanaimo, and on Gabriola Island, and between Grenville, Matsqui and Yale, had to be reconstructed, the poles, brackets and insulators having been, in many instances, completely destroyed. Although the lines were frequently interrupted by these fires the receipts show a gratifying increase, the figures for the year being, receipts, \$27,461.76, expenditure, \$36,461.76; as compared with \$25,093.40 receipts, and \$30,595.69 expenditure in 1882-83.

TARIFF OF RATE ON GOVERNMENT TELEGRAPH LINES.

On page 218 will be found a statement giving the tariff on Government Telegraph Lines.

ARBITRATIONS AND AWARDS.

At the Session of 1883 the usual vote of \$5,000.00 was made to meet one-half of the expense of the Board of Official Arbitrators -- the other half being paid by the Department of Railways and Canals. No cases were referred to the Board from this Department during the fiscal year. Expenditure, \$2,818.00.

LIST OF ENGINEERS, FIREMEN, &c.

In Appendix No. 4, pages 57-60, will be found a list of the Engineers, Firemen and Caretakers employed in Public Buildings throughout the Dominion; and in Appendix No. 1, pages 9-10, will be found details of the expenditure at each place.

LEVELLING BETWEEN LAKE CHAMPLAIN AND THE ST. LAWRENCE.

In Appendix No. 7, pages 119-124, will be found a preliminary report by Mr. R. Steckel, C. E. of this Department, on the Geodetic Levelling from Lake Champlain to tide water in the St. Lawrence, conducted under his supervision during part of the fall of 1883. Besides the correct determination of the surface declivity of the Richelieu River, and the establishment of permanent bench marks for future reference, another object of this survey is the completion of a circuit of levellings many hundreds of miles in length, from the waters of the Atlantic Ocean in the Hudson River back to the same waters in the St. Lawrence. This circuit is to be formed in conjunction with the spirit levelling that has already been satisfactorily

completed, and other operations about to be carried out under the supervision of the United States Coast and Geodetic Survey. The levellings were continued in the summer and fall of 1884, and a complete report will be published next year.

STATEMENT OF DREDGING PLANT.

Appendix No. 8, pages 125-128, contains a statement showing the number of dredges, dredge tugs, scows and stone lifters owned by this Department, with the cost of construction, number of crews, average wages per month, &c.

QUEBEC HARBOUR IMPROVEMENTS.

In Appendix No. 9, pages 129-132, will be found the report of the Quebec Harbour Commissioners on the harbour improvements at Quebec and the Graving Dock at Lévis.

SHIP CHANNEL BETWEEN MONTREAL AND QUEBEC.

By the Act 46 Vic., chap. 38, assented to 25th May, 1883, authority was given to advance to the Montreal Harbour Commissioners the further sum of \$900,000.00 to enable them to continue the deepening of the ship channel between Montreal and Quebec, so as to obtain a depth of 27½ feet at low water. Dredging was commenced on the 14th of June, 1883, and the result of the year's operations will be found in Appendix No. 10, pages 133-138.

STAFF EMPLOYED ON SLIDES AND BOOMS.

Appendix No. 15, pages 159-162, contains a list of the staff employed on the different slides and booms, giving date of appointment, salary, &c.

GOVERNMENT PIERS AND WHARVES.

Appendix No. 17, pages 172-178, contains a statement of the Government piers and wharves in Ontario and Quebec, showing their location, dimensions, &c.

OPENING AND CLOSING OF NAVIGATION.

Appendix No. 18, pages 179-184, contains tabular statements showing the dates of the opening and closing of navigation, in the fiscal year 1883-84, at the principal ports of Canada on the seaboard, and on the Gulf and River St. Lawrence and the Great Lakes, as well as ports which are always open.

ARRIVALS FROM SEA, &c.

In Appendices Nos. 19, 20 and 21, pages 185-198, will be found statements of the number of vessels which have arrived from sea from 1868 to 1883, at Halifax, St. John, Charlottetown, Quebec, Montreal and Victoria; the number and tonnage of vessels constructed at the principal ship-building ports of Canada, from 1868 to 1883; and the number of vessels wrecked on the sea-coast and in the Gulf, River and Lakes of the St. Lawrence from 1868 to 1883.

CONTRACTS, &c.

In Appendix No. 23, pages 219-228, will be found statements of the contracts let by the Department, property purchased, and property leased, during the fiscal year.

ACTS RELATING TO PUBLIC WORKS.

Appendix No. 24 contains a list of some of the Public Acts of the Parliament of Canada, passed at the Session of 1884, and having reference to the Public Works Department or works under its charge.

THE CONTRACTED LIQUID VEIN.

Appendix No. 25 contains an essay on the Contracted Liquid Vein, affecting the present theory of the science of hydraulics, by Mr. R. Steckel, C.E., an officer in the Engineering Branch of this Department. The author calls attention to the fact that the principles upon which the theory of the science of hydraulics are based are altogether of an artificial nature, being propounded and adopted chiefly on account of their ready adaptation of the laws of computation; and believing the true basis of the whole science to be identical with that of the formation of the contracted liquid vein at the exit of a liquid from an orifice in a reservoir, he applied himself to the investi-

gation of this well-known but unexplained phenomenon, with the result that he suggests a new theory which may have an important bearing on the science of hydraulics. Mr. Steckel has devoted his leisure time for several years to the study of this subject, and supports his theory with a large number of carefully made experiments.

TABLES OF DISTANCES.

Appendix No. 26 contains a number of tables relating to the inland navigation of Canada, ocean routes to foreign countries, Canadian land routes to the seaboard, Government railways and telegraph lines, &c., &c. The fourth part of this Appendix contains some carefully prepared tables showing the distances by Canadian railways. From these tables it appears that the longest railway route through Canadian territory, from ocean to ocean, is shorter than the shortest route through American territory.

NATIONAL ART GALLERY.

Appendix No. 27 contains a statement of the pictures, &c., received in the National Gallery during the fiscal year, and the number of visitors. Since the close of the fiscal year the Gallery has been enriched by a donation, obtained through the kindness of H. R. H. the Princess Louise, of a handsome series of engravings, illustrative of the course of study in the Royal School of Art, South Kensington.

EXPENDITURE ON PUBLIC WORKS.

Appendix No. 28 contains summary statements of the expenditure on public works by Provincial Governments prior to Confederation, and from Government and other sources from Confederation to 30th June, 1884; the amount expended in each Province; the expenditure on works authorized by special Acts of Parliament, and the cost of the Parliament and Departmental Buildings, Ottawa.

DEPARTMENTAL STAFF.

Appendix No. 29 contains a list of the Members, Commissioners and Assistant Commissioners of the Board of Works of the Province of Canada from 1841 to 1867; and of the Ministers, Deputy Ministers, Secretaries, Chief Engineers and Chief Architects of the Department of Public Works from Confederation to 30th June, 1884.

OFFICIAL CORRESPONDENCE.

Appendix No. 30 contains a statement of the official correspondence of the Department from 1867 to 30th June, 1884.

Respectfully submitted,

HECTOR L. LANGEVIN,

Minister of Public Works.

OTTAWA, 13th December, 1884.

APPENDICES.

APPENDIX No. I.

STATEMENT OF EXPENDITURE

DURING FISCAL YEAR ENDED 30TH JUNE, 1884,

BY

O. DIONNE, ACCOUNTANT.

APPENDIX No. I.

STATEMENT showing the Amount expended by the Department of Public Works,
Dominion of Canada, during the Year ended 30th June, 1884.

Name of Work.	Construc- tion.	Repairs.	Staff and Maintenance	Total.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.
PUBLIC BUILDINGS.				
GENERALLY	10,885 33	680 00	.....	11,565 33
<i>Nova Scotia.</i>				
Amherst Post Office, &c.	34 52	.....	.....	34 52
Antigonish do	3,279 53	.....	.....	3,279 53
Arctick do	1,074 45	.....	.....	1,074 45
Halifax Dominion Building .....	.....	2,231 64	.....	2,231 64
do Drill Shed .....	.....	1,451 22	.....	1,451 22
do Penitentiary .....	.....	105 95	.....	105 95
Lunenburg Marine Hospital .....	.....	170 00	.....	170 00
New Glasgow Post Office, &c.	125 15	.....	.....	125 15
North Sydney do &c.	50 50	.....	.....	50 50
Pictou Custom House .....	.....	638 46	.....	638 46
do Marine Hospital	6,952 51	.....	.....	6,952 51
Sydney Quarantine Hospital	4,367 00	.....	.....	4,367 00
Turo Custom House, Post Office, &c.	3,494 13	.....	.....	3,494 13
Windsor do do &c.	1,727 64	.....	.....	1,727 64
Yarmouth do do &c.	6,000 00	.....	.....	6,000 00
<i>Prince Edward Island.</i>				
Charlottetown Dominion Building .....	.....	3,117 05	.....	3,117 05
Summerside Post Office, &c.	2,053 03	.....	.....	2,053 03
<i>New Brunswick.</i>				
Bathurst Post Office, &c.	1,070 95	.....	.....	1,070 95
Carleton, St. John, Post Office	9,728 91	.....	.....	9,728 91
Cantham Custom House .....	.....	486 00	.....	486 00
do Post Office	247 07	.....	.....	247 07
Dorchester Penitentiary	34,381 27	100 00	.....	34,481 27
Fredericton Barracks	12,783 93	.....	.....	12,783 93
do Post Office .....	.....	50 21	.....	50 21
Moncton Post Office, &c.	4,331 59	.....	.....	4,331 59
Middle Island Quarantine Station	112 85	.....	.....	112 85
Newcastle Custom House .....	.....	4 75	.....	4 75
do Post Office, &c.	3,200 13	.....	.....	3,200 13
Portland do	9,102 80	.....	.....	9,102 80
St. John Civil Service Examination Offices. ....	.....	14 00	.....	14 00
do Custom House	2,790 45	150 68	.....	2,941 13
do Drill Shed .....	.....	641 15	.....	641 15
Carried over	117,793 74	9,841 11	.....	127,634 85

APPENDIX No. 1—Continued.

Name of Work.	Con- struction.	Repairs.	Staff and Maintenance	Total.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Brought forward.....	117,793 74	9,841 11		127,634 85
PUBLIC BUILDINGS—Continued.				
<i>New Brunswick—Concluded.</i>				
St. John Fort Dufferin.....	1,430 46			1,430 46
do Marine Hospital.....	10,332 57			10,332 57
do Penitentiary.....		225 74		225 74
do Post Office.....	2,328 22	65 66		2,393 88
do Public Buildings.....		51 51		51 51
do Savings Bank.....		50 17		50 17
St. Stephen's Post Office, Custom House, &c.....	3,119 46			3,119 46
Sussex do do.....	5,297 63			5,297 63
Woodstock do do.....	12,818 68			12,818 68
<i>Quebec.</i>				
Chambly Fort.....		1,807 13		1,807 13
Chicoutimi Marine Hospital.....	4,001 32			4,001 32
Hull Post Office, &c.....	18,830 12			18,830 12
Isle aux Noix, Fort Lennox Barracks.....		144 67		144 67
Lévis Fortifications.....		3,954 23		3,954 23
do Immigrant Building.....	45,294 45			45,294 45
Montreal Champ de Mars.....		131 75		131 75
do Civil Service Examination Offices.....		35 00		35 00
do Custom House.....	12,207 67	416 31		12,623 98
do Drill Shed, new roof, &c.....	40,404 13			40,404 13
do Examining Warehouse.....	28,997 96	204 76		29,202 72
do Inland Revenue Building.....	8,754 20			8,754 20
do Lachine Canal Office.....		76 50		76 50
do Post Office.....	10,790 50	469 00		11,259 50
do Public Buildings.....		90 00		90 00
Quebec Artillery Barracks.....		10 43		10 43
do Cartridge Factory.....	1,962 19			1,962 19
do Citadel.....	19,920 51			19,920 51
do do Cliff.....	3,736 30			3,736 30
do do Buildings.....		3,717 22		3,717 22
do Culler's Office.....		816 45		816 45
do Custom House.....		862 15		862 15
do do (old).....		600 00		600 00
do Drill Shed.....	587 82			587 82
do Dufferin Terrace.....	2,024 82			2,024 82
do Examining Warehouse.....	27,533 06			27,533 06
do Fortifications.....	26,318 76			26,318 76
do Gas Inspector's Office.....		86 01		86 01
do Marine Hospital.....	730 00			730 00
do Military Buildings.....		184 58		184 58
do Post Office.....	1,460 67	159 20		1,619 87
do Weights and Measures Offices.....		52 00		52 00
Sherbrooke Post Office, &c.....	14,651 06			14,651 06
Sorel do.....	302 61			302 61
St. Helen's Island Military Buildings.....		5 52		5 52
St. John's Barracks.....	14,814 89			14,814 89
do Post Office.....		217 95		217 95
St. Vincent de Paul Penitentiary.....	20 357 22	60 00		20,417 22
Three Rivers Custom House.....	541 20	1,194 32		1,735 52
do Post Office, &c.....	6,452 20			6,452 20
Carried over.....	463,794 42	25,479 37		489,273 79

APPENDIX No. 1—Continued.

Name of Work.	Construc- tion.	Repairs.	Staff and Maintenance	Total.
	\$ cts	\$ cts.	\$ cts.	\$ cts.
Brought forward.....	463,794 42	25,479 37		489,273 79
PUBLIC BUILDINGS—Continued.				
<i>Ontario.</i>				
Amherstburg Post Office, &c.....	6,673 92			6,673 92
Barrie do	4,316 06			4,316 06
Belleville Examining Warehouse.....	3,561 02			3,561 02
do Post Office, &c.....	12,129 16	52 25		12,181 41
Berlin do	3,684 67			3,684 67
Brantford do		149 35		149 35
Brockville do	15,056 59			15,056 59
Chatham do	31,637 45			31,637 45
Clifton do	18,205 23			18,205 23
Cobourg do	273 86			273 86
Cornwall do	19,901 75			19,901 75
Galt do	174 05			174 05
Gananoque do	11,582 95			11,582 95
Guelph do		916 22		916 22
Hamilton Civil Service Examination Offices.....		32 00		32 00
do Custom House		75 70		75 70
do Immigrant Building.....	2,065 15			2,065 15
do Post Office, Custom House, &c.....	91,288 70			91,288 70
Kingston Civil Service Examination Offices.....		18 50		18 50
do Custom House.....		42 50		42 50
do Fortifications.....		4,956 71		4,956 71
do Inland Revenue Office.....		2 00		2 00
do Military College.....	7,417 78	10,878 34		18,296 12
do Penitentiary	13,899 39	180 00		14,079 39
do Post Office.....		45 00		45 00
London Custom House.....	5,000 00	976 08		5,976 08
do Drill Shed.....		310 00		310 00
London Military Buildings.....		603 73		603 73
do Post Office.....		5,523 64		5,523 64
Niagara Military Buildings.....		92 63		92 63
Ottawa Cartier Square.....		867 76		867 76
do Drill Shed.....		457 23		457 23
do Geological Museum.....		229 61		229 61
do Military Store-House.....	5,297 67			5,297 67
do Nepean Point.....		673 50		673 50
do Parliament Buildings, alterations Post Office.....	1,361 00			1,361 00
do Parliament Buildings, Electric Light.....	7,887 39			7,887 39
do do Pump House.....	1,600 99			1,600 99
do do Ventilation.....	4,153 11			4,153 11
do Post Office.....	3,424 70	503 45		3,928 15
do Public Buildings.....		134,300 96		134,300 96
do do Gas.....			22,239 80	22,239 80
do do Grounds.....	500 00		9,098 47	9,598 47
do do Heating.....			50,403 90	50,403 90
do do Removal of Snow			2,616 10	2,616 10
do do Telephonic Service.....	1,699 05		778 02	2,477 07
do do Water.....			9,087 00	9,087 00
do do Wellington Street Block.....	45,184 21			45,184 22
do Rideau Canal Collector's Office.....		21 70		21 70
do Supreme Court		380 50		380 50
Port Colborne Custom House.....		21 00		21 00
Port Dalhousie Canal Office.....		44 14		44 14
Carried over	781,770 28	187,833 87	94,223 29	1,063,827 44

APPENDIX No. 1—Continued.

Name of Work.	Con- struction.	Repairs.	Staff and Maintenance	Total.
	\$ cts	\$ cts.	\$ cts	\$ cts.
Brought forward.....	781,770 28	187,833 87	91,223 29	1,063,827 44
PUBLIC BUILDINGS—Continued.				
<i>Ontario—Concluded.</i>				
Port Hope Post Office, &c.....	19,442 40			19,442 40
Prescott, Fort Wellington Barracks.....		37 50		37 50
Prince Arthur's Landing Immigrant Station.....	7,335 05			7,335 05
Rideau Hall.....		25,413 32		25,413 32
do Allowance for Fuel and Light.....			8,000 00	8,000 00
do Removal of Snow.....			966 57	966 57
Sarnia Immigrant Building.....	1,881 77			1,881 77
St. Catharines Post Office, &c.....	16,977 07			16,977 07
St. Thomas do.....	19,094 42			19,094 42
Stratford do.....	14,088 25			14,088 25
Toronto Assistant Receiver-General's Office.....		44 84		44 84
do Civil Service Examination Offices.....		176 35		176 35
do Custom House.....		1,901 55		1,901 55
do Drill Shed.....	72 00			72 00
do Examining Warehouse.....	49,474 48	395 85		49,870 33
do Forts.....	20,372 79	2,551 55		23,424 34
do Immigration Office.....		130 14		130 14
do Immigrant Sheds.....		195 11		195 11
do Inland Revenue Offices.....		44 65		44 65
do Military Buildings.....		274 86		274 86
do Post Office.....		5,723 38		5,723 38
do Public Buildings.....		151 68		151 68
Trenton Drill Shed.....		317 80		317 80
Windsor Post Office, &c.....	500 55	653 07		1,153 62
<i>Manitoba.</i>				
Brandon Immigrant Shed.....	120 00	131 00		251 00
Stony Mountain Penitentiary.....	32,528 82	20 00		32,548 82
Winnipeg Architect's Office.....		1,162 07		1,162 07
do Assistant Receiver-General's Office.....		1 9 55		139 55
do Custom House.....		280 13		280 13
do Dominion Land Office.....	776 64	643 80		1,420 44
do Fort Osborne Barracks.....	6,304 25			6,304 25
do Immigration Offices.....		7 20		7 20
do Lieut.-Governor's Residence.....	42,423 81	rental 4,000		46,423 81
do Parliament Building.....	127,916 58			127,916 58
do Post Office (New).....	8,078 10			8,078 10
do do (Temporary).....	11,082 33			11,082 33
do Powder Magazine.....	3,838 45			3,838 45
<i>North-West Territories.</i>				
Battleford Buildings.....	1,850 41			1,850 41
Fort Pel y barracks.....	4,179 46			4,179 46
High River Industrial School.....	3,602 50			3,602 50
Prince Albert Court House.....	275 50			275 50
Public Buildings Generally.....	4,668 00			4,668 00
Qu'Appelle Court House.....		353 00		353 00
do Immigrant Station.....	11,586 58			11,586 58
do Industrial School.....	2,862 50			2,862 50
Carried over.....	1,193,602 99	242,522 27	102,160 86	1,539,375 12

APPENDIX No. 1.—Continued.

Name of Work.	Con- struction.	Repairs.	Staff and Maintenance	Total.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Brought forward.....	1,193,602 99	242,582 27	103,189 86	1,539,375 12
PUBLIC BUILDINGS—Continued.				
<i>North-West Territories—Concluded.</i>				
Regina Clerk of Works' Office		51 00		51 00
do Council Chamber.....	3,378 93			3,378 93
do Lieutenant-Governor's Residence	10,718 49			10,718 49
<i>British Columbia.</i>				
Nanaimo Post Office, &c.....	19,580 98			19,580 98
New Westminster Penitentiary.....	2,685 32			2,685 32
do Post Office.....	10,117 86	13 50		10,131 36
Victoria Batteries		18 00		18 00
do Custom House.....		254 25		254 25
do Post Office	1,537 06	1,833 02		3,370 08
do Quarantine Station	46 00			46 00
<i>England.</i>				
London High Commissioner's House.....	41,999 33			41,999 33
SALARIES OF ENGINEERS, FIREMEN, &c.				
<i>Nova Scotia.</i>				
Halifax Dominion Building	\$2,204 33			
do Penitentiary	412 50			
<i>Prince Edward Island.</i>				
Charlottetown Dominion Building.....	1,553 15			
<i>New Brunswick.</i>				
Dorchester Penitentiary	400 00			
Fredericton Post Office, &c.....	399 96			
St. John Custom House.....	1,625 04			
do Penitentiary	450 00			
do Post Office.....	1,140 00			
Sussex do	282 03			
<i>Quebec.</i>				
Montreal Custom House	820 00			
do Examining Warehouse	1,164 50			
do Inland Revenue Offices.....	720 00			
do Post Office.....	746 00			
Quebec Citadel buildings.....	73 25			
St. John's Post Office	333 28			
Three Rivers Custom House.....	833 70			
do Post Office.....	273 75			
Carried over.....	13,431 49	1,283,666 96	244,752 04	193,189 86
		9		1,631,603 86

APPENDIX No. 1—Continued.

Name of Work.		Con- struction.	Repairs.	Staff and Maintenance	Total.
		\$ cts.	\$ cts.	\$ cts.	\$ cts.
Brought forward.....	\$13,431 49	1,283,666 96	244,752 04	103,189 86	1,631,608 86
PUBLIC BUILDINGS—Continued.					
SALARIES OF ENGINEERS, &c.—Concluded.					
<i>Ontario.</i>					
Belleville Post Office	425 00				
Brantford do	600 00				
Gananoque Custom House.....	122 00				
Kingston Military College.....	1,320 00				
London Custom House	700 00				
do Post Office.....	386 77				
St. Catharines Custom House	158 86				
do Post Office	259 98				
Stratford do	330 00				
Toronto Custom House.....	1,108 00				
do Examining Warehouse.....	896 50				
do Inland Revenue Offices	354 00				
do Post Office.....	780 00				
Windsor do	1,000 08				
<i>British Columbia.</i>					
New Westminster Penitentiary.....	285 00				
PUBLIC BUILDINGS GENERALLY.....	90 00			22,347 68	22,347 68
HEATING DOMINION BUILDINGS.					
<i>Nova Scotia.</i>					
Halifax Dominion Building.....	946 00				
Pictou Custom House.....	73 77				
do Inland Revenue Offices.....	15 00				
do Marine Hospital.....	24 80				
Sydney do	15 00				
<i>Prince Edward Island.</i>					
Charlottetown Dominion Building....	638 66				
<i>New Brunswick.</i>					
Chatham Custom House.....	50 62				
do Inland Revenue Office.....	10 00				
do Post Office	55 59				
Fredericton Post Office.....	435 57				
St. Andrew's Inland Revenue Offices.	39 00				
St. John Custom House.....	2,350 48				
do Marine Hospital.....	621 04				
do Penitentiary	52 00				
do Post Office.....	665 14				
do Savings Bank.....	282 85				
Sussex Post Office.....	425 55				
Carried over.....	6,691 07	1,283,666 96	244,752 04	125,537 54	1,653,9 6 54

APPENDIX No. 1—Continued.

Name of Work.	Construction.	Repairs.	Staff and Maintenance	Total.	
Brought forward.....	\$ 6,691 07	1,283,666 96	\$ 244,752 04	\$ 125,537 54	\$ 1,653,956 54
PUBLIC BUILDINGS—Continued.					
HEATING PUBLIC BUILDINGS—Concluded.					
<i>Quebec.</i>					
Chamblly Basin Canal Office.....	24 00				
Hull Post Office.....	169 25				
Montreal Custom House.....	1,357 06				
do Examining Warehouse.....	2,104 74				
do Inland Revenue Offices.....	358 58				
do Post Office.....	1,225 02				
Quebec Citadel Buildings.....	170 91				
do Custom House.....	1,180 38				
do Post Office.....	183 35				
St. John's Post Office.....	169 28				
St. Vincent de Paul Penitentiary....	2,393 85				
Three Rivers Custom House.....	351 57				
<i>Ontario.</i>					
Barrie Post Office.....	132 35				
Belleville Post Office.....	441 55				
Brantford do.....	372 49				
Cobourg do.....	10 00				
Cornwall Inland Revenue Offices.....	27 60				
Gananoque Custom House.....	6 50				
Guelph do.....	310 87				
Hamilton do.....	687 66				
do Post Office.....	456 79				
Kingston Custom House.....	276 16				
do Inland Revenue Offices.....	15 00				
do Military College.....	30 00				
London Custom House.....	858 80				
do Post Office.....	198 67				
Port Robinson Inland Revenue Offices	20 00				
Rideau Hall.....	15 00				
Stratford Post Office.....	535 22				
Smith's Falls Inland Revenue Offices.	12 00				
St. Catharines Custom House.....	511 74				
St. Catharines Post Office.....	68 78				
Toronto Custom House.....	1,405 19				
do Inland Revenue Offices.....	333 15				
do Post Office.....	943 33				
Windsor Post Office.....	577 05				
<i>Manitoba.</i>					
Winnipeg Architect's Office.....	110 00				
do Custom House.....	1,031 25				
do Dominion Land Office.....	687 50				
do Post Office.....	1,003 75				
<i>North-West Territories.</i>					
Qu'Appelle Clerk of Works' Office.....	96 00				
Carried over.....	27,553 46	1,233,666 96	244,752 04	125,537 54	1,653,956 54

APPENDIX No. 1—Continued.

Name of Work.	Construc- tion.	Repairs.	Staff and Maintenance	Total.	
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	
Brought forward.....	\$27,553 46	1,283,666 96	244,752 64	125,537 54	1,653,956 54
PUBLIC BUILDINGS—Continued.					
HEATING PUBLIC BUILDINGS—Concluded.					
<i>British Columbia.</i>					
New Westminster Penitentiary.....	6 25				
do Post Office.....	112 37				
Victoria Custom House	64 00				
do Post Office	84 87				
Yale Post Office.....	6 25				
PUBLIC BUILDINGS GENERALLY.....	285 19				
			28,112 39		28,112 39
HARBOURS AND RIVERS.					
Harbours Generally.			6,143 06		6,143 06
<i>Nova Scotia.</i>					
Arisaig Pier.....		9 00			9 00
Bear River.....	320 68				320 68
Benacidae Pond	5,772 96				5,772 96
Catalogne Gut.....	1,500 00				1,500 00
Cheverie Pier.....	1,736 24				1,736 24
Chipman's Brook.....	1,498 21				1,498 21
Coffin's Island.....	2,890 19				2,890 19
Cow Bay.....	7,184 66				7,184 66
Cramberry Head.....		100 00			100 00
Digby Pier.....		1,266 50			1,266 50
East Bay.....	246 30				246 30
Grand Narrows, Barfa Strait.....	3,000 00				3,000 00
Great Village River, Londonderry.....	4,250 00				4,250 00
Harbourville.....	1,499 95				1,499 95
Havre au Boucher.....	205 97				205 97
Ingonish South.....		759 82			759 82
Jordan Bay.....		102 50			102 50
Kingsport Pier.....		96 30			96 30
L'Ardoise.....		215 69			215 69
Little Hope Island.....		1,250 00			1,250 00
Mabou Harbour.....		698 27			698 27
Maitland Pier.....		750 00			750 00
Meteghan Cove.....		32 00			32 00
Militia Point.....	2,000 00				2,000 00
McNair's Cove.....	4,995 89				3,995 89
Oyster Pond.....	1,472 51				1,472 51
Parker's Cove.....	1,999 97				1,999 97
Parsons' or Partridge Island River.....	2,500 00				2,500 00
Port Head Pier.....	9,539 40				9,539 40
Port Lorne (formerly "Port Williams").....	4,374 15				4,374 15
Three Southon Harbour.....	1,000 00				1,000 00
West Arichat.....	1,600 00				1,600 00
White Point.....		1,000 00			1,000 00
Yarmouth.....	4,457 99				4,457 99
Carried over.....	1,347,712 03	251,032 12	159,792 99		1,758,537 14

APPENDIX No. 1—Continued.

Name of Work.	Con- struction.	Repairs.	Staff and Maintenance	Total.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Brought forward.....	1,347,712 03	251,032 12	159,792 99	1,758,537 14
HARBOURS AND RIVERS—Continued.				
<i>Prince Edward Island.</i>				
Campbell's Cove.....	530 30			530 30
Colville Bay.....		939 55		939 55
Malpeque Breakwater.....	3,584 72			3,584 72
Rustico Harbour.....	4,135 50			4,135 50
South West River, New London.....	1,874 70			1,874 70
St. Peter's Bay.....		309 60		309 60
Victoria Breakwater (formerly "Wood Islands").	4,008 53			4,008 53
<i>New Brunswick.</i>				
Anderson's Hollow.....	3,652 50			3,652 50
Buctouche.....	2,060 55			2,060 55
Caraget.....	4,205 70			4,205 70
Cocaigne Harbour.....	13 30			13 30
Grand Anse.....	2,755 44			2,755 44
Hopewell Cape—Ballast Wharf.....	3,212 17			3,212 17
Madawaska River.....	999 79			999 79
Mispec Breakwater.....	2,825 21			2,825 21
Pointe du Chêne Harbour (Shediac).....		817 59		817 59
Quaco Harbour.....	14 00			14 00
Richibucto Harbour.....	1,000 00			1,000 00
Rocher Bay Breakwater.....	3,574 06			3,574 06
Shippegan Harbour.....	4,491 64			4,491 64
St. Andrew's Harbour.....		9 75		9 75
St. John Harbour.....	41,715 05			41,715 05
do River, River des Chutes to Bear River...	2,000 00			2,000 00
do do Above Grand Falls.....	4,999 99			4,999 99
do do Grand Falls.....	799 95			799 95
do do Removal of Snags.....	250 00			250 00
St. Mary's River.....	1,500 00			1,500 00
Tynemouth Creek.....	500 00			500 00
Upper Salmon River.....	4,268 76			4,268 76
<i>Maritime Provinces.</i>				
Harbours and Rivers Generally.....	4,676 80			4,676 80
<i>Quebec.</i>				
Anse St. Jean Pier.....	485 20			485 20
Bagotville (St. Alphonse) Pier.....	3,586 03			3,586 03
Bas St. Paul Pier.....	12,228 38			12,228 38
Barachois de Malbaie.....	986 04			986 04
Berthier (en bas) Pier.....		522 93		522 93
Bic Pier.....	226 41			226 41
Black River.....	681 17			681 17
Cap à l'Aigle Pier.....	345 00			345 00
Carleton Pier.....	167 02			167 02
Chenal du Moine Pier.....	3,499 45			3,499 45
Chicoutimi Pier.....	2,145 84			2,145 84
Carried over.....	1,475,711 23	253,631 54	159,792 99	1,889,135 76

APPENDIX No. 1—Continued.

Name of Work.	Con- struction.	Repairs.	Staff and Maintenance	Total.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Brought forward.....	1,475,711 23	253,631 54	159,792 99	1,889,135 76
HARBOURS AND RIVERS—Continued.				
Quebec—Concluded.				
Eboulements Pier.....		498 65		498 65
Etang du Nord Breakwater, Magdalen Island.....	10,503 87			10,506 87
Harbours and Rivers Generally.....		3,390 18		3,390 18
Isle aux Condres Pier.....	1,167 78			1,167 78
Isle aux Grues, Havre Pointe aux Pins.....	1,145 73			1,145 73
Lanoraie Pier.....	208 15			208 15
Loures Pier, Lake Mégantic.....	1,194 71			1,194 71
Malbaie Pier.....		1,059 11		1,059 11
Matane Pier.....	5,199 19			5,199 19
Montreal Harbour.....			25 65	25 65
New Carlisle Pier.....	9,026 53			9,026 53
Newport River.....	7 70			7 70
Percé Pier.....	1,515 00			1,515 00
Phillipsburg Harbour, Missisquoi Bay.....	32 79			32 79
Piers below Quebec Generally.....			1,363 39	1,363 39
Port au Saumon Harbour.....	499 59			499 59
Quebec Harbour.....			98 22	98 22
Quebec Marine Hospital Wharves.....	2,039 72			2,039 72
do Queen's Wharf.....	190 85			190 85
Rivière Batiscan.....	1,999 97			1,999 97
do Blanche Pier.....	5,186 65			5,186 65
do du Lièvre.....	548 50			548 50
do du Loup (<i>en bas</i>) Pier.....	10,098 18			10,098 18
do Nicolet, Harbour of Refuge.....	30,995 76			30,995 76
do Ottawa, between Bristol and Portage du Fort.....	2,007 50			2,007 50
do Ottawa, channel opposite Calumet.....	454 67			454 67
do Ouelle Pier.....	4,547 16			4,547 16
do Richelieu, wharf between Lacolle and Clarenceville.....	3,516 44			3,516 44
do Saguenay, channel below Chicoutimi.....	7,082 97			7,082 97
do do enlargement of La Grande Dé- charge.....	4,996 29			4,996 29
do do Lake St. John, survey.....	3,988 23			3,988 23
do St. Francis.....	2,193 08			2,193 08
do St. Lawrence, removal of chains and anchors.....	14,246 61			14,246 61
do St. Lawrence, removal of rock, Dorval Channel.....	209 54			209 54
do St. Louis.....	9,432 89			9,432 89
do Yamachiche, removal of land slip.....	3,000 00			3,000 00
do Yamaska.....	11,070 24			11,070 24
Sault aux Cochons.....	464 80			464 80
St. Agnès Pier, Lake Mégantic.....	1,227 48			1,227 48
St. François (Isle d'Orléans) Pier.....	6,179 22			6,179 22
St. Jean do.....	60 55	55 70		116 25
St. Jean Port Joli Pier.....	4,892 10			4,892 10
St. Timothée Pier.....		187 21		187 21
St. Zotique Pier.....	4,708 18			4,708 18
Three Rivers Harbour.....	8,848 20			8,848 20
Trois Pistoles Pier.....	1,511 12			1,511 12
Carried over.....	1,651,912 17	258,862 39	161,280 25	2,072,054 81

APPENDIX No. 1—Continued.

Name of Work.	Con- struction.	Repairs.	Staff and Maintenance	Total.
Brought forward.....	\$ cts. 1,651,912 17	\$ cts. 258,862 39	\$ cts. 161,280 25	\$ cts. 2,072,054 81
HARBOURS AND RIVERS—Continued.				
<i>Ontario.</i>				
Belleville Harbour	5,015 92			5,015 92
Belle River do	2,032 50			2,032 50
Chantry Island Breakwater	2,345 30			2,345 30
Cobourg Harbour	14,850 24			14,850 24
Collingwood Harbour.....	30,802 27			30,802 27
Consecon do	3,012 85			3,012 85
Goderich do	6,860 16			6,860 16
Harbours and Rivers generally			6,616 78	6,616 78
Kaministiquia River	115 84			115 84
Kincardine Harbour	6,829 69			6,829 69
Kingston do	8,169 13			8,169 13
Kingsville do	18,391 25			18,392 25
Little Bear Creek	5,167 00			5,167 00
Little Current	10,421 06			10,421 06
L'Original Wharf.....	5,331 90			5,331 90
Meaford Harbour.....	9,862 28			9,862 28
Morpeth do	5,768 03			5,768 03
McGregor's Creek	5,000 00			5,000 00
Newcastle Harbour	12,703 03			12,703 03
Ottawa River, Narrows above Pembroke	1,207 90			1,207 90
Owen Sound Harbour	6,583 05			6,583 05
Peterborough do	2,894 87			2,894 87
Port Albert do	466 50			466 50
Port Elgin do	8,302 85			8,302 85
Port Hope do	13,526 45			13,526 45
Prince Arthur's Landing Harbour	1,698 72			1,698 72
Rondeau Harbour.....	5,649 32			5,649 32
Southampton Harbour.....	1,607 58			1,607 58
Sydenham River.....	6,604 10			6,604 10
Thornbury Harbour.....	7,050 15			7,050 15
Toronto do	253,363 15			253,363 15
Whitby do	2,350 50			2,350 50
Warton do	21,341 42			21,341 42
Wilson's Channel.....	70 95			70 95
<i>Manitoba.</i>				
Assiniboine River.....	3,065 71			3,065 71
Harbours, &c, Generally	522 40			522 40
Rainy River.....	195 80			195 80
Red River (mouth of river)	10,866 40			10,866 40
<i>North-West Territories.</i>				
Saskatchewan River (examination and improve- ment).....	14,000 00			14,000 00
<i>British Columbia.</i>				
Courtney River.....	801 65			801 65
Cowichan do	1,041 89			1,041 89
Carried over.....	2,167,802 98	258,862 39	167,897 03	2,594,562 40

APPENDIX No. 1—Continued.

Name of Work.	Con- struction.		Repairs.		Staff and Maintenance		Total.	
	\$	cts.	\$	cts.	\$	cts.	\$	cts.
Brought forward.....	2,167,802	98	258,862	39	167,897	03	2,594,562	49
HARBOURS AND RIVERS—Concluded.								
<i>British Columbia—Concluded.</i>								
Fraser River	9,854	42					9,854	42
Harbours, &c., Generally					599	17	599	17
Lillooet River.....	500	00					500	00
Naas do	113	00					113	00
Victoria Harbour.....	5,292	78					5,292	78
DREDGE VESSELS.....	115,552	44	24,714	71			140,267	15
DREDGING.								
<i>Nova Scotia.</i>								
Annapolis	1,379	30						
Digby	3,100	38						
East River.....	3,838	60						
Halifax Railway Terminus....	496	98						
do Richmond Wharf.....	149	09						
Jeddore	4,050	07						
Little Glace Bay.....	485	10						
Lunenburg.....	7,089	31						
Mabou.....	6,775	02						
Middle River.....	1,687	30						
Picton Landing.....	1,054	56						
St. Peter's Canal.....	4,415	36						
	34,521 07							
<i>Prince Edward Island.</i>								
Charlottetown Ferry.....	546	61						
Pownal Wharf.....	354	66						
Rocky Point Ferry.....	5,919	94						
Southport.....	4,818	85						
	11,640 06							
<i>New Brunswick.</i>								
River Miramichi, Horse Shoe..	1,602	93						
do (outer bar)...	1,624	02						
Pointe du Chêne.....	5,036	18						
St. Mary's, River St. John....	5,277	98						
	13,541 11							
Total Maritime Provinces.....	59,702	24						
<i>Quebec.</i>								
Chateauguay River.....	4,290	03						
Laprairie Harbour.....	3,684	92						
Repentigny Harbour.....	1,050	00						
Rivière à la Graise, Rigaud.	2,657	50						
do du Nord.....	290	20						
do Ottawa, Calumet.....	281	96						
do St. François.....	1,961	25						
Carried over.....	14,215	86	59,702	24	2,299,115	62	283,577	10
					168,496	20	2,751,188	93

APPENDIX No. 1—*Continued.*

Name of Work.	Construction.	Repairs.	Staff and Maintenance	Total.
Brought forward...\$14,215 86 59,702 24	\$ cts. 2,299,115 62	\$ cts. 283,577 10	\$ cts. 168,496 20	\$ cts. 2,751,188 92
DREDGING—Concluded.				
Quebec—Concluded.				
River St. Lawrence	31 15			
do St. Placide.	4,563 65			
Yau treuil Harbour.....	725 52			
Generally.....	1 092 85			
	20,629 03			
Ontario.				
Bayfield Harbour.....	\$524 82			
Goderich do	2,236 53			
Hawkesbury Harbour, Ottawa				
River.....	267 77			
Kincardine Harbour.....	549 67			
Lion's Head.....	228 00			
L'Original Harbour.....	638 98			
McGregory's Creek.....	47 10			
Pictou Harbour.....	7 50			
Toronto Harbour.....	3,523 50			
Generally.....	4,851 69			
	12,875 56			
British Columbia.....	14,822 88			
GENERAL SERVICE	3,815 71			
	111,845 42			111,845 42
SLIDES AND BOOMS.				
Saguenay District Works	3,360 57	5,368 90	1,023 68	9,753 15
St. Maurice District Works	1,621 00	5,008 37	15,160 55	21,789 92
do River, Grandes Piles Booms.....	10,647 70			10,647 70
Ottawa District Works			21,639 90	21,639 90
do River Works	10,032 30	2,097 22		2,097 22
South Nation River Works.....	575 02			
Gatineau River Slides.....	1,655 13			
Madawaska do	3,162 17	12,441 48		12,441 48
Black do	1,479 12			
Petewawa do	4,536 90	63 00		63 00
Coulonge do	2,305 52			
Dumoine do	2,619 89			
Newcastle District Works	674 31	26,366 05		26,366 05
Belœil Piers and Booms.....		4,371 49	2,130 10	7,175 90
		25 00	199 93	224 93
ROADS AND BRIDGES.				
Des Joachims Bridge	26,772 47			26,772 47
Ottawa Union Suspension Bridge.....		1,002 00		1,002 00
Isle aux Noix Bridge.....		849 67		849 67
St. David Bridge.....	2,558 00			2,558 00
Temiscouata Road.....		913 68		913 68
Dundas and Waterloo Road			120 44	120 44
Trails and Bridges—Crow Nest Pass, N.W.T.....	1,769 53			1,769 53
TELEGRAPH LINES.				
New Brunswick.				
Mainland to Grand Manan		462 33		462 33
Chatham to Escuminac	866 78			866 78
Carried forward	2,473,833 10	327,944 59	208,770 80	3,010,548 49
	17			

APPENDIX No. 1—Concluded.

Name of Work.	Con- struction.	Repairs.	Staff and Maintenance	Total.
Brought forward.....	\$ cts. 2,473,833 10	\$ cts. 327,944 59	\$ cts. 208,770 80	\$ cts. 3,010,548 49
TELEGRAPH LINES—Concluded.				
<i>Quebec.</i>				
North Shore, St. Lawrence, Pointe des Monts Section	22,432 40	.....	.....	22,432 40
<i>Manitoba and North-West Territories.</i>				
Telegraph Lines Generally.....	3,776 00	.....	23,145 67	26,921 67
Prince Arthur's Landing to British Columbia.	3,168 59	.....	.....	3,168 59
Saskatchewan to Prince Albert.....	4,981 79	.....	.....	4,981 79
<i>British Columbia.</i>				
Vancouver Island and Washington Territory.....	7,885 62	.....	.....	7,885 62
New Westminster and Ladner's Landing.....	1,171 46	.....	.....	1,171 46
Telegraph Lines Generally.....	.....	.....	36,358 27	36,358 27
LAND and CABLE Telegraph Lines, Lower St. Law- rence and Maritime Provinces.....				
Telegraph Service Generally.....	4,559 19	.....	12,161 01	12,161 01
Agent and Contingencies, British Columbia.....	.....	.....	6,395 10	10,954 29
.....	.....	.....	2,796 49	2,796 49
MISCELLANEOUS.				
Surveys and Inspections.....	.....	.....	28,982 61	28,982 61
Arbitrations and Awards.....	.....	.....	2,818 00	2,818 00
Monument to late Sir G. E. Cartier, Bart.....	733 45	.....	.....	733 45
Monument to Joseph Brant.....	50 00	.....	.....	50 00
National Art Gallery, Ottawa.....	.....	380 15	.....	380 15
Painting in oil commemorative of Conference 1864	4,000 00	.....	.....	4,000 00
Gratuity to Widow G. E. McLaughlin.....	.....	.....	333 33	333 33
Copying Indexes, &c., of late Department of Public Works.....	.....	.....	1,650 00	1,650 00
Extra Clerks, copying Returns ordered by Par- liament.....	.....	.....	918 55	918 55
Unforeseen expenses.....	.....	.....	704 61	704 61
Totals.....	2,526,591 60	328,324 74	325,034 44	3,179,950 78
WORKS AUTHORIZED BY SPECIAL ACTS OF PARLIAMENT.				
St. Lawrence River, deepening between Quebec and Montreal.....	110,000 00	.....	.....	110,000 00
Quebec Harbour Improvement.....	200,529 00	.....	.....	200,529 00
Lévis Graving Dock.....	137,000 00	.....	.....	137,000 00
Esquimalt Graving Dock.....	394,288 26	.....	.....	394,288 26
Totals.....	841,817 26	.....	.....	841,817 26
Grand Totals.....	3,368,408 86	328,324 74	325,034 44	4,021,768 04

O. DIONNE,
Accountant.

APPENDIX No. 2.

REPORT

ON

PUBLIC BUILDINGS

THROUGHOUT THE DOMINION,

FOR FISCAL YEAR ENDED 30TH JUNE, 1884.

BY

THOS. FULLER, CHIEF ARCHITECT.

APPENDIX No. 2.

REPORT OF THE CHIEF ARCHITECT.

Ref. No. 53,662.

DEPARTMENT OF PUBLIC WORKS,
OTTAWA, 10th November, 1884.

SIR,—I have the the honor to submit a General Report upon construction and repairs, in connection with the various public buildings under the control of this Department, during the fiscal year ended 30th June, 1884.

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

THOS. FULLER,
Chief Architect.

F. H. ENNIS, Esq.,
Secretary, Dept. Public Works.

PROVINCE OF NOVA SCOTIA.

AMHERST.

PUBLIC BUILDING.

The site which was given by the town is situated on what is known as the Court House Lot.

Plans are now in course of preparation for this building, which is to accommodate the Postal, Customs and Inland Revenue services.

ANTIGONISH.

PUBLIC BUILDING.

The alterations to the old college building, referred to in my last report, are nearly completed, and the building is now occupied.

Clerk of Works, Mr. J. Macdonald.

ARICHAT.

PUBLIC BUILDING.

A site on the corner of Main and Lower Water streets, fronting on the harbour, was purchased 19th August, 1883, and instructions have been received to prepare drawings, &c., for a building to accommodate the various Government offices.

NEW GLASGOW.

PUBLIC BUILDING.

Plans were completed and approved by the various Departments, and a contract was entered into on 23th June, 1884, for the erection of this building, on the corner of Dalhousie and Provost streets.

The main building, 47 feet by 61 feet, comprises basement, two stories and attic, with an annex 25 by 22 feet, one story in height.

The external walls throughout are to be stone—the partitions partly wood and partly brick. The external walls above ground are to be faced with red sandstone random coursed with window and door dressings, base course, string courses, moulded cornices, archivolt, keystones, consoles, pediments, finials and carved caps and bases of columns to door-jamb, of cut grey sandstone.

The floors and roofs are to be of wood, the latter covered with slates and galvanized iron. There are to be public entrances to the Post Office on both streets, and one to the Custom House on Provost street.

The central compartment on Provost street will be pronounced by a slight projection, containing, on each floor groups of three windows, and terminated by a boldly moulded pediment, in which provision is made for a clock face. On either side of pediment are to be two dormer windows, of appropriate design.

The Dalhousie street front has a large semicircular headed window, lighting the Post Office, over which are coupled windows and a semicircular arch in the attic, surmounted by a pediment. The western elevation is of similar treatment, but the northern somewhat plainer.

Plans, &c., prepared by this Department.

Clerk of Works, Mr. Donald Grant.

Contractor, Mr. James Strachan.

PICTOU.

MARINE HOSPITAL.

Since the date of my last report, this building is completed and occupied.

Plans, &c., prepared by this Department.

Clerk of Works, Mr. W. J. Lorrain.

Contractors, Messrs. Macdonald & Stewart.

SYDNEY.

QUARANTINE STATION.

The buildings described in report of last year are completed and occupied.

Plans, &c., prepared by this Department.

Clerk of Works, Mr. J. K. McLeod.

Contractor, Mr. Hugh McDonald.

TRURO.

POST OFFICE, CUSTOM HOUSE AND INLAND REVENUE OFFICE.

Plans were prepared and approved by the various Departments, and a contract for this building was entered into on the 12th September, 1883, since when work has been carried out in such a manner that it is probable it will be roofed in this autumn.

The main building, 56 feet by 41 feet, will accommodate in the basement, fuel, furnace room, &c. On the ground floor, the Post Office, first floor Customs and Inland Revenue office, and, in the attic caretaker and spare offices. In the rear is a one story building, 42 feet by 22 feet, for Weights and Measures and Examining Warehouse and also a porch for the mail lobby. The buildings are to have stone foundations, and the exterior walls above ground of red brick and grey sandstone dressings, the partitions, floors, stairways and roofs of wood. The roofs are to be covered with slates and galvanized iron.

Gas and water will be supplied from the city services.

The main features of the elevation on Princes street are the centre, comprising groups of windows in a recessed arch surmounted by a lofty gable, and the bold

entrances to the Post Office and Custom House in the angles; the red brick facing, relieved by the grey sandstone dressings and string courses, is harmonious and pleasing. A similar but plainer treatment is adopted in the other elevations.

Plans, &c, prepared by this Department.

Clerk of Works, Mr. S. S. Crowe.

Contractors, Messrs. Townsend & MacKay.

WINDSOR.

PUBLIC BUILDING.

Plans were completed and approved by the various Departments.

A contract for this building, which is in course of erection on Gerrish street, between Gray and Water streets, was entered into on 15th October, 1883.

It consists of a main building, comprising basement, two stories and attic, and an annex of one story and basement. The main building, 51 feet by 41 feet, will accommodate the Post Office on the ground floor, the Customs and Inland Revenue on the first floor, and cartaker in the attic. The annex is 25 feet by 30 feet, and is for the Examining Warehouse, and Weights and Measures on the ground floor and a furnace room in basement. The foundations and basement walls are to be rubble stone; the exterior walls above ground level are of brick, with grey sandstone dressings; the partitions, floors and roofs are of wood; the roofs covered with slates and galvanized iron. The plinths, string courses, cornices, gable copings, door jambs and arches, window sills and heads, corbels, etc., are of cut grey sandstone.

The two principal entrances are to be on the street front, and the mail entrance in the rear.

There is to be a brick vault on the ground floor for the Post Office and two on the first floor, for the Customs and Inland Revenue respectively.

The features of the elevation on the main street are the entrance doorways, and the windows in groups of three to light the Post Office on ground floor and Customs on first floor. These windows are in a recess, which is arched over on attic floor and surmounted by a lofty gable, all treated with simplicity in the mouldings, the whole forming an imposing elevation.

Provision has been made for supplying the building with gas and water.

Plans, &c., prepared by this Department.

Clerk of Works, Mr. Robert Sutherland.

Contractor, Mr. J. Macintosh.

YARMOUTH.

PUBLIC BUILDING.

On the 27th June, 1884, a site was purchased for this building, with frontages of 140 feet 4 inches and 42 feet 6 inches on John and Main streets respectively.

PROVINCE OF PRINCE EDWARD ISLAND.

CHARLOTTETOWN.

DOMINION BUILDING.

On the night of the 20th February, 1884, this building was destroyed by fire.

Instructions have been given to have the necessary drawings prepared for a building to replace it, and upon the same site. The plans will be completed as soon as possible and tenders invited by advertisement.

SUMMERSIDE.

PUBLIC BUILDING.

The plans were completed and approved of by the various Departments and a contract for the erection of this building was entered into on 16th October, 1883.

It is situated on the corner of Fitzroy and Tanner streets.

The foundation and basement walls are to be of rubble stone, the exterior walls above ground to be of red brick with cut grey sandstone dressings, and the floors and roofs of wood, the latter covered with slates and galvanized iron. It will probably be roofed this season.

The main building, 68 by 39 feet, comprises basement, two stories and attic, to accommodate the Post Office on the ground floor, the Customs and Inland Revenue on the first floor, and the caretaker in the attic. Attached is a building 30 by 24 feet, comprising basement and ground floor, which will be occupied by the Gas Inspector, Inspector of Weights and Measures and as an Examining Warehouse, and the basement as store, fuel and furnace rooms.

The public entrances to the Post Office, Custom House, Inland Revenue offices and Gas Inspection offices are on Tanner street and the mail entrance on Fitzroy street.

The main building has an ununiform plan and is surmounted by a high pitched roof which, on the Tanner street elevation, is broken by a brick gable and two brick dormers.

The cut sandstone work comprises jambs, arches, archivolt and spandrels of entrance doors, sills and lintels of windows, plinth course, plain and moulded string-courses, corbels, copings and chimney caps.

Plans, &c., prepared by this Department.

Superintending architect, Mr. D. Stirling.

Clerk of works, M. Richard M. Hunt.

Contractor, Mr. Pierce Doyle.

PROVINCE OF NEW BRUNSWICK.

CARLETON (ST. JOHN).

POST OFFICE.

My report of last year contains a description of this building, which is now well advanced, and is expected to be completed and occupied this season.

Since my last report it was decided to add a clock turret, which was placed on the apex of the main roof.

Plans, &c., prepared by this Department.

The works were commenced under the superintendance of Mr. D. E. Dunham, at whose decease Mr. H. H. Mott was appointed Superintending Architect.

Clerk of Works, Mr. C. F. Tilley.

Contractors, Messrs. Causey, Bond & Milden.

DORCHESTER.

GENERAL PENITENTIARY FOR THE MARITIME PROVINCES.

Work on the new cell-wing and new boiler-house chimney were carried on steadily during the year, but, owing to necessary demolition and rebuilding at the commencement, it is not probable that the cell wing will be roofed this autumn. The boiler-house is completed and furnished with three new boilers, connected with the prison apparatus and having a sufficient capacity for heating the existing building and the new cell wing now in progress.

The new tank and tank-house, referred to in last year's report, are completed. The machinery lately in use at the St. John Penitentiary is, where suitable, being set up in the workshop building.

Plans, &c., prepared by this Department.

Superintending Architect, Mr. G. E. Fairweather.

Clerk of Works, Mr. John E. Turnbull.

Superintendent of Masonry, Mr. H. J. McGrath.

Contractor for cell wing and boiler-house, Mr. D. A. Duffy.

Contractors for heating apparatus, Messrs. Wisdom & Fish.

FREDERICTON.

BARRACKS.

These buildings, of which a full description is contained in Appendix No. 2, General Report of the Minister of Public Works, 1867-1882, were extensively repaired, altered, fitted and furnished to render them suitable for the use of the Dominion School of Infantry Instruction.

Superintending Architect, Mr. J. T. C. McKean.

Clerk of Works, Mr. R. Sutherland, jun.

MONCTON.

PUBLIC BUILDING.

Drawings were prepared in accordance with the views of the various Departments. This building was contracted for 23rd August, 1883, and is now in course of erection on the corner of Main and Telegraph streets.

It is a red brick building with grey sandstone dressings, and on a stone foundation, having a main portion, 52 feet by 43 feet, comprising basement, two stories and attic, and a one-story annex, 85 feet by 18 feet.

The main building will accommodate the Post Office on the ground floor, the Customs and Inland Revenue on the first floor, the caretaker on the attic floor and the heating apparatus and fuel in the basement. The annex will be for Weights and Measures, &c.

The main features of this design are the three bold entrances on Main street (two for the Post Office and one for the upper flats), the central gable on the Main street and the clock tower on the street corner, the last mentioned being carried up two stages higher than the main building.

The cut sandstone work consists of plinth, string courses, cornice, window and door jambs, sills and heads, copings of gables, &c. The floors and roofs to be of wood, the latter covered with slate and galvanized iron.

Plans, &c., prepared by this Department.

Superintending Architect, Mr. G. E. Fairweather.

Clerk of Works, Mr. E. Milliken.

Contractor, Mr. G. J. O'Doherty.

NEWCASTLE.

PUBLIC BUILDING.

A lot was secured at the corner of Water, Henry and King Streets for a building to accommodate the local Post Office, Custom House and Inland Revenue Office.

ST. JOHN.

MARINE HOSPITAL.

This building was fully described in a previous report.

Owing to the failure of the original contractor, the works were taken possession of by this Department and were re-let, and the works are now being carried on at such a rate as to warrant the expectation of their completion at an early date.

A contract was entered into for a hot-water heating apparatus, which is now in course of construction.

The plans, &c., were prepared by Mr. D. E. Dunham, Architect, who carried on the works until his decease, when Mr. H. H. Mott, architect, was appointed to superintend its completion.

Clerk of Works, Mr. C. F. Tilley.

Contractors for the building :

First contractor, Mr. Wm. Lawler,

Second contractors, Messrs. Bond & Milden.

Contractors for heating apparatus, Messrs. Campbell & Ellis.

ST. STEPHENS.

PUBLIC BUILDING.

A site, with a frontage of 80 feet on Water street, for a building to accommodate the various Government offices, was purchased on 28th November, 1883, and instructions have been received to prepare the necessary drawings, specification, &c.

SUSSEX.

POST OFFICE, CUSTOM HOUSE, &c.

The works described in my report of last year have been completed and the building occupied.

Plans, &c., prepared by this Department.

Superintending Architect, Mr. G. E. Fairweather.

Clerk of Works, Mr. Thomas Heffer.

Contractor for building, fittings, grading, &c., Mr. Wm. Toms.

Contractors for heating apparatus, Messrs. Wisdom & Fish.

PORTLAND.

POST OFFICE.

A building on the corner of Main and Simonds streets, known as the Williams property and previously used as the local Post Office, was purchased 14th July, 1883.

The building which was built in 1869 has a main portion 45 feet by 72 feet, and a wing 28 feet by 32 feet. There are three stories, basement and attic, built of brick, on a stone foundation, and having wooden floors and roofs.

WOODSTOCK.

POST OFFICE, CUSTOM HOUSE, &c.

The construction of this building, which was described in my last report, is now well advanced, and it should be completed ready for furnishing this season.

Drawings and specifications prepared by this Department.

The works were commenced under the superintendence of Mr. D. E. Dunham, at whose decease Mr. H. N. Black was appointed Superintending Architect.

Clerk of Works, Mr. J. F. Fletcher.

Contractor, Mr. J. Limerick.

PROVINCE OF QUEBEC.

CHAMBLY.

OLD FORT.

The loose stones remaining from the ruins were collected and a wall built on the river front to prevent further encroachment during the spring freshets.

Portions of the walls were pointed, and portions thought dangerous were taken down.

A fence was built around the military burying ground.

Clerk of Work, Mr. J. O. Dion.

CHICOUTIMI.

MARINE HOSPITAL.

Since my report of last year this building has been completed, fitted with a hot-water apparatus, the furniture and bedding required all supplied, and the building is now occupied.

A brick laundry and dairy, waterworks and drains, are in course of construction.

Plans, &c., prepared by this Department.

Superintending Architect, Mr. F. X. Berlinguet.

Clerk of Works, Mr. Téléphore Boily.

Contractor for buildings, Mr. Wm. Warren.

Contractor for heating apparatus and for water pipes, Mr. Z. Vandry.

HULL.

POST OFFICE AND INLAND REVENUE OFFICE.

This building is completed and occupied.

Plans, &c., prepared by this Department.

Clerk of Works, Mr. Joseph Derouin.

Contractor, Mr. Wm. Toms.

LÉVIS.

FORTS AND MILITARY WORKS.

A roof similar to that of Forts Nos. 2 and 3 was erected over the casemates, &c., of Fort No. 1.

The military bridge at St. David de Lévis originally built by the Imperial Government, was rebuilt.

The stables at Engineers' Camp were fitted up for the use of the Dominion Cavalry School.

Plans, &c., prepared, and work supervised by this Department.

Clerk of Works, Mr. Jacques Jobin.

Contractor for bridge at St. David de Lévis, M. Nicholas Piton.

Contractor for roofing Fort No. 1 and stables, Engineers' Camp, Mr Pierre Samson.

MONTREAL.

CHAMPS DE MARS.

New fencing, gates and gullies were constructed on St. Gabriel, Craig and Gosford Streets; drains were laid between the upper slope and the main drain on Craig street; the embankments throughout were graded and sodded; the retaining wall was repaired, pointed and re-coped, and new stairs built from Craig street to the promenade.

Superintending Architect, Mr. Alph. Raza.

Contractor, Mr. Louis Allard.

CUSTOM HOUSE.

Various alterations to and fitting up of offices, repairs to roofs, &c., have been executed.

Superintending Architect, Mr. James Nelson.

Contractors, Mr. Moise Martin and Mr. Geo. R. Prowse.

DRILL HALL

A contract was entered into, 27th June, 1883, for taking down and rebuilding a portion of the walls. On the 16th August, 1883, a contract was entered into for an iron roof for the Hall.

The Hall is of the same size as the original, viz. 125 feet by 316 feet, inside-measurement. It is constructed of local limestone, the street fronts in courses with cut stone dressings. The roof is of wrought iron, covered with galvanized iron and glass.

There are entrances both on Craie street and Vitre street.

The work has progressed satisfactorily and the iron roof is expected to be placed in position and completed this autumn.

Plans, &c., prepared by this Department.

Superintending Architect, Mr. A. Raza.

Clerk of Works, Mr. A. Lapierre.

Contractor for masonry, Messrs. J. B. St. Louis & Bro.

Contractor for roof, Mr. W. Hendrie.

EXAMINING WAREHOUSE.

On 27th November, 1883, a contract was entered into for the reconstruction, with wrought rolled iron beams and brick arches, of the existing wooden floors, which were decayed and dangerous. The work, which has to be done in sections, in order to prevent interruption of public business, is being carried on satisfactorily, and it is expected that it will be fully completed this autumn.

A contract was entered into, 2nd November, 1883, for a one-story stone addition, at the corner of Common and McGill streets, for the storage of bulky goods, oils, &c.

Sundry repairs and alterations to steam fittings, hoists, &c., &c., have been executed.

Superintending Architect, Mr. James Nelson.

Clerk of Works, Mr. C. Dandelin.

Contractors for floors, Messrs. Cousineau & Valiquette.

Contractor for addition, Mr. John Black.

POST OFFICE.

During the past fiscal year the following works were performed:

A hydraulic passenger and goods hoist, from basement to attic; a hydraulic letter elevator, from basement to ground floor; altering skylights; addition to screen, main lobby; enlarging Registered Letter Office; new winter porches to front entrances; new skylights; fittings and furniture for Money Order Office; additional heating coils; inside painting and colouring; repairing chimneys and various general repairs.

Superintending Architect, Mr. James Nelson.

Contractor for works generally, Mr. Louis Allard.

do hoist, Messrs. Miller Bros.

do letter elevator, Mr. E. Chanteloup.

do heating coils, Messrs. R. Mitchell & Co.

do smoke flues, Mr. G. R. Prowse.

do repairs to chimneys, Messrs. Plante & Dubuc.

QUEBEC.

CITADEL.

The outer facing and all the parapet of Diamond Bastion, from Mann's Curtain to the south-west angle, and also a portion of the outside of the wall of Richmond Bastion, were taken down and rebuilt.

The footings of outer walls of King's and Richmond Bastions and of the curtain wall between, were pointed.

A roof was built over the main gateway and also over casemates Nos. 4 to 11 Dalhousie Bastion, similar to that over Richmond Bastion.

A new well house was constructed, new porches at officers' quarters, new tanks at Jebb's Redoubt, and various repairs executed to the various buildings, the shot and shell yard, fences, stabling, &c., &c.

Works executed under the immediate superintendence of this Department.

Superintendent, Mr. James Shearer.

Clerk of works, Mr. P. Mahon.

Contractor for roofing main gateway, Mr. F. De Varennes.

do do Dalhousie Bastion, Mr. Chas. Jobin.

do facing Diamond and Richmond Bastions, Messrs. Costolow & Lortie.

do pointing footings, Mr. J. O'Leary.

do general repairs, Messrs. Rousseau Bros.

DRILL HALL.

Plans were prepared, and on the 20th May, 1884, a contract was signed for the construction of this building, which is to be erected on the Dominion Government property at the Cove Fields, in the rear of the old Drill Shed.

The Drill Hall will be 266 feet long by 96 feet wide, and 30 feet in height, from the floor to the wall-plate, and 70 feet from floor to apex of roof; a gallery, 7 feet wide and 18 feet above the floor, supported on iron brackets, will extend around the entire interior of the hall.

On the western side, and returning around both ends half-way, is a lean-to 25 feet wide, with a raking ceiling averaging 23 feet high, for use as armories, &c.

At the northern and southern ends, respectively, are to be the caretaker's apartments and the officers' quarters, each 40 feet by 55 feet, and two stories in height.

The main entrance to the Hall is to be in the middle of the eastern side, flanked by two circular towers, containing the stairs leading to the galleries, and having conical roofs, terminating in ornamental iron finials.

On each side of the main entrance, the wall is to be divided by stone buttresses into six bays, each of which is to contain a narrow light, with a large window over extending through the cornice into the roof, and having pilasters, architrave, frieze, cornice and highly ornate and carved roof, above which, in the main roof, an ornamental ventilator. The windows at the ends are similar, but those on the western side are plainer in character.

The roof is of wood, covered with galvanized iron, and crowned by an ornamental iron ridge cresting, divided by ornamental standards with metal bannerets, and subdivided into panels of foliated iron work.

Plans prepared and work superintended by Mr. E. E. Taché, Architect.

Clerk of Works, Mr. W. J. Peters.

Contractors, Messrs. Costolow & Lortie.

EXAMINING WAREHOUSE.

This building was described in my report of last year. Work has been carried on continuously, and it is expected that the building will be roofed in this autumn.

Plans &c., prepared by this Department.

Clerk of Works, Mr. Pierre Gauthier.
 Contractor, Mr. Denis O'Brien.
 Superintendent Architect, Mr. Berlinguet.

FORTIFICATIONS.

The following works were carried out under the immediate superintendence of this Department :—

- Re-building retaining wall, St. Valier street, Mr. Chas. Jobin, Contractor.
 Wall between St. John and Kent Gate do do
 Repairing, pointing, &c., rebuilding wall do do
 Repairing at Mount Carmel do do
 Pointing, repairing, &c., Martello Tower No. 1, Messrs. Pampalou & Mathieu, Contractors.
 Re-building walls of St. John Bastion, Mr. Thos. Pampalon, Contractor.
 Repairing walls of Military Store, Palace Hill, Messrs. Costolow & Lortie, Contractors.
 Repairing and pointing Rampart Walls, Messrs. Costolow & Lortie, Contractors.
 Building Champlain street wall do do
 Building wall and fence on cliff above St. Valier street, Mr. J. Larose, Contractor.
 Repairing walls, embankments, &c., Esplanade, Mr. Wm. Meek, Contractor.
 Providing seats and platforms, new fence gates, wood pavement, on Kent and St. Louis Gate, &c., Mr. L. Boivin, Contractor.
 Grading outside St. Louis Gate, Mr. M. Hudon, Contractor.
 Roofing Armoury Building, Mr. Z. Vandry, do
 Superintendent, Mr. J. Shearer.
 Clerk of works, Mr. Jos. Guillote.

ST. JOHN'S.

BARRACKS.

These buildings were repaired and altered to render them suitable for use as a Dominion school for infantry instruction.

The roofs generally were re covered with slate, new floors to kitchens and passages, officers, quarters were put down, and new doors windows, plastering, &c., were done where found necessary. A system of waterworks and drainage and a new drill shed were provided, and the old kitchen and the magazine were taken down.

Architect, Mr. J. R. Poitras.

ST. VINCENT DE PAUL.

PENITENTIARY.

The stone dining hall referred to in my last year's report has been roofed and covered with galvanized iron, the windows glazed and fixed in position; the basement paved with cut limestone flagging, 6 inches in thickness, bedded upon 9 inches of concrete, and the basement ceiling vaulted with brick. Of the main sewer, referred to in my last report, a length of 100 yards, which is excavated in rock, was completed during the past year, and the entire work is expected to be completed by the close of 1884.

It will be built of dressed stone, with a section 3 feet 9 inches by 2 feet 3 inches, and will be 662 yards in length, 150 yards of which is through heavy rock cutting, of an average of 18 feet in depth.

A cut stone dwarf fence wall, 69 feet in length and 6 feet in height, with stone-piers and ornamental cast-iron railing and gates, was erected, and a dressed stone-flag sidewalk put down, in the front of the Warden's residence.

A wooden store building, 40 feet by 24 feet, was built within the boundary wall.

Two woodsheds, 24 feet by 18 feet, were built, one at the Warden's and one at the Episcopal Chaplain's residence.

An additional guard-house was erected on the eastern angle of the boundary wall.

Two hundred and fifty two iron bedsteads, with palm leaf mattresses and pillows, were made, and fixed in the northern and eastern dormitory wings.

At the Guards' cottages, eight chimney shafts, 14 feet in length, were taken down, re-built and capped with cut stone; the roofs were re-shingled and, together with the whole of the exterior woodwork, were painted two coats.

The roofs of the dormitories and the woodwork of the residences of Warden, Deputy Wardens and Episcopal Chaplain were painted two coats. The iron barriers of new dining hall windows were japanned two coats.

A large number of repairs, a large quantity of fitting-up, such as shelving, &c., and a good deal of one-coat painting have been done throughout the various buildings.

Plans, &c., prepared by this Department.

Superintending Architect, Mr. John Bowes.

SHERBROOKE.

POST OFFICE, CUSTOM HOUSE AND INLAND REVENUE OFFICES.

The contractors for this building failing to carry on the work with due diligence, the contract was re-let and it is expected that the building will be completed early next winter.

Plans, &c., prepared by this Department.

Superintending Architect, Mr. F. X. Berlinguet.

Clerk of Works for masonry, Mr. R. Richards; and for carpentry, &c., Mr.

J. Low.

First Contractors, Messrs. Robellard and Murphy.

Second Contractor, Mr. G. G. Bryant.

SOREL.

PUBLIC BUILDING.

A site on the corner of Prince and George streets was obtained by gift from the Corporation of Sorel on 13th March, 1884, and instructions have been received to prepare plans, &c., so that tenders may be invited at once for the building.

THREE RIVERS.

POST OFFICE.

The works in conversion of this building into a Post Office, referred to in my last report, requiring the elevating of the principal story, and building a lower or ground floor story of stone beneath, are now in progress, and I consider that the works will be completed and the office occupied by the 1st January 1885.

Plans &c., prepared by this Department.

Superintending Architect, Mr. O. Z. Hamel.

PROVINCE OF ONTARIO.

AMHERSTBURG.

POST OFFICE, CUSTOM HOUSE, &c.

Plans for this building were prepared and approved by the various Departments, and a contract for its construction signed on 3rd October, 1883.

It is situated on the corner of Dalhousie and Richmond streets measuring, 60 feet by 42 feet, and comprises a basement, two stories and attic.

The basement is to contain an Examining Warehouse, office for Weights and Measures, fuel and furnace rooms; the ground floor, the Post Office, the first floor the Customs and Inland Revenue offices, and the attic the quarters of the caretaker, and some spare rooms. Brick safes are provided on the two principal floors for the various Departments.

The basement external walls are of rubble masonry, and the partitions of brick, and the walls of superstructure are of red brick with cut stone plinth, string courses, copings and dressings of windows and door openings. The floors, roofs and partitions are of wood, the roof covered with slates and galvanized iron.

On the Dalhousie street or principal front, the centre slightly projects and contains two superimposed groups of three windows each, the lower lighting the Post Office, public lobby, and the upper lighting the Customs long room. Over these will be a gable containing a small triplet to light the caretaker's quarters. On either side of this projection are the public entrances, one to the Post Office and the other to the Customs and Inland Revenue, above which are coupled windows, lighting offices on first floor. The remaining elevations are similarly but more plainly treated.

Plans, &c., prepared by this Department.

Superintending Architect, Mr. Wm. Scott.

Clerk of Works, M. Twomey.

Contractor, Mr Patrick Navin.

BARRIE.

POST OFFICE, &c.

Plans were prepared and approved by the various Departments, and a contract for this building, which is situated on Dunlop street, was entered into 12th September, 1883.

It is 34 feet by 45 feet, and consists of basement for Examining Warehouse, Weights and Measures Office, boiler room, fuel room &c., &c., a ground floor for the Post Office, a first floor for the Customs and Inland Revenue Offices, and an attic for the caretaker, &c.; three brick safes are provided, one on the ground and two on first floor.

The basement walls are of stone and those of the superstructure of red brick with brown sandstone strings, cut stone plinth, sills and heads and archivolt to windows and doors, and moulded cut stone pediment.

The roofs and floors are of wood, the former covered with slates and galvanized iron. There are three public entrances one of which is on Dunlop street, two for the Post Office, and one for the Customs and Inland Revenue.

The building has an extended front. The north and south angles built canted, contain the principal entrances. The front is formed into three compartments by brick pilasters, with triplet windows between on each floor, terminated by pediment. The remaining elevations are treated in a plainer manner.

Architects, Messrs. Kennedy, McVeittie & Holland.

Clerk of Works, Mr. Edward Byrne.

Contractor, Mr Wm. Toms.

BELLEVILLE.

POST OFFICE, CUSTOMS AND INLAND REVENUE OFFICES.

The contract has been completed and the building is now occupied.

Architect, Mr. R. C. Windeyer.

Clerk of Works, Mr. John Branton.

Contractors for building and for heating, Messrs. Northcott & Alford.

do Post Office fittings, Mr. P. Forin.

do Custom House fittings, Mr. W. Alford.

BROCKVILLE.**POST OFFICE, CUSTOM HOUSE AND INLAND REVENUE OFFICES.**

A description of this building was given in my report of last year, since when the works have been continuously carried forward though not as rapidly as could be desired, but it is probable that the building will be roofed this autumn.

Plans prepared and work supervised by this Department.

Clerk of Works, Mr. George Steacy.

Contractors, Messrs. Tompkins & Crain.

CHATHAM.**POST OFFICE, CUSTOM HOUSE AND INLAND REVENUE OFFICES.**

The contract works described in my last report are completed. A hot-water heating apparatus has been put in and the offices fitted up, furnished and occupied.

Plans, &c., prepared by this Department.

Superintending Architect, Mr. W. F. Rutley.

Clerk of Works, Mr. John Baxter.

Contractor for building, fittings, footpaths, &c., Mr. J. E. Askwith

Contractors for heating apparatus, Messrs. J. & J. Blackmore & Co.

CLIFTON.**POST OFFICE, &C.**

My last report contains a description of this building, which is expected to be completed ready to fit up and furnish next winter.

Plans are now being prepared for a heating apparatus.

Plans, &c., prepared and work supervised by this Department.

Clerk of Works, Mr. J. B. Jones.

Contractor, Mr. J. E. Askwith.

COBOURG.**POST OFFICE, CUSTOM HOUSE, &C.**

The alterations and additions referred to in my report of last year are now being carried out.

Plans, &c., prepared by this Department.

Clerk of Works, Mr. S. Retallack.

Contractor, Mr. W. Battell.

CORNWALL.**POSTAL, CUSTOMS AND INLAND REVENUE OFFICES.**

It is expected that this building, which was described in last year's report, will be roofed and the works comprised in the original contract completed this autumn.

Tenders for a heating apparatus will be invited at an early date.

The works are expected to be completed and furnished ready for occupation during next fiscal year.

Plans, &c., prepared by this Department.

Superintending Architect, Mr. J. J. Browne.

Clerk of Works, Mr. Wm. Aitcheson.

Contractors, Messrs. Gordon & Ross.

GALT.

PUBLIC BUILDING.

A site was presented by the Corporation of the town of Galt, on 8th April, 1884, with a frontage of 110 feet on South Water street and average depth of 62 feet, extending back to the Grand River, and instructions have been received to prepare plans, &c., so that the work may be tendered for during the coming season.

GANANOQUI.

CUSTOM HOUSE.

A description of this building appeared in my last year's report, since which the building has been completed and occupied. Designs for a hot water apparatus to heat the building are being prepared.

Plans and specifications prepared and work supervised by this Department.

Clerk of Works, Mr. W. Hogan.

Contractor, Mr. George J. Wilson.

HAMILTON.

POST OFFICE, &c.

A description of this building appeared in my report of last year. Since the date of the signing of contract 15th August, 1882, the works were carried on continuously, and at present rate of progress it is expected to be roofed in early this autumn.

Plans, &c., prepared by, and the superintendence of the work done by this Department.

Clerk of Works, Mr. George Sharpe.

Contractors, Messrs. Van Allen, Brown and Love.

KINGSTON.

PENITENTIARY.

The breakwater referred to in my report of last year was completed.

The northern portion of the west wharf 600 feet in length 12 feet in breadth and 13 feet in depth being dilapidated, required re-construction. The work is in progress and is expected to be completed by March 1885.

The construction of the heating apparatus referred to in former reports is still in progress. A cut stone duct 3 feet 6 inches x 2 feet 6 inches inside, to contain the steam and return mains was carried from the boiler house to the rotunda, and the heating service of the rotunda and three cell wings or dormitories is completed. The heating service is now being extended to the north wing, which contains the offices of the Warden, Deputy Warden and Accountant, the residences of the Matron and Deputy Matron and the female prison.

A Worthington steampump was placed in the boiler house and attached to the new system of water works now in course of construction and to be completed by the close of the calendar year.

Branches of a 6 inch main service pipe are being distributed to the Warden's residence, the north, east and south workshops, the lunatic asylum, and to 22 hydrants. A boiler-plate cistern of 10,000 gallons capacity supported on stone piers 20 feet in height, was placed in the rear of the Warden's residence and covered by a frostproof wooden building with a covering of felt and galvanized iron.

A 9 inch tile drain 70 yards long was laid from the north wing across the cellar and the Deputy Warden's yard; 20 yards of this was through heavy rock cutting.

The laundry and the storehouse in the female prison yard being dilapidated, were taken down and replaced by stone buildings plastered inside, and having their roofs covered with galvanized iron.

A wooden cattle shed covered with galvanized iron, size 15 feet by 18 feet, was erected behind the Warden's residence.

About 1500 yards of pointing in cement were done to the prison boundary and yard walls.

Plans, &c., prepared by this Department.
Superintending Architect, Mr. John Bowes.

POST OFFICE.

A portion of the fittings, &c., being obsolete, were taken out and replaced by others of recent pattern, suitable for a rapid and efficient discharge of the local postal business.

ROYAL MILITARY COLLEGE.

The addition to the Mechanical Engineer's dwelling is completed.

An apparatus for the manufacture of gas from naphtha together with the necessary mains, &c., to light the College building, were fitted up and are now in operation.

The water service was extended to the quarters occupied by the College Staff beyond the inner inclosure.

Cleaning, painting, whitewashing and general repairs were done to the various buildings.

Superintending Architects, Messrs. Power & Sons.

Contractor for addition to Mechanical Engineer's dwelling, Mr. J. Waddell.

Contractor for gas service, The Combination Gas Co.

LONDON.

CUSTOM HOUSE.

The steam heating apparatus has been extended to the examining warehouse and the lockup.

Essential repairs to roof and carpenters work throughout have been carried out.
Architect, Mr. Thos. H. Tracy.

MILITARY BUILDINGS.

A brick addition was made to the house occupied by the store keeper and paymaster, a new store shed was erected, the magazine roof painted and various minor repairs executed.

Architect, Mr. Thos. H. Tracy.

POST OFFICE.

The works reported on in last year's report were carried out.

The yard has been paved with cedar blocks, a new platform added to caretaker's house, the walls of rooms and corridors have been painted, the ceilings colored and a variety of necessary repairs and renewals done throughout the building.

Architect, Mr. Thos. H. Tracy.

NIAGARA.

MILITARY BUILDINGS.

General repairs, principally to roofs, and outside boarding were executed last summer.

Architect, Mr. D. B. Dick.

OTTAWA.

PARLIAMENT BUILDING.

Two new stained windows of more appropriate glass were placed in the House of Commons Gallery with a view to increasing the light.

As the glass in the Senate and House of Commons ceilings had been frequently broken and replaced with glass of various qualities and strengths, much of which was so inferior, that it was considered dangerous and necessary to take out the whole and replace it with glass of a uniform strength and color, which was done.

The Commons old Reading Room was divided into two stories and altered to accommodate the reporters of the House.

The north western entrance to the apartments of the Speaker of the House of Commons was altered and a stone porch built over the landing of the outside steps.

Essential cleaning, painting, repairs, &c., were effected, in connection with the various offices throughout the building.

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

PARLIAMENT GROUNDS, &C.

These have been maintained efficiently.

MONUMENT TO THE LATE SIR GEORGE E. CARTIER, BART.

Since my last report, the bronze statue has been delivered, and awaits the erection of the pedestal.

Sculptor, Mr. L. P. Hébert.

EASTERN BLOCK, DEPARTMENTAL BUILDING.

Necessary repairs, furnishing, fitting, cleaning, painting, &c., were executed under the superintendence of this Department.

WESTERN BLOCK, DEPARTMENTAL BUILDING.

Essential repairs, cleaning, &c., have been effected.

Work executed under the superintendence of this Department.

NEW DEPARTMENTAL BUILDING, WELLINGTON STREET.

Plans were prepared, tenders invited and a contract entered into 20th September 1883, for the erection of this building to front on Wellington, Metcalfe and Elgin streets.

In order to obtain good drainage it was found necessary to connect with the City main drain on Slater Street. After consulting the City Engineer and examining the various routes it was agreed to take the drain westward along Wellington Street to Bank street and thence along Bank street to the main drain, this being deemed the least expensive and most serviceable route.

The Wellington street elevation is 280 feet long, the Elgin street 110 feet long and the Metcalfe street 99 feet long.

In the rear is a private roadway extending from Metcalfe to Elgin street.

There will be a sub-basement, basement and ground, first, second and attic floors.

The sub-basement is to be 231 feet by 26 feet 6 inches, lighted by thirteen windows on the south side, opening into areas, and is to contain the heating apparatus and fuel, it is to be groined with brick, the haunches filled with concrete levelled to receive the floor over. The basement (the floor of which is only 4 feet below level of side walk on Wellington street) is divided by a corridor through the entire length

of the building, and the space on the sides may be sub-divided if necessary, into thirty-one well lighted rooms, the windows being above the level of the street, the whole to be groined with brick, supported on piers and walls of stone and brick.

The ground, first and second floor have central corridors, 10 feet in width, extending the whole length of the building; on each of these floors there will be eight large and two small rooms, which may be sub-divided hereafter by iron partitions. In the attic, the entire area of the floor, except the staircases, will be available.

There are to be entrances on each of the streets, which will have fourteen stone steps to lead from the street to ground floor, eight feet above the level of sidewalk. The entrance porch will be carried up to level of first floor, boldly treated, richly ornamented with side pilasters, trusses and carved panels and surmounted by a bold moulded cornice with pedestals.

The ground floor ceiling will be 19 feet, the first floor 18 feet, the second floor 17 feet, and the attic will be arched and be 25 feet to crown.

For sanitary purposes the W. C's have been placed in a building in the rear of main stairway, separated from main building by an open court.

There are to be three stairways leading from the sub-basement to the attic, one in the centre and one at each extremity, the principal being opposite the central or Wellington street entrance. In addition, there is provision made for four elevators to go from sub-basement to attic.

The external walls throughout are to be faced with sandstone backed with brick, and the internal and partition walls of brick. The floors and ceilings are to be constructed with wrought-iron girders and rolled-iron joists with brick arches between and concrete on the top.

The entrance halls and corridors will be laid in encaustic tiles set in cement.

The roofs are to be constructed with wrought-iron covered with slates, and the flats with cement.

The main corridors are to be divided into bays by pilasters and arched with brick, a space to be left between the crown of arch and the floor over, for the purpose of ventilation.

The approaches to the main stairs from corridor are through arcades supported by polished granite columns.

The Wellington street elevation includes basement, three stories and attic, and broken by a central projection and two angle pavillions projecting 12 feet.

The general height of this elevation from level of sidewalk to deck of roof is 96 feet, the central projection being, however, carried up 112 feet and the angle projections 104 feet above level of sidewalk.

The main entrance is to be deeply recessed, circular headed, and have on each side a pilaster, as described above.

The central projection has a square headed window on either side of the main entrance, a group of three in each pavillion and of six in each curtain. On the first floor the windows are similar in number to the ground floor openings, but they are semi-circular headed. The jambs have granite shafts with cut sandstone caps and bases and moulded arches and archivolt. Under the sill of each is a carved panel. The second floor windows are in a group, five in the central projection, in one of four in each pavillion, and, in each of the curtains there are seven windows grouped in couplets and triplets, all semi-circular headed and having granite shafts with sandstone caps and bases in the jambs and moulded arches and archivolt.

The pavillion roofs have highly ornate hips and ridges. In each pavillion is a cut stone dormer with richly carved pediment, the central being four-light and the others three light. The roof of the curtains has three cut stone pedimented dormers, the central being two-light and the others one-light.

On the ground level covering the area wall and extending between the pavillions are cut stones balustrades. The line of the ground floor window sills is marked by a moulded string course, and that between the ground and first floors by a boldly cut sandstone moulded and dentiled cornice. Between the first and second floor, by

a moulded and ornamented belt course. Above the second floor windows is the main cornice which is to be boldly projected, bracketed, elaborately moulded and have a richly carved frieze course.

The Metcalfe and Elgin street elevations are similarly treated.

Plans, &c., prepared by this Department.

Clerk of Works, Mr. J. W. Imlay.

Contractor, Mr. A. Charlebois.

POST OFFICE.

This building was generally repaired, cleaned, and painted externally and internally.

RIDEAU HALL.

The usual annual cleaning, partial repainting, repapering, whitewashing, distempering, minor alterations and repairs were done to the Government House and the various buildings in connection therewith, together with repairs to furniture under the superintendence of this Department.

PORT ARTHUR.

IMMIGRATION BUILDING.

A description of this building was given in my report last year, since when it has been completed and occupied.

Plans, &c., prepared by this Department.

PORT HOPE.

POST OFFICE, CUSTOM HOUSE, &c.

This building, which I described in last year's report, is now roofed in, and will probably be completed during the next fiscal year.

Plans, &c., prepared and works supervised by this Department.

Clerk of Works, Mr. Jos. G. King.

Contractor, Mr. Wm. Toms.

ST. CATHARINES.

POST OFFICE, CUSTOMS AND INLAND REVENUE OFFICES.

The contract is completed, and the building is now occupied.

Architect, Mr. R. C. Windeyer.

Clerk of Works, Mr. Louis Dorr.

Contractor for the building, Mr. Nelson Carter.

do for fittings, Mr. E. Switzer.

do for heating apparatus, Messrs. D. S. Keith & Co.

ST. THOMAS.

POST OFFICE, CUSTOM HOUSE, &c.

Description in last report.

Work in the construction of this building has not progressed as expeditiously as was expected, owing to the difficulty of obtaining stone from the quarries; it is, however, expected the building will be covered in this fall, and completed during the coming winter.

Plans, &c., prepared by this Department.
 Superintending Architect, Mr. Edwin Ware.
 Clerk of Works, Mr. Thomas Arkell.
 Contractor, Mr. Henry Lindop.

STRATFORD.

POST OFFICE, CUSTOM HOUSE AND INLAND REVENUE OFFICES.

This building is completed and occupied.
 Plans, &c., prepared by this Department.
 Superintending Architect, Mr. J. R. Kilburn.
 Clerk of Works, Mr. Wm. Roberts.
 Contractor, Mr. J. E. Askwith.

TORONTO.

EXAMINING WAREHOUSE.

A contract for a portion of the proposed addition to this building, referred to in last year's report, was entered into October 19th, 1883, since when, the works have been carried on continuously, and it is expected that they will be completed during the next fiscal year.

This new wing is 105 feet long, 70 feet wide, and four stories high, and is a massive structure of white brick, with stone dressings, harmonizing with the original building, but the detail of a simple character. The floors and roof are constructed with iron girders, iron beams, and brick arches.

This addition is intended for use as a bonded warehouse for the storage of merchants' goods. It is arranged to admit of a further extension of 150 feet westward.

In the existing building a new iron stairway from the ground to first story was constructed, the water service in part renewed, and various essential repairs executed.

Plans, &c., prepared and work supervised by Mr. D. B. Dick, Architect.
 Clerk of Works, Mr. Wm. L. Beale.

NEW FORT.

These buildings, etc., which were fully described in appendix N° 2, General report of Minister of Public Works, 1867-1882, were altered, repaired, fitted, furnished, drained and supplied with water and gas services to render them suitable for the use of the Dominion School of Infantry Instruction.

Superintending architects, Messrs. Stewart & Denison.

OLD FORT AND MILITARY CEMETERY.

General repairs to buildings, fence and bridge at Old Fort and a new fence at Military Cemetery, were carried out during last summer.

Architect, Mr. D. B. Dick.

POST OFFICE.

The internal fittings were altered and re-arranged, reducing the area of the public lobby and increasing the working space.

Minor repairs to roof &c, were executed.

Superintending Architect, Mr. D.B. Dick.

PROVINCE OF MANITOBA.

STONY MOUNTAIN.

PENITENTIARY.

Since my last report the following works have been carried out,—

Strengthening cells in prison wing.

Changing penal into ordinary cells.

Construction of 10 temporary wooden cells within north end of prison wing.

Construction of a detached stone building containing 6 penal cells.

Veneering guards' cottages with brick.

Erecting two brick—veneered wooden cottages for guards.

Completing an unfinished stone cottage.

Boring 5 wells—average depth 90 feet—and building 5 well houses.

Extension of and repairs to the electric bell system.

Extension of water service.

Fire clay drain from penal cells.

Repairs to eaves troughs and conductors of prison, and various small works and repairs.

Resident Clerk of Works, Mr. D. Smith.

Contractor for penal and for wooden cells, Mr. John E. Ennis.

Do alterations to cells, Messrs. Rourke & Cass.

Extension of water service, Messrs. Garth & Co.

WINNIPEG.

LIEUTENANT-GOVERNOR'S RESIDENCE.

The works referred to in my last report are completed, and the building is occupied.

Plans, &c., prepared by this Department.

Resident Clerk of Works, Mr. D. Smith.

Contractor, for building, grading, &c., Messrs. Bowles & Williams.

do heating apparatus, Messrs. Garth & Co.

PARLIAMENT BUILDING.

During last autumn a contract was entered into for an additional wing to be used as Assembly Chamber; that originally intended for the purpose, having been required for offices.

The entire building is nearly completed and the second session of the 5th Parliament of the Province of Manitoba was held in it, opening 13th March, 1884.

On the 4th January, 1884, a contract was entered into, for the erection of a hot-water heating apparatus, which is now in operation.

Arrangements are being made for grading, fencing, footpaths, &c.

Plans, &c., prepared by this Department.

Resident Clerk of Works, Mr. D. Smith.

Contractors for the building, Messrs. J. E. Gelley & Co.

do for heating apparatus, The American Plumbing Co.

POST-OFFICE.

Plans were prepared and approved by the various Departments and a contract entered into on 28th September, 1884, for the erection of this building on the site of the original Post Office, at the corner of Main and Owen Streets, the location being central and generally considered the best in the city. The building will be 120 feet long by 60 feet wide with a basement and four full stories, which will afford accommodation as follows :

Basement floor, one room, 49 x 52 for use of Post Offices, with wash rooms, &c. ; also furnace and fuel rooms.

Ground floor, Post Office with brick vault and two entrance doors on Main Street, also entrance Hall, Staircase and elevator to upper floors.

First floor,—Savings Bank—with brick vault, Post Office Inspector's suite of offices, lavatories, &c.

Second floor, Post Office Inspector's Office, Dept. of Public Works, lavatories, &c.

Third floor, spare offices, caretaker's apartments, lavatories, &c.

As a precaution against fire, a brick wall will divide the portion containing the Savings Bank from the offices in the rear, and the roof over the former will be constructed with rolled iron joist and brick arches; the remaining portion of roofs and partitions will be of wood.

The building is to be faced with pressed brick and masonry of red sandstone, from Nipigon.

There are to be three public entrances to the Post Office; two on Main and one on Owen Street. The entrance for Savings Bank and other offices to be in the centre bay of the elevation on Owen Street, and the Mail entrance also on the same street.

The Main street front is vertically divided into three bays by four pilasters extending from plinth to cornice. The two outer bays contain on the ground floor public entrances to the Post Office, and the centre bays three large window openings with segmental heads. The three upper stories have the same number of windows, but with square heads in alignment with the openings of ground floor. The Owen street elevation is treated similarly but in five bays, the centre of which has groups of four windows. The stories are marked horizontally between the ground and first floor by a moulded and dentiled cornice, and between first and second floor, by a stone belt with carved band, and between the second and third floors by a heavily moulded cornice with carved corbels, &c. The frieze consists of a series of brick arches with stone archivolt, and carved panels placed in alignment with the windows below, and will be protected by a moulded stone cornice with stone pediments in the centre of each elevation, in the tympana of which will be appropriate curving.

A return of 20 feet, on the rear elevation, is carried out in the same manner as the street fronts, but the remainder of the elevations are to be devoid of ornament.

The roof covering will be of galvanized iron.

Plans, &c., prepared by this Department.

Resident Clerk of Works, Mr. D. Smith.

Contractor, Mr. James G. Macdonald.

POWDER MAGAZINE.

This building, situated upon the Government Reserve, Fort Osborne, is now almost completed.

The walls are brick on a stone foundation, and with roof covering of galvanized iron.

The building is 40 feet by 30 feet, and 12 feet in height from footings to wall-plate, and contains a small-arm ammunition store, an artillery ammunition store and a spare room. Outside, at a distance of 12 feet from the building, is a fence wall of brick.

Plans, &c., prepared by this Department.

Resident Clerk of Works, Mr. D. Smith.

Contractors, Messrs. Rourke & Cass.

TEMPORARY POST OFFICE.

A description of this building is to be found in my last report.

The building is completed and occupied.

Resident Clerk of Works, Mr. D. Smith.

NORTH-WEST TERRITORIES.

QU'APPELLE.

IMMIGRANT SHED.

This building, described in my last report, and which was accidentally destroyed by fire on 13th May, 1883, has been rebuilt.

Resident Clerk of Works, Mr. Wm. Henderson.

Contractor, Mr. M. P. Zindord.

INDUSTRIAL SCHOOLS AT HIGH RIVER AND AT QU'APPELLE.

Plans have been prepared for Industrial Schools for the Department of Indian Affairs, and the works are to be proceeded with at once.

Plans, &c., prepared by this Department.

REGINA.

NEW PUBLIC BUILDINGS.

Additions and repairs have been done to the wooden buildings referred to in my report of last year; new offices and outbuildings have been put up for the Indian Department; and the Lieutenant Governor's residence, the Court House, and the Judge's and Sheriff's offices fitted up and furnished.

Resident Clerk of Works, Mr. Wm. Henderson.

Contractor for Lieutenant Governor's residence, Mr. J. McCallum.

“ “ Council Chamber, Mr. Thos. Barton.

“ “ Indian Office, Mr. M. P. Zindord.

“ “ Wells, &c., Mr. Thos. Howard.

PROVINCE OF BRITISH COLUMBIA.

NANAIMO.

POST OFFICE, CUSTOM HOUSE AND INLAND REVENUE OFFICES.

The last report contained a description of this building, which is completed and being fitted up for occupation.

Plans, &c., prepared by this Department.

Contractors, Messrs. Smith & Clarke.

NEW WESTMINSTER.

PUBLIC BUILDING.

This building is completed, fitted up and occupied.

Plans, &c., prepared and work supervised by this Department.

Contractor, Mr. Chas. Hayward.

GENERALLY.

A large quantity of ordinary and essential repairs has been done to the various public buildings throughout the Dominion, involving considerable office work and supervision, but none of them of sufficient importance to warrant special description.

APPENDIX No. 3.

ARCHÆOLOGICAL NOTES ON FORT CHAMBLY, P.Q.

1709-1775 ;

ALSO

AN ACCOUNT OF ITS RESTORATION,

1881-1884.

APPENDIX No. 3.

ARCHÆOLOGICAL NOTES ON FORT CHAMBLY.

1709 to 1760.

On the banks of the Chambly River (1), beside the beautiful St. Louis Rapids stands a memorial of the days of French rule in this country. This memorial is old Fort Pontchartrain, whose walls, still erect, remind us, the descendants of the Gauls of old, of what our fathers did for the settlement of New France and to protect it against its enemies.

In 1709 the colony was threatened by the English from the direction of Orange (now Albany, capital of the State of New York), and Chambly, as a military post, was evidently liable to be attacked by the enemy.

Old Fort St. Louis, erected in August, 1665 (2), under the direction of Captain Jacques de Chambly, of the Carignan-Salière regiment, by order of Sr. Alexandre de Prouville, Marquis de Tracy, His Majesty's Lieutenant-General throughout the whole extent of the French possessions in America, was crumbling to ruin. In 1693 it had been completely repaired; but in 1700 it was in such a state of decay that the timber sills were rotten, and the roofs and windows were entirely destroyed. It was burnt in 1702. Repaired at various periods, its palisades, 15 feet in height, but feebly withstood the force of wind or storm. The material of war in the fort consisted of six cannon and swivel-guns. In the month of June, 1709, one soldier and the Commandant, Paul d'Ailleboust, Sr. de Périgny, formed the garrison. The population of Chambly consisted of thirty settlers, occupied in repairing and restoring to order their buildings and farms, continually devastated by the dreaded Iroquois, subsidized by the enemy at Orange, whose reprisals amply avenged the Deerfield massacre. Since 1687, when the Agnies attacked Chambly and burnt the crops, the settlers had taken refuge at Boucherville village, which had been surrounded by a palisade of stakes by P. Boucher, at one time Governor of Three Rivers. The majority of the settlers devoted themselves to hunting, and carried on a secret trade in furs with the English of Fort Orange. Still, the climate was warmer than that of Quebec, the soil fertile, the yield of all kinds of grain good, and fish was abundant; so that any intelligent, steady man might easily establish himself, with the advantage of doing a little trade with the Indians.

A few Abenakis families had consented to set up their wigwams and tents around the fort.

Such was the state of Chambly at this period, during which several military movements had been effected with a view of repulsing or preventing the enemy from passing the frontier, and a considerable army numbering 1,600 to 1,700 men, had occupied Chambly up to the 15th October.

(1) Champlain ascended this river, and on 12th July, 1609, he visited the banks of the rapids. The river was known under the name of "Rivière des Iroquois," "Tersonon," "Richelieu," "St. Louis," "Sorel," and lastly "Chambly." "No Christians," says Champlain, "had reached this place but ourselves, and we had no little difficulty in ascending the river with oars."

(2) The fort was built with stakes, and measured 24 *toises* on each face. It served as a garrison for the soldiers and a storehouse for provisions. The fort was commenced during the week in which the festival of St. Louis is celebrated, and it was named after him. Father Chaumonot, a Jesuit, said the first mass, and Father Dupéron died at the fort in November, 1665. In 1673 there was a grist-mill at the fort, for the convenience of the settlers. The mill was built on a tongue of land forming a hill, and was situated near the Jonquas Cottage, opposite the present fort.

Meantime M. de Longueuil (1) had convoked a large assembly, which was held in one of the halls of the Seminary at Montreal, when it was resolved to fortify Chambly. "The Intendants," says a contemporary memoir, "directed the necessary expenditure to be made; they also compelled all the settlers of the Government of Montreal to contribute a *corvée* of eight days' labor, in order that work might be commenced the following year." M. Chaussegros de Léry, engineer, was directed to proceed to Chambly and gather the material necessary for the construction of the new fort.

M. de Vaudreuil wrote to France, urging the necessity of building this stone fort in order to protect the colony; and in the winter of 1709-10 workmen were engaged in cutting the angle stones, as well as those of the gates and windows, from material quarried on the spot.

In the spring of 1710 excavation was begun, and by the autumn the whole enclosing wall had obtained a height of 12 feet, and was made secure, by the troops in garrison, who had been employed at the work during the summer.

In 1711 the works were actively carried on and the fort was finished in the month of September of the same year, under the superintendence of Captain Josué Bois Berthelot (Dubois) Sr. de Beaucour, who, in the previous year, had conducted the works of the fortification of Quebec (2).

In a letter to the Minister, Pontchartrain, M. M. de Vaudreuil and Raudot, speaking of the new fort, praised M. de Beaucour in the following terms: "He had devoted himself with the utmost care and attention, and the works were apparently good and solid enough to last for all time." During the whole time the works were under construction a large detachment of troops remained on the frontier, as well to cover the work as to meet the movements of a party of fifty men of the Boston Government, who threatened the frontier of the colony.

The fort presents the figure of a quadrilateral, flanked by four bastions, with angles corresponding to the four cardinal points.

Each face of the outer wall presents a length of 180 feet from the great angle of one bastion to another, forming thus a circumference of 720 feet.

The bastions are 30 feet in height, and the curtains 25 (3).

The Fort of Chambly was capable of holding 500 men. The interior was well adapted for the wants of commandants and officers (4). A chapel, built against the curtain opposite to the river, served as a church for the inhabitants of the country, up to 1739. This chapel had, for titular, St. Louis, King of France (5).

In 1733 the curtain beside the rapids was going to ruin; it was strengthened, and storehouses and prisons built up against it.

The fort was always occupied by a small garrison, until the events which induced the war between France and England, in 1743. The material in the fort in 1742 consisted of two cast metal culverins, two-pounders, with two field carriages, 200 cannon balls of various sizes, one gun carriage, three iron guns (one-pounders), one carriage, fourteen swivel guns, mounted on crotches, and fourteen culverin rests. From the following year it served as an *entrepot*, and Chambly became the highway of the troops which so courageously defended the French frontier (6).

Quebec, the city of Champlain, had fallen for the second time into the hands of the English, and the French soldiers had to submit to a defeat which did not involve dishonor. Three armies at once invaded our bleeding and desolated country,

(1) M. Lemoine de Longueuil, in the absence of M. de Ramsey, was at the head of the Government of Montreal.

(2) The fort was built in accordance with the principles of Vauban. The operations of defence were effected through battlements and embrasures constructed in the works.

(3) The word bastion comes from the Italian *bastione*, (fortified tower), and curtain from *cortina*.

(4) A spacious courtyard existed in the interior of the fort, the site of which is now covered with stones and debris.

(5) Still this chapel served for the garrison up to 1747, when the material was removed to Fort St. John.—*Note by the Author.*

(6) Amongst these regiments we find the Regiments "De la Reine," "Languedoc," "Guienne," "Bearn," "Royal Rousillon," "De Berry," and the troops of the colony.—*Note by the Author.*

and despite the heroism of her chiefs and of her defenders, New France, forgotten by Louis XV., was to succumb before the ably combined forces of her deadly enemies.

At the end of August, 1760, Major Robert Rogers, forming part of the army led by Colonel Haviland, joined Colonel Darby at Chambly, to which point the latter had transported several pieces of light artillery for the reduction of the fort; but as the garrison consisted of only fifty men under Captain Lusignan, they surrendered at discretion to the enemy. The *fleur-de-lis*, which had floated over Chambly since 1665, gave way to the British flag.

1775.

The effervescence which manifested itself in 1774, amongst the New England settlers, who were in open revolt against the Mother Country, extended to the French Canadians on the River Chambly, who responded to the advances made by Colonel Ethan Allan, Major Brown, of Massachusetts, James Livingstone, of New York, and the traitor, Arnold.

In September, 1775, a camp was formed at Point Oliver (now St. Mathias), situated on the east of Chambly, commanded by Livingstone, Jérémie Dugrand, a barber, and Loyseau, a blacksmith. These three persons had succeeded in raising under their orders some forty or fifty men.

About the 15th of October, Montgomery, at the instance of Livingstone, sent forward, under the care of Moses Hazen, two small pieces of light artillery (three, according to another MSS.) which were moved, on a very dark night, from St. John to Chambly, and placed on property of Mr. J. A. Maurice, facing the former residence of the late Noël Darche, Esq., where earthworks had been prepared by Barthélemy Darche, an old soldier, "*cannonier et bombardier*," of the "*Mombillard*" (?) Company, who had, from the beginning, exhibited much activity in favor of the "*Bostannais*" movement.

Majors Brown and Livingstone, at the head of 300 Canadians, and Colonel Bedel, of the Rangers, having under his orders 150 regulars, opened, on the 17th October, the attack on the fort, the garrison of which was commanded by Major Joseph Stopford, of the 7th Royal Fusiliers.

Far from imitating the heroic defence of the garrison of St. John, he capitulated without making use of the means he had in hand. In addition to a large quantity of provisions stored in the fort, it contained an amount of war material sufficient to enable the Major to stand a long siege, for he had under him a force of eighty-six officers, non-commissioned officers and men.

The capitulation was signed on the 18th, and on the following day Major Stopford gave up the colors of his regiment to the enemy, without receiving the honors of war. The prisoners, after being conducted to St. John in charge of Captain Willet, were transferred to Hartford, in the State of Connecticut, and in the month of February of the following year, some of them were at Trenton, in the State of New Jersey (1).

General Montgomery, who had succeeded to Schuyler at the camp of St. John wrote to the latter under date of 20th October: "That with the six tons of powder, found in the fort at Chambly, he would soon finish the siege of St. John." In fact, according to the official documents, but for Stopford's cowardice, or his connivance with the American troops, the defenders of Fort St. John would have been able to offer greater resistance, and Montgomery would have been compelled to raise the siege.

The Fort of St. John capitulated on the 2nd November, and on the 3rd the enemy's troops entered the place.

(1) The officers who were made prisoners under Major Stopford were Capt. Price (sick at Chambly), Capt. Godwin, Lieut. Hamar, Lieut. Harrison, Lieut. Shellenostre, Capt. Aye du Schonee, Commissioner McCullough, and a Surgeon.—*Note by the Author.*

On the 16th June, Gen. Sullivan, successor to Gen. Thomas (deceased 2nd June, of small-pox, at Chambly, where many died of that disease) (1) fled with an army, demoralized as much by fear as by famine, disease and disorder. The fugitives found time before the arrival of Burgoyne's army, to burn the fort, the launches under construction and everything they could not carry off.

Guy Carleton (2) restored the woodwork of the fort, of which the walls remained standing, and shortly afterwards furnished it with a large garrison (3).

A large number of prisoners taken from the Americans by the English during the war of Independence were confined there (4).

Chambly became in 1812 the rendezvous of the troops and Canadian militia, who there awaited orders to take the field against the armies of the United States. The fort was repaired, and served as an *entrepot* and storehouse for the requirements of the war. On the occasion of the events of 1837-38, it was placed in a state of siege by M. Alphonse de Sallaberry, and a large number of the inhabitants took refuge in it, fearing lest, outside the fortress, they might be attacked by the English troops, who were momentarily expected.

In 1850 the fort was still in a very good condition, and two or three years later Rev. Pierre Marie Mignault, supported by the leading citizens of Chambly, requested that the building might be appropriated to the use of the deaf mutes in charge of the *Clercs Viateurs*. The Government did not accede to the prayer. It was in 1856 that the Imperial Government transferred the ground to the Government of Canada.

* * * * *

Abandoned by all, this relic of days gone by will soon crumble beneath its weight of years, unless some helping hand shall promptly rescue it from total destruction, and religiously preserve for future generations the venerable walls that sheltered so many heroes, whose memory has been faithfully transmitted to us by history and the documents of the day.

J. O. DION.

CHAMBLY BASIN, 10th October, 1875.

NOTE.—These archeological notes are from the official source of documents, manuscripts preserved in the Archives of Boston, New York, Quebec, Montreal, Three Rivers, Ottawa and Chambly.

SECOND PART.—RESTORATION OF THE FORT AT CHAMBLY. 1881-2-3-4.

On the 7th June, 1881, His Excellency the Governor General, the Marquis of Lorne; His Honor Theodore Robitaille, Lieutenant-Governor of the Province of Quebec; Sir Hector L. Langevin, C.B., K.C.M.G., Minister of Public Works, Canada; the Hon. J. A. Mousseau, Q.C., Secretary of State; the Hon. A. Caron, Minister of Militia; ex-Lieutenant-Governor Macdonald, of the Province of Ontario, and a considerable number of distinguished persons, visited the ruins of old Fort Chambly, on the occasion of the inauguration of the monument to De Salaberry, which had attracted the *élite* of the Province of Quebec to the banks of the Richelieu.

The spectacle was a remarkable one, which was presented by the scene passing before the eyes of the thousands present on this occasion. The Field Battery, under Lieut.-Colonel Stevenson, boomed forth a Royal salute, and the band of the 65th Battalion, under Lieut.-Colonel Ouimet, played "God Save the Queen."

The occasion was a propitious one for me to put into execution a project which had been ripening for several years, and I took advantage of the general enthusiasm

(1) Over 3,000 persons suffered from this dreadful malady at Chambly and St. John, and most of them were without shelter.—*Author's note.*

(2) Guy Carleton left Canada in 1778.

(3) The walls still bear traces of fire.

(4) Amongst others, the two brothers Simmons of "Johnson Hall," Connecticut, whose story is most interesting.—*Editor's note.*

to request His Excellency to grant his aid towards the preservation of our old ruins, which he found so picturesque and majestic. His reply was most encouraging, and the distinguished persons who surrounded him applauded my petition. The encouraging words of Sir Hector seemed to me the guarantee of future success.

Later on, Sir Hector, by ordering the execution of the work of restoring the walls of the old fortress—the plans of which were by Vauban—did more than a mere act of patriotism, inasmuch as he gave, in the name of the country, a proof of respect for the memory of the valiant soldiers who erected this fort against barbarism, and made it a rampart for Christian civilization. The walls, surrounded by a new prestige, will tell out more strongly than ever the history of our ancestors—a tale of courage, self denial, of devotion, in every trial, to their country, their king and their God.

After the official request, which had been made by a petition signed by the leading citizens of Chambly, supported by Mr. Benoit, M.P., and by an archæological memorandum signed by me, an Inspector, Mr. Shearer, came on the 2nd of December to visit the locality. The cold was intense; the snow covered the ruins; nobody accompanied him; he returned disenchanted, as he told me in the autumn of 1883, and his report was only half-favorable towards the preservation of the old monument.

Having learnt his views I undertook to plead anew the cause of the old fort, almost immediately after the departure of this gentleman. During the Session I tormented Mr. Benoit and the Minister of Public Works. A grant of one thousand dollars was given.

I received my appointment as Director of Works from Mr. Fuller, Chief Architect, who forwarded his instructions on the 17th June, 1882. From that time I put my hand to the business and endeavoured to carry on the works with economy and prudence. On the 24th June the scaffolding was put up and the workmen were at work. As I intended that a memorial of this restoration should be kept for the future, documents were prepared under my care and deposited under the base of the chamber on the right of the gate of entry. As witness the following from *La Minerve* of the 11th July, and the *Montreal Gazette*, describing the ceremony which had taken place on the occasion in which more than three hundred persons had taken part:—

“ COMMENCEMENT OF THE WORKS AT FORT CHAMBLY.

“The ceremony which was to have taken place on Wednesday and was put off on account of the bad weather, took place on Saturday afternoon—the 8th July, 1882—in the midst of a considerable gathering of persons, distinguished by their education and their social position. The ladies were in great numbers; and persons outside our nationality, who spend the summer season at Chambly, made it their duty to attend this strictly French celebration, it being, on their part, an evidence of respect for France and at the same time a compliment to the citizens of Chambly.

“Every one was delighted at the liberality of the Government towards Chambly, and the name of the Honorable the Minister of Public Works, Sir Hector Langevin, was greeted with enthusiastic cheers.

“These walls, which will remain standing for a long time to come, will be a proof that the remembrance of France, our mother country, is warmer than ever among us. The people of Chambly ought to be proud of this evidence of esteem that they have just received from the Federal Government, namely, the preservation of this old fort which was always considered by the Government of France as being the key of Canada.

“Mr. Yule, the old Seigneur of Chambly, presided over the meeting, by general request. In an *extempore* address he delivered a fine eulogium of the old colonists and France. Mr. J. O. Dion, the Director of the Works, set forth admirably the facts connected with the history of the fort, and his speech concluded amidst applause. There were sealed up in the stone the following documents: A list of the Commandants of the fort, of the missionaries and first colonists, a plan of the old fort and that of the present one, and an account of the ceremony. Enthusiastic cheers were

given for His Excellency the Governor General, for the Federal and Local Governments and for Mr. Dion. At the moment when these documents were sealed up, three hearty cheers were given, and the old fort at the same time being illuminated, presented, at a distance, a fairy-like appearance."

Under the heading "The Fort at Chambly," the *Montreal Gazette* published the following:—"A very interesting ceremony took place at Chambly, on Saturday evening last (8th), being the inauguration of repairs on the decaying old fort at that place. There was a large number of persons present, including Mr. Yule, Seigneur of Chambly; Mr. John S. Hall, of Montreal; Mr. J. O. Dion, of Chambly Basin, by whose patriotism and energy the work of preserving the old fort from entire ruin has been begun, and Messrs. Ortigny, Ulric and Coutemanche, Councillors of Chambly. A brief history of the fort was read by Mr. Dion, after which a foundation stone was placed under the doorway, on the west side. Another stone, laid in commemoration of the event, in the names of the Corporations of Chambly Canton and Chambly Basin, and containing the names of the persons performing the ceremonies, was placed in the western bastion."

All the newspapers gave their support by publishing interesting details, as well respecting the ceremony as about the old fort. The public showed its interest in the preservation of this old national relic by the large number of tourists who visited the ruins. Artists, amateurs and photographers, made sketches of the Citadel, of which some were carried to Europe and others to the United States and Ontario. On the 11th August over 500 excursionist paid a visit to the fort. After this date several excursions were organized, with the sole object of visiting our historical monuments.

During the summer the works advanced rapidly. The workmen were busy in repairing the walls of the bastions and curtains, of which a portion of the base presented a melancholy appearance. All the stone at the angles had been carried away, even including the defences which surrounded the fort. The casements were of modern construction and were cracked on the sides, and the stones were barely kept on their courses. More than once the workmen, wishing to consolidate some portions of the walls, had to remove the stones to lay them more solidly. It was fortunate that no accident happened during the progress of the works. The casements were closed up and the embrasures likewise, in order to prevent the water from entering and making new cracks. The exterior walls were completed, except a portion of the eastern bastion.

It was in 1856 that the fort was handed over to the Canadian authorities. After 1862 a portion of the curtains on the side facing the rapids fell, and in 1866 there only remained 31 feet of them, on which still rested, on the north side, two magazines. It was in 1733 that this curtain was backed by prisons and magazines; but inasmuch as there was no point of connection between these new buildings and the curtain, the vaults could not last long. In 1752 they threatened to fall into ruin, and it became necessary to build buttresses, one of which is still in a very good state of preservation. Out of eleven chimneys, there only remains one, in a very bad condition.

THE CEMETERY.

On the 17th of July I addressed a request to the Honorable the Minister of Public Works, in order to secure a new enclosure for the cemetery of the fort, the opening of which dates back to 1707 and the closing to 1843. However, at the time when troops were present for military exercises, after 1860, several soldiers were buried there. During the season I urged Mr. Fuller to grant me what I desired, and had asked for. Mr. Ewart, when visiting me, confirmed my request, and on the 12th of September I received the necessary authorization. While digging holes for the posts the workmen discovered a considerable number of skeletons which were buried in a coffin which I caused to be placed in the cemetery. I took the trouble to remove several skeletons which were found in the road which

runs alongside of the cemetery, in order to give them a more suitable burying place. This portion, which forms the angle of the road, was part of the old cemetery. The land of the cemetery extended as far as the brook on the north-west side; but the spring freshets have washed away a portion of this land. Within the recollection of a great number of persons, one springtime, during which the waters rose to a greater height than usual, a considerable number of coffins, in a rotten condition, were swept away by the floods, and the piles of bones lay about the banks, and nobody conceived the idea of writing to the Government. In 1725 the cemetery, with the gardens, of the fort commandants, officers, subalterns, as well as soldiers, was comprised within an enclosure of fifteen acres in superficies. It is situate between the fort, the brook and the river. I urgently requested the Government to sternly forbid the carrying away of sand or gravel from the lands behind, as far as the brook.

The following is a copy of the first act of burial, kept bound up in the first register of the parish of St. Louis, and which I give in all its entirety:—

“I, Recollet, almoner and missionary of the Royal Fort of Chambly, do certify that I buried Jean Boisset in the place set apart as a cemetery. All the Sacraments of our Holy Mother the Church were administered to him. He died about midnight on the eve of Twelfth Day, of the year 1707, aged about 84 years. He was a resident of Chambly. In witness whereof I have signed.—J. PIERRE
“DUBLARON, Recollet.”

This cemetery served the parishioners of Chambly down to the year 1739 (November), at which time a new church was erected by Father Levasseur, a Recollet, on the site where the present one stands. The cemetery was consecrated at the same time. The cemetery of the fort received the mortal remains of the soldiers, and high-born dames even asked to be buried there. During the later wars a considerable number of soldiers were laid there. The soldiers belonged to various regiments which fought so valiantly during this period, so fruitful in heroism and devotion to the old flag of the *fleur-de-lis*. After the cession of Canada to England, the English officers and soldiers, as well as several Germans, were buried there. During the occupation of Chambly by the American troops, it served as a place of interment for the unfortunate victims of small pox. General Thomas was buried there, as well as Canadian volunteer militiamen of 1812-13-14-15.

The fence, which embraces an enclosed area of about 490 feet, is solidly built of cedar and red pine. Notwithstanding the sum (not much more than \$300) which has been allowed me, I succeeded beyond my hopes. The materials are good, and will last a long time.

Some head-boards, bearing the names of the old soldiers who repose in these places, would give an interest to the old burying ground. Once the proposed memorial was constructed it would honor the brave men of the various regiments who there sleep in peace.

On the 8th of November, the Deputy Minister of Railways and Canals, Mr. Trudeau, as well as Mr. H. Parent, the Engineer of the St. Lawrence Canals, paid a visit to the fort, and seemed to be well satisfied with what they saw.

Under the caption, “Historical Monuments,” the *Minerve* gives a report, of date the 6th December, which I add here, and which will complete what I have to say upon the work executed during the season of 1882.

Extract from an article, “Monuments Historique,” published by the *Minerve*, 20th December, 1883:—

“HISTORICAL MONUMENTS.

“Much attention has been given lately to the monuments of the French domination, or of the ancient period of the colony, which our Province possesses. One of the most interesting of these old monuments is the Chambly Fort. This ancient relic of the French in Canada has just been restored, under the direction of Mr. J. O. Dion, by order of the Dominion Government. The task imposed upon the director of the works was a difficult one, and the sum devoted to this work was small. Those

who visited the ruins at Fort Pontchartrain, at the time of the inauguration of the Salaberry monument, know in what a sorry condition it was. Everything threatened to fall into ruins. The bastions were hardly standing upon their bases. The difficulty was to know where to commence, and what portion to save the first. According to competent men, the success has been beyond all hope, in the way of saving the old fort, which to-day really presents an imposing appearance. There was this to be dreaded in making the restoration. It was the giving the walls worn out with years too new an appearance. The old fort has been repaired, but it has preserved the aspect which years had given to it. The order given to the workmen was to make it new while making it old, an idea which only pleased them moderately well. The interior walls are finished, with the exception of a portion of the eastern bastion. There has been a great deal of clearing away; but there still remains much to be done in the interior. The old prison, which served as a State prison in 1837, has been retained. Mr. Dion has taken advantage of the ruins to make very convenient look-out places of them. Henceforth the fort will be a place for promenading for the citizens of Chambly, who will make it their boulevard. Near the old Fort of Chambly is situate a cemetery which all the world seems to have been ignorant of, so much was it neglected. Nevertheless, the Government has already made some sacrifice in order to honor the memory of the brave men who repose there beneath the sod. Those who had charge of the inclosure had only regard for it as a means of securing fees. In other respects its history was unknown to them. At the repeated solicitation of Mr. Dion, a new fence has been erected and the old cemetery is also restored. All the old grave stones buried in the ground have been raised, the hillocks appear most distinctly, and several crosses are there which attest its ancient origin. One of them overshadows the tomb of the family of Hertel, where rests the famous Captain Claude de Beaulac, his wife and Madame Marguerite de Tavanet, the wife of the hero of new France, François Hertel, whose children have so greatly emblazoned our history by their heroism and devotion. Madame Hertel was sister-in-law of Captain Jacques of Chambly. The cemetery was opened in 1707, and the first who was buried there was the head of the Boiset family, who died at the age of 84, during the eve of Twelfth Night. This Boiset had been a soldier in the company of Chambly. Mdlle. de Bragelonne and the wife of the illustrious Seigneur of Lantagnac rest beneath the sod which covers the brave men who fought for the French flag. Chambly, as is well seen, is full of souvenirs of bygone times, the ancient and heroic period of Canada. There is reason to be thankful to the Government for the interest taken in this historical locality, and to thank, in particular, His Excellency the Marquis of Lorne and Sir Hector Langevin, to whom are owing the initiative steps taken in this direction by the Dominion authorities, at the instance of Mr. Benoit, M.P., and Mr. Dion. It is to be desired that the other antiquities that remain to us may find as devoted protectors as did the old fort at Chambly. It is fitting to add, that the Dominion Government, in selecting Mr. Dion to oversee the work of restoring the Cambly Fort, have made an intelligent choice. Mr. Dion was the man for the emergency; and Chambly, which already owes him the monument to De Salaberry, will thank him, without doubt, for his new work, which insures to this interesting locality the preservation of its historic character."

OPERATIONS IN 1883-84.

Not having been able to complete the works, in spite of my eager desire to do so, I exerted myself again in order to secure an additional grant, encouraged by Mr. Benoit, M.P., and Sir Hector Langevin, who, understanding the importance of preserving this important landmark of our history, were very well disposed to favor my designs.

On the 24th July, 1883, I received orders to continue the work. I devoted my attention to repairing the damage occasioned by the ice in the spring, and I finished up the work commenced in the eastern bastion. I re-established the lines of the

inner walls, and consolidated the curtains and the bastions, and particularly the base of the inner walls, which threatened to tumble down. This was a slow and painful work for the workmen; and fears of accidents happening obliged me to watch very closely these operations, which were more costly than the former ones. The separating walls, which were so much support to the curtains, had disappeared. I caused them to be rebuilt, as well as the glacis from the foot of the great curtains, which had been destroyed by the water, and lessened by so much the strength of the principal walls. An embankment was raised on the side of the rapids, which allowed promenaders to enjoy the magnificent view; and the excavations which I had caused to be made permitted them to see the walls of the old magazines and prisons, where the prisoners of war, from 1780 to 1784, were confined by order of Johnson, whose tale is so touching. This embankment is not quite in line; but not being willing to destroy any part of the old walls, I thought it well to construct it. Upon these magazines rested a gallery, which was built upon the roof, and allowed the sentinels to exercise their vigilance over the river, the rapids and the surrounding country. At the great angle of the north bastion once floated the flag, the guarding of which was entrusted to the officers and sergeants who had distinguished themselves in the discharge of their duties on the field of honor. At all of the bastions was a sentry-box, whence the sentry could scrutinize the country, and study the movements of the enemy at the foot of the ramparts.

I strengthened the vault of the prison which sheltered so many of our fellow countrymen during the troubles of 1837-38. I did the same with the great powder magazine on the eastern side.

With the object of preserving the base of the bastions on the side of the rapids, I caused to be transported a quantity of stone, cherishing the hope that these works would be continued later on.

The object proposed by the Government in ordering these works was not only to afford bread, but further, to come to the aid and development of talent. I put this principle into practice, and employed one of the workmen who had the necessary taste, in chiselling all round the gate of entry, the names of the old fort-commandants, while, at the same time, also preserving those of Champlain and the heroes of Carillon. The workman, Moreau, worked in this way for one hour or two each day during several weeks. This gate was well suited to my design, for it was panelled all round.

This page of history engraved upon the stone, recalls to remembrance Samuel de Champlain, who passed beyond the Sault des Iroquois, on the 12th of July 1609.

Tracy, Governor General and Viceroy of North America, a venerable old man who displayed so nobly loyalty to this country, and who, at the head of the valiant Carignan-Salières regiment, went, in 1666, to fight the terrible Iroquois, even into their very villages. A posterity grateful to the memory of these heroes of New France, will salute these names, which the populace will one day hail with enthusiasm, heroes who have left on our history so enduring a mark.*

Talon.—The faithful Intendant, whose energetic course of action at this period, firmly established the prosperity of the French colony. Chambly, the Captain of the Carignan-Salières regiment, highly esteemed by his King, somewhat blustering, but whose valor in combat, caused him to be adored by his soldiers.

Courcelle, who, at the head of his "Capots Bleus," (Colonial soldiers), went through the campaign of 1666.

Salières, with head whitened in the service of his king, built afar off the Fort of Ste. Thérèse, which is, however, but at a short distance from Fort Chambly.

De St. Ours.—The brave soldier, whose noble family dated back more than five hundred years, a relative of Marshal Déstrade, and one of whose descendant smade himself illustrious in the latter campaigns.

*NOTE.—As a matter of fact, on the 30th of August last, in the presence of some hundreds of persons, this monument was unveiled by the Hon. Mr. Laviolette, on the request of Mr. Dion.

Chaumondi, S. J., who in August, 1665, offered the holy sacrifice of the Mass which was then, for the first time, said upon the shores of the St. Louis Rapids.

Piot de Langloiserie, a brave officer, who served in several campaigns with distinction.

Duplessis, who, in spite of his valor, and after having beaten off the Mohawks from the foot of the Fortress of posts, was not able to prevent their burning Chambly in 1687.

Hertel, head of that valiant family, the terror of their enemies, at whose side Lafrenière, Rouville, and Beaulac so often fought.

Dejordy, Péan, Lantagnac, all officers who distinguished themselves in the field.

Bois Berthelot, Sieur Debeaumont, who built, under De Lery (Chaussegros), the existing fort.

Dubergères, an officer whose genius, impeded the Iroquois in their march, by placing a number of obstacles in the rapids above Ste. Thérèse.

Boucher de Niverville, the third Seigneur of Chambly, an officer who deserved the Cross of St. Louis.

D'Aillebout, Meloise, Contrecoeur, Sabrevois, whose services, rendered to this colony are so highly acknowledged by their superior Charlevoix, the historian, who visited Chambly in 1723. Levasseur, a Recollet Father, the founder of our first parish church.

Lusignan, a distinguished officer, the last commandant of Fort Chambly, who suffered the pain of seeing the French standard replaced by the English one.

A good number of other names might have found a place there; Varennes, Varlet, who especially distinguished himself at the fight, called "La Bataille" in 1691, between La Prairie and Chambly. Also Quatrebache, Charly, Banque-Maure, Benoit, &c. If all these names are dear to Canada, how much more are those who fought at Carillon, so valiantly, in 1758. Nor did I forget to engrave the names of Montcalm, Levis, Bourgainville, Bourlamarque, Langis, Raymond, Gaspé, Lanaudière and Marin. The last died in the Fort at L'Assomption, after having commanded at the Fort of Chambly. The souvenir of the militia of 1812, was not omitted, and this monument raised to the national glory under the inspiration of patriotism, will be a history to future generations, by repeating the names of France and Canada. In fact, what place could be more suitable than old Fort Chambly, to proclaim these names to posterity? Have not these old walls been the witnesses of the tramp of our glorious armies against enemies who have become sincere friends. Who knows but that after such a good example having been given, it will produce similar movements in our towns and parishes? A number of our educated young men who command confidence, might make use of their leisure moments, often many, to perpetuate the remembrance of men of distinction and action, who belong to our own history. At the time of his last visit, Mr. Ewart perfectly understood the motive which possessed me and approved of its object. On the 2nd of November, I made a plantation of trees around the old cemetery. I add the report of *La Minerve*, and also that of the *News*, of St. Johns, P. Q., and these two will conclude my report, which I hope will meet with the approbation of the Honorable the Minister of Public Works, and of the Deputy Minister.

From the Minerve, 9th November, 1833.

"The old French cemetery which has been restored during the last year, by order of Sir Hector Langevin, at the instance of Mr. Dion, was on Friday last the theatre of a touching ceremony.

The Abbé Lesage, curé of Chambly; the Abbé Dugas, vicar; Mr. Duvernet, of the Church of St. Stephen; the professors, the students of the College, and a great number of citizens went there at the invitation which had been extended to them.

The place of meeting was the celebrated Fort of Chambly, there in the interior trees were planted which will call to mind the visit of the distinguished persons who honored Chambly by their presence on the 7th of June, 1881.

The planting was done by Messrs. Lesage, Duvernet, Dugas, Scheffer, and Ouimet, after which the assembly went to the cemetery, to render homage to the memory of the French colonists, the soldiers of the various regiments of Carignan-Sallières, Royal Rouissillon, Bearn, Bery, Languedoc, of "La Reine," and of the English and Scotch Battalions, and those of the American army, and others whose remains repose on the poetic banks of the St. Louis Rapids.

After having examined the works and the inscriptions which recall the illustrious names of New France, the Abbé Lesage spoke, and caused his hearers to see the necessity there was that a country and a locality, should preserve its ancient historical souvenirs. He congratulated Mr. Dion on the efforts he had made in order to elevate Chambly, while at the same time accomplishing a task which did honor to the country.

Mr. Dion succeeded to Mr. Lesage, and in a few words, gave an historical sketch of the old cemetery at Chambly. He added, that the Government in preserving the old fort, had done a grand work; but that in preserving the old cemetery, Sir Hector had done more in the name of his honorable colleagues, because he had given an example of respect and gratitude to the memory of those who had labored for their country. He thanked the curé and the other persons present for having accepted his invitation, while regretting at the same time that he had so little time for the organization of such a demonstration. He then invited the citizens to plant trees which each one hastened to do."

"The News," of St. Johns, P. Q.

The old fort, under the direction of Mr. Dion, has been greatly improved in appearance, and the old military burial ground made to look as if the memory of those interred was precious. The old walls have been cemented within and without the fort, the *debris* all removed from its interior, and trees planted at each angle, and one in the centre, while at the same time boxes have been put up that the swallow may find a rest for itself. The doorway has been inscribed with the names of the leading French soldiers, while a large marble tablet has been prepared for placing over the porch, recording events connected with its history. Trees planted this year and the last, seem to be thriving well in the graveyard, while the wooden memorial tablets and crosses, painted in white and lettered in black, add to the appearance, and greatly relieve the monotony."

Before closing this, however, I ought to report that a plantation of trees in the neighborhood of the fort, was made on the 12th May, 1884, in conformity with the desires of the Government of Quebec. This plantation, and the former one, have induced several persons to plant ornamental trees. The presence of Abbé Lesage, of the Rev. Mr. Duvernet, of the ecclesiastics of the College of Marieville, and Mr. D. S. Martel, M.P., greatly increased the *éclat* of the latter plantation, and encouraged the inhabitants of the two villages to ornament their lands as well as the streets of their respective municipalities.

In the month of September, I had asked from Sir Hector the favor of an historical tablet, and this favor has been most graciously granted. The form of this tablet, which I hope to inaugurate in September next, is very pleasing to the eye. It is surmounted by the arms of Chambly, and the mural crown, and it bears the following inscription:—1711. "All honor to Champlain," 1609-1665. Chambly, Tracy, St. Ours, Talon, De Lery, Concéelles, Carignan-Sallières, Chaumont, S. J. Bois Berthelot, Langloissrie, Desbègères, Duplessis, D'aillèbout, Hertel, Demeny, Sabrevois, Charlevoix, S. J. DeJordy, LeVasseur, P. R. Péan, Contrecoeur, Lantagnac, Meloise, Beaulac, B. Niverville, Rouville, Lusignan, Lévis, Montcalm, Marin, Bourgainville, Bourlamarque, Raymond, Langis, Gaspé, DeLanaudière, Carillon,

1758, France, Milcie, 1812, Canada. "Courage and Loyalty." In the reign of Louis the 14th, King of France and of Navarre, the Marquis of Vaudreuil being Governor General of New France, this fort was erected in 1711, burned in 1779. Restored by Guy Carleton in 1777. Abandoned in 1847, it was repaired in 1882 and 1883, in the reign of Victoria, the Marquis of Lorne being the Governor General of Canada, Théodore Robitaille, Lieutenant-Governor of Quebec, by order of Sir Hector Langevin, C.B., K.C.M.G., Minister of Public Works of Canada. Thomas Fuller Architect ; Director, J. O. Dion.

J. O. DION,
Director of the Works at Chambly.

Chambly, September, 1884.

APPENDIX No. 4.

LIST

OF

ENGINEERS, FIREMEN AND CARETAKERS

OF

PUBLIC BUILDINGS THROUGHOUT THE DOMINION.

GIVING

DATE OF APPOINTMENT, SALARY PAID, Etc.

APPENDIX No. 4.

Ref. No. 53,760.

STATEMENT showing the Engineers, Firemen, Caretakers and Watchmen Employed at Dominion Public Buildings on 30th June, 1884, giving Dates of Appointment, Salary, &c.

Place.	Building.	Name.	Position.	Date of Appointment.	Salary per Month.	Time Employed.	Total Amount Paid per Annum.
					\$ cts.		\$ cts.
Halifax.....N.S.....	Penitentiary.....	M. Kennedy.....	Caretaker.....	31st October, 1880...	37 50	1 year.....	450 00
	Dominion Building	John Powell.....	Engineer.....	1st do 1871.....	62 50	do.....	750 00
St. Charlottetown.....P.E.I.	do	Richard Power.....	Fireman.....	1st do 1871.....	50 00	6 months.....	300 00
	do	M. Sullivan.....	Night watchman.....	31st do 1880.....	9 p.w.	1 year.....	468 00
	do	J. Tobin.....	do.....	31st do 1880.....	9 p.w.	do.....	468 00
	do	D. McLeod.....	Engineer.....	12th September, 1872...	33 33	do.....	400 00
	do	Ed. Harding.....	Fireman.....	6th October, 1881.....	28 07	6 months.....	168 00
	do	E. Fleming.....	do.....	7th do 1882.....	28 07	do.....	168 00
	do	James Grant.....	Watchman.....	18th August, 1881.....	37 50	1 year.....	459 00
	do	do.....	do.....	do.....	37 50	do.....	450 00
	do	do.....	do.....	do.....	50 00	do.....	600 00
	Dorchester.....N.B.....	Penitentiary.....	Jas. A. Piercy.....	Engineer.....	do.....	33 33	do.....	400 00
Fredericton.....N.B.....	Post Office, &c.....	James Perkins.....	Caretaker.....	31st May, 1881.....	33 33	do.....	400 00
St. John.....N.B.....	Custom House.....	Geo. H. Jones.....	Engineer.....	17th February, 1880...	60 00	do.....	720 00
	do	Geo. B. Spiller.....	Fireman.....	1st December, 1881...	45 00	6 months.....	270 00
Sussex.....N.B.....	Penitentiary.....	Geo. Campbell.....	Caretaker.....	29th October, 1880...	37 50	1 year.....	500 00
	Post Office.....	Henry Howe.....	Engineer.....	4th November, 1881...	55 00	do.....	660 00
	do	Ed. Hancy.....	do.....	27th do 1881.....	40 00	do.....	480 00
	Post Office, &c.....	John Asbell.....	Caretaker.....	19th October, 1883...	33 33	1 year.....	400 00
	Examining Warehouse...	M. Boyer.....	Fireman.....	4th March, 1882.....	45 00	do.....	510 00
	Post Office.....	John Watson.....	Engineer.....	18th October, 1876...	60 00	1 year.....	720 00
	Inland Revenue.....	W. Thompson.....	do.....	1st December, 1882...	60 00	do.....	720 00
	Custom House.....	Thos. Ryan.....	do.....	4th March, 1882.....	80 00	do.....	960 00
	do	W. Wallace.....	Fireman.....	1st October, 1882...	45 00	8 months.....	360 00
	do	J. V. Marchand.....	do.....	2nd December, 1882...	45 00	do.....	360 00
St. John's.....Que.....	Post Office, &c.....	Wm. Comper.....	Night watchman.....	— December, 1881...	12 50	do.....	150 00
Three Rivers.....Que.....	do	Joseph Forand.....	Caretaker.....	29th September, 1882...	16 67	do.....	200 00
	Custom House.....	R. G. Lajoie.....	do.....	1st March, 1882...	58 33	do.....	700 00
Belleville.....Ont.....	Post Office.....	Jos. Charbonneau.....	do.....	27th July, 1883.....	1 p.d.	do.....	365 00
	do	J. P. Reeves.....	do.....	17th October, 1883...	50 00	do.....	600 00
Brantford.....Ont.....	do	John Squires.....	Engineer.....	27th do 1880...	50 00	do.....	600 00

Kingston.....Ont...	Military College	Wm. Johnston.....	do	31st May, 1881....	1881....	65 00	do	780 00
London.....Ont...	do	M. Madden.....	Fireman	12th October, 1878....	1878....	45 00	6 months....	270 00
St. Oathaines.....Ont...	Custom House	Thos. Bayley	Engineer.....	27th November, 1875....	1875....	50 00	1 year	600 00
Stratford.....Ont...	Post Office.....	John Price.....	Fireman.....	14th January, 1884....	1884....	45 00	do	510 00
Toronto.....Ont...	do	Wm. Bryson.....	Caretaker	3rd August, 1883....	1883....	33 33	do	400 00
	Custom House.....	J. H. Roberts.....	Engineer.....	do	do	60 00	do	720 00
	do	John A. Wills.....	do	1st November, 1876....	1876....	90 00	do	1,080 00
	Examining Warehouse	James Humphrey	Fireman.....	16th do 1881....	1881....	45 00	6 months....	270 00
	Post Office.....	J. G. Robertson.....	do	1st January, 1877....	1877....	60 00	1 year	720 00
	do	James Cosgrave	do	28th December, 1881....	1881....	45 00	6 months....	270 00
	Revenue Building.....	M. Stewart	do	11th March, 1878....	1878....	45 00	do	270 00
Windsor.....Ont...	Post Office.....	James Claxton.....	do	25th October, 1882....	1882....	45 00	do	270 00
	do	John Hannan.....	Engineer.....	7th do 1880....	1880....	50 00	1 year	600 00
Winnipeg.....Man..	Parliament Building	Wm. Curtis.....	Caretaker	9th March, 1880....	1880....	33 33	do	400 00
		John Drysdale.....	Engineer.....	do	do	90 00	do	1,080 00

APPENDIX No. 5.

REPORT

ON THE

Heating Apparatus, Gas, Water and Bell Services, Etc.,

IN THE

PUBLIC BUILDINGS, OTTAWA,

DURING FISCAL YEAR ENDED 30TH JUNE, 1884.

BY

JOHN R. ARNOLDI, MECHANICAL ENGINEER.

APPENDIX No. 5.

REPORT OF THE MECHANICAL ENGINEER.

Ref. No. 51,511.

MECHANICAL ENGINEER'S OFFICE,
OTTAWA, 1st Sept., 1884.

SIR,—I have the honor to report as follows in reference to the Public Buildings Ottawa, during the fiscal year ended the 30th June, 1884, viz:

PARLIAMENT BUILDING.

A further extension of the ventilating system of the House of Commons was made during recess, by the addition of a powerful exhaust fan and pipe connections to the surrounding corridors of the Commons Chamber and some of the basement and Restaurant apartments, the result being most satisfactory. Prior to the opening of the last session of Parliament it was decided to have an experimental trial of incandescent electric lighting in this building, and for that purpose, two installations were constructed for the illumination of the main vestibule, the main corridors surrounding the Chambers, the *Hansard* reporters room, Speaker's apartments, Press room, Telegraph office, Reading room, Restaurants and adjoining rooms and the basement corridors beneath the Chambers, in both the Senate and Commons. All the lighting in the Commons side was done by the United States Electric Lighting Company of New York, and the main vestibule and all the lighting on the Senate side was done by the Edison Electric Lighting Company of Hamilton, Ontario. Nothing was done on the heating apparatus, beyond the ordinary repairs. The engines, boilers, heating apparatus and general services of gas, water and bells are in good condition.

EAST AND WEST BLOCKS.

In the western block, a complete overhaul of the steam coils was made and the vaults fully renovated; the same work is also being done in eastern block. No other work was done in either block, beyond the ordinary maintenance and repairs to gas, water and bell services.

SUPREME COURT.

Nothing but ordinary maintenance was required in this building.

RIDEAU HALL.

A new hot water boiler with considerable new piping has been put in this building, and a new apparatus for heating water has been placed in the laundry, both of which were greatly needed and are giving good satisfaction.

OTTAWA POST OFFICE AND CUSTOMS BUILDING.

Nothing was required to the heating, gas, or water services of this building during the year, beyond ordinary maintenance.

GEOLOGICAL MUSEUM.

Beyond ordinary maintenance and repairs of apparatus, no work was required or done in this building during the year.

PARLIAMENT GROUNDS. FLOWER PROPAGATING HOUSE.

Nothing was required to be done in connection with the heating apparatus of this building.

INDIAN DEPARTMENT BUILDING (LEASED).

New gas fixtures, water closets and wash basins were placed in this building during the year, owing to there having been none previously, and considerable alterations to the bell service were also done, with a small amount of gas fitting work.

I have the honor to be, Sir,

Your obedient servant,

(Signed) JNO. R. ARNOLDI,

Mechanical Engineer.

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

APPENDIX No. 6.

REPORT

ON

HARBOURS AND RIVERS, DREDGES, DREDGING AND SURVEYS

THROUGHOUT THE DOMINION.

FOR THE FISCAL YEAR ENDED 30TH JUNE, 1884.

BY

HENRY F. PERLEY, CHIEF ENGINEER.

 APPENDIX No. 6.

 REPORT OF THE CHIEF ENGINEER.

Ref. No. 53,846.

 CHIEF ENGINEER'S OFFICE,
 OTTAWA, 20th October, 1884.

SIR,—I have the honour to report as follows on the Harbour Works and Surveys of the last fiscal year.

I have the honour to be, Sir,
 Your obedient servant,

HENRY F. PERLEY,
Chief Engineer.

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

PRINCE EDWARD ISLAND.

CHARLOTTETOWN.

The channel leading to the ferry landing at Rocky Point was completed by the dredge "Prince Edward" on the 15th September, 1883. Between the 17th and 20th September, the 30th September and 24th November, 1883, and the 8th May and the 16th June, 1884, dredging was done near and around the ferry wharf at Southport, on the southern side of the harbour; and between the 20th and 29th September, 1883, a quantity of material was removed from around Pownal Wharf, Charlottetown.

WOOD ISLANDS.

Wood Islands are situated on the southern coast of the island, about 35 miles southeast from Charlottetown. Here, the Local Government, in 1859, began the construction of works to form a harbour, and between 1873 and 1883, various amounts have been expended by this Department in the construction of a breakwater on the western side of the entrance, and in repairing the old work on the eastern side.

Last year an additional length of 80 feet was added to the western breakwater.

COLVILLE BAY.

Colville Bay, on the east coast of King's County and 16 miles to the westward of East Point, is the principal place of shipment in the eastern end of the island, and is also the eastern terminus of the Government railway.

The breakwater built by the Department is 1,160 feet in length, and affords shelter to all classes of vessels during southerly winds. Owing to its very exposed position, it has received much damage since its completion, and will require an annual expenditure for its maintenance, for upon its permanence depends the safety of the wharves in connection with the railway.

ST. PETER'S BAY.

St. Peter's Bay, on the northern coast of the island, lies 35 miles to the westward from East Point.

The works referred to in the report of last year as being in progress, for the improvement of the entrance to the bay, were abandoned by the contractor, after having completed about three-fifths of the work to be done.

RUSTICO.

Rustico is situated on the northern side of the island, about midway between North and East Points.

The harbour is of good size and well sheltered, but entrance is rendered difficult by the existence of a shifting "bar" of sand.

The works commenced in 1882 for the construction of a breakwater 1,200 feet in length on the western, and one of 450 feet in length on the eastern sides of the entrance, were completed in January last. They have proved to be successful in confining the water, thus increasing the velocity of the water over the "bar," which has now a depth of 9 feet over it, where in former years there were but 7 feet.

NEW LONDON.

New London Harbour is situated on the northern coast of the island, about 10 miles to the eastward of the entrance to Richmond Bay.

The works constructed by the Department at the entrance to and on the eastern side of the harbour have resulted in increasing the depth over the "bar" from 6 to 14 feet.

The works referred to in the report of last year as being in progress on the western side of the entrance have been completed.

MALPEQUE.

Malpeque Harbour lies within the eastern entrance to Richmond Bay, on the northern side of the island, and about 90 miles to the westward from East Point and 40 miles from North Cape.

The breakwater built by the Department at the outer end of the Royalty Sands has proved of great benefit to vessels seeking shelter, and of advantage to the inhabitants of the locality as a place for the shipment of their produce late in the fall of the year, when the ice has formed in the upper reaches of the bay.

Since the construction of this breakwater the sands between it and the high land at Royalty Point has been washing away, and during last year works were commenced for the preservation of the beach and to prevent a breach being made, and at the end of the year about one-half of the work contracted for had been completed.

NOVA SCOTIA.

COW BAY.

As stated in the report of last year, the breakwater at this place was damaged to a great extent during the early part of 1883. Up to the close of the fiscal year, three breaches of 150 feet in length in the seaward face were repaired, close-piling driven over a distance of 150 feet, 1,800 cubic yards of ballast placed where required, and repairs made to the covering and to the mooring piles on the inner side.

This work, owing to its exposed position, will always be subject to damage, and require constant expenditure to maintain it in a state of usefulness.

CATALONE.

Catalone Gut, connecting Catalone Lake with Mira Bay, is situated on the eastern coast of Cape Breton. It is about 800 feet in length and from 70 to 80 feet in width, but did not possess a sufficient depth of water to admit of the passage of boats even at high water. To obviate this, the amount appropriated has been expended in deepening the channel by hand labour, which has given present relief, but it is believed that, owing to the shifting nature of the material forming the beach, there is little chance of the improvement remaining permanent.

LITTLE GLACE BAY.

In Cape Breton County, about 14 miles to the southward from Sydney Harbour. Between the 1st and 12th July, 1883, the dredge "St. Lawrence," removed 2,012 cubic yards of mud and stone from the entrance to the harbour.

EAST BAY.

East Bay, Cape Breton County, is an arm of the Bras d'Or, at the head of which, for the accomodation of the steamer carrying the mails between Port Mulgrave, in the Gut of Canso, and Sydney, a wharf was built in 1881 by the inhabitants of the locality. To obtain a greater depth of water a block 70 feet in length was built in 1882-83 by the Department, and with the appropriation of last year, the inshore or original portion was placed in a thorough state of repair, and a substantial hand rail placed on either side, and at the back of the pier head, this last being needed, as the traffic on the pier is almost wholly carried on during the night.

MILITIA POINT.

Militia Point, Inverness County, is situated on the north shore of the Great Bras d'Or Lake.

For the accomodation of the trade of the locality, and to afford a landing place for the steamers plying on the lake, a wharf 150 feet in length has been constructed, having 12 feet water at its outer end.

GRAND NARROWS.

Grand Narrows, also known as Barra Strait, is a contracted portion of the Bras d'Or Lake, Cape Breton. For the accomodation of steamers and vessels, the Provincial Government, some years since, built a small wharf, which, with the amount appropriated, was extended during the past year a distance of 142 feet into 13 feet water.

BENACADIE POND.

Benacadie Pond, Cape Breton County, is an inlet from the Great Bras d'Or Lake, the entrance to which was obstructed by a bar of shifting sand and gravel.

An opening having a depth of 10 feet has been made through this bar, and the sides of the new channel thus formed have been protected by piles and brush and stone work.

The dredge "Cape Breton" was engaged from the 28th May until the close of the fiscal year in opening the passage above referred to.

MABOU.

The Harbour of Mabou, Inverness County, is situated on the western coast of Cape Breton, about 6 miles to the northward of Port Hood, the shire town.

Since 1872 a large amount of money has been expended in opening a new entrance to this harbour. The amount appropriated at the last session of Parliament was expended in repairing the breastwork on the northern side of the channel.

Between the 1st July and 31st August, 1883, the dredge "Cape Breton" operated on the shoal off the entrance to the harbour, and the "Canada" worked at the same place from the 2nd until the 28th June, 1884.

PORT HOOD.

Port Hood, the shire town of Inverness County, is situated on the western coast of Cape Breton, 20 miles to the northward of the northern entrance to the Gut of Canso.

The pier at this place was built by the Local Government in 1865-66, and assumed by the Dominion in 1867.

Owing to its exposed position, and the ravages of the sea worm (*teredo navalis*), this pier has been constantly in need of repairs, and during last year it was found necessary to close-pile the northern face and protect same with "riprap," to replace fenders, to re-ballast portions of the work, and to renew the covering over a distance of 120 feet at the shore end.

HARBOUR AU BOUCHE.

Harbour au Bouché, Antigonish County, is a small harbour on the southern shore of St. George's Bay, to the westward of the northern entrance to the Strait of Canso.

During the summer of 1883 a large boulder which obstructed the channel in the harbour was successfully removed.

PICTOU.

During the past year the dredge "St. Lawrence" operated in the channels of the East and Middle rivers emptying into the harbor of Pictou, and also around the wharves and slip of the Intercolonial Railway at Pictou Landing, on the southern side of the harbour.

MCNAIR'S COVE.

McNair's (properly Ballentine's) Cove, Antigonish County, is situated on the northern side of St. George's Bay, 5 miles south-west of Cape George.

The amount appropriated has been expended in rebuilding a portion of the superstructure of the breakwater at this place, which has received serious damage by ice.

GREAT VILLAGE RIVER.

Great River Village, Colchester County, empties into the northern side of Cobequid Bay, the extreme end of the eastern arm of the Bay of Fundy.

For some distance from its mouth, this river flowed with a circuitous course through a dyked marsh of considerable extent, and for the purpose of improving the navigation of this portion, the opening of a straight channel 1,850 feet in length has been commenced, the cost of the work being partly borne by the residents of the locality, and at the close of the fiscal year about one-half of the contemplated work had been executed.

MAITLAND.

Maitland, Hants County, is situated on the southern shore of Cobequid Bay, at the mouth of the Shubenacadie River.

The pier built in 1873-76 has been placed in a state of repair.

CHEVERIE.

Cheverie, Hants County, is situated on the southern shore of the Basin of Minas, and east of the mouth of the River Avon. During 1873-74, the pier at this place built by the Local Government was extended a distance of 70 feet; and during 1882-83 a further length of 150 feet was built, thus making the pier 420 feet in length.

For the protection of vessels loading at the pier, the construction of a length of 130 feet of breakwater is now being proceeded with by contract, and at the end of June last one-third of the work had been accomplished.

PARRSBORO'.

During the year the improvement of the channel of the Partridge Island River at Shannon's and Mullin's Points was brought to completion.

KINGSPORT.

Formerly Oak Point, Kings County, is situated on the western shore of the Basin of Minas, between the mouth of the Cornwallis River and Cape Blomidon.

A small amount was expended in the execution of necessary repairs to the pier at this place.

CHIPMAN BROOK.

Chipman Brook, Kings County, is situated on the southern shore of the Bay of Fundy, about 64 miles to the eastward from Digby Gut. In 1877 a length of 60 feet was added to the pier built in former years by the Provincial Government, which consisted of a pier, dry at low tide, and a retaining wall.

During the past year, portions of the retaining wall have been rebuilt, and repairs executed on the outer portion of the pier.

HARBOURVILLE.

Harbourville, Kings County, is situated on the northern coast of the province, about 55 miles to the eastward of Digby Gut, and the harbour is formed by piers on either side of a small stream which flows into the Bay of Fundy, built at the expense of the Provincial Government. In 1876, the western pier was extended a distance of 40 feet by the Department, and general repairs were executed on other parts of the works.

During 1883-84 an entirely new face has been built on the seaward (west) side of the western pier, and a new "break" the full length of the pier constructed.

PORT LORNE.

Port Lorne, formerly called Port Williams, Annapolis County, is situated on the northern coast of the Province, about 32 miles to the eastward of Digby Gut.

The breakwater referred to in the report of last year as being in course of construction, has been brought to completion.

PARKER'S COVE.

Parker's Cove, Annapolis County, is situated on the southern shore of the Bay of Fundy, about 15 miles to the eastward of Digby Gut, and directly north of the town of Annapolis and distant therefrom about 7 miles.

A small breakwater 165 feet in length has been built near the eastern end of the cove, for the accommodation of small coasting vessels and fishermen.

ANNAPOLIS.

Annapolis, the shire town of the county of the same name, is situated at the mouth of the Annapolis River, and is the terminus of the railway from Halifax, and of the steamers plying from St. John, Boston, etc.

The dredge "New Dominion" operated in front of the railway wharf from the 1st August to the 8th September 1883, and cleaned off a portion of the clay and boulders overlying the rock.

BEAR RIVER.

Bear River, Digby County, empties into the southern side of Annapolis Basin, about 10 miles east of the town of Digby.

A small amount was expended in the removal of boulders which obstructed the channel, and impeded the ascent and descent of vessels at or near low tide.

DIGBY.

Digby, the shire town of the county of the same name, is situated at the western end of Annapolis Basin. The pier at this place was built many years ago by the Government of Nova Scotia for the accommodation of the mail steamers plying between Annapolis and St. John, N. B., and for its repairs and maintenance quite a large sum has been expended by the Department. During the past year new fender piles and braces were placed along the whole face of the inclined landing, the roadway reconstructed, and general repairs executed to mooring chocks, posts, fenders, etc.

Work on the southern side of the pier, and the shoal ground to the eastward, was continued by the dredge "New Dominion" from the 1st July to the 1st August, and from the 8th September to the 3rd November, 1883.

METEGHAN COVE.

Meteghan Cove, Digby County, is situated on the southern side of St. Mary's Bay, 3 miles S. W. from Meteghan River.

During the year some small repairs were made in securing the fenders, and the flooring on the outer end of the breakwater.

YARMOUTH.

Yarmouth Harbour is situated at the western extremity of the Province, and is formed by shingle beaches which extend from Cape Forchu to the mainland. Owing to the action of the sea during heavy gales the top of the beaches became lowered in places to such an extent that it was feared that breaches would be made and the harbour destroyed. The Local Government constructed a length of 200 feet of protection works, and in 1873-74 the Dominion built 2,800 feet, reaching to Cape Forchu.

As this work had become decayed in parts and had received damage, extensive repairs were executed during the fiscal year.

CRANBERRY HEAD.

Cranberry Head, also called Sanford, Yarmouth County, lies about 6 miles to the northward of the town of Yarmouth. Here some years ago a breakwater for the use and protection of fishermen was constructed by the local authorities. In 1876 an extension 150 feet in length, and in 1878-79 a further length of 50 feet, were built by the Department. During 1880 repairs were executed, and during the past year a small amount was expended in re-sheathing the outer end, and effecting other needed repairs.

LITTLE HOPE ISLAND.

Little Hope Island is situated in the Atlantic, about 3 miles off the south-western coast of Nova Scotia, about midway between Port Mouton and Port Joli, Queen's County, and lies directly in the track of vessels bound to and from the ports between Liverpool and Halifax, and has therefore been long established as a principal light station.

To prevent the total destruction of this island, which is only 280 feet in length by 180 feet in width, and is a mere patch of granite boulders, the Department, in 1872-73, built a sea-wall 285 feet in length on the most exposed sides.

During the past year this sea-wall was thoroughly repaired and strengthened.

WHITE POINT.

White Point, Queen's County, is a small fishing village on the Atlantic coast, about 8 miles south-eastward of the entrance to the harbour of Liverpool.

The breakwater at this place, built at the expense of the Dominion and Provincial Governments, having received injury, has been repaired.

COFFIN'S ISLAND.

Coffin's Island, Queen's County, lies off the entrance to Liverpool Bay, and is one of the principal light stations on the south-western coast of Nova Scotia.

For the further protection of the small harbour in the centre of the island, substantial crib-work has been built for a distance of 350 feet across a low portion of the eastern beach, which has proved beneficial in arresting and retaining the sand on the seaward side.

LUNENBURG.

Lunenburg is situated at the head of Lunenburg Bay, about 40 miles west of Sambro light, Halifax harbour. The harbour is secure and well sheltered, and has a depth of from 9 to 15 feet at low water.

The dredge "Geo. McKenzie" worked on the shoals in the harbour from the 27th October to the 21st December, 1883, and from the 7th May until the 30th June, 1884.

HALIFAX.

The work done on account of the Department of Railways and Canals at the deep water terminus of the Intercolonial Railway, in the harbour of Halifax, was brought to completion on the 19th July, 1883.

THREE FATHOM HARBOUR.

Three Fathom Harbour, Halifax County, is situated on the Atlantic coast, about 14 miles to the eastward of the entrance to Halifax Harbour.

"Shut in" Island to the southward, and a series of small islands connected by gravel bars, form a safe harbour for small vessels during stormy weather.

In 1878-79, works were constructed to prevent the opening of a breach through one of these connecting beaches, and during the past year these works were extended a distance of 230 feet.

JEDDORE.

Jeddore, Halifax County, is situated about 42 miles to the eastward of the entrance to Halifax Harbour. Here the dredge "Geo. McKenzie" operated from the 7th August until the 22nd October, in opening a passage through the shoal separating the eastern and western channels in the harbour, for the use and benefit of the fishermen of the locality.

OYSTER POND.

Oyster Pond, Guysboro' County, is one of several large ponds on the northern shore of Chedabucto Bay, which form the only boat harbours between the southern entrance to the Gut of Canso, and Guysboro' Harbour, a distance of 15 miles.

In 1876 the entrance to this pond was deepened, and the sides of the channel protected with crib-work. During the past year the protection work on the eastern side has been extended 105 feet, in order to arrest and retain the sand and gravel, of which the beach is composed, and prevent the shoaling of the channel.

WEST ARICHAT.

West Arichat, Richmond County, is a small but safe harbour on the southern side of Ile Madame. It is sheltered by Creighton Island on the south and a breakwater 1,285 feet in length on the west, which extends from the main land to the island, and was built at the joint expense of the Dominion and Provincial Governments.

During the fiscal year repairs in the shape of close fenders, and replacing a quantity of ballast, were executed.

ST. PETER'S.

St. Peters, Richmond County, is a small village about 30 miles to the eastward of the Strait of Canso, where the canal connecting the Atlantic with the Bras d'Or has been constructed.

Between the 17th September and 17th November, 1883, the dredge "Cape Breton" was engaged in dredging the foundation of the protection wall at the northern end of the canal, and in deepening a few points in the channel leading from the canal to the Bras d'Or.

NEW BRUNSWICK.

GRAND ANSE.

Grand Anse, Gloucester County, is a small indent in the southern shore of the Baie des Chaleurs, about mid way between the harbours of Bathurst and Shippegan.

In 1875, the construction of a breakwater for the protection of fishermen was commenced, and the work continued from time to time, until, in 1879, a length of 200 feet had been completed. During the past year a further length of 60 feet was constructed, and a large amount of work was done on the old work in the way of re-ballasting, and raising the western end to form an approach to the new portion.

CARAQUET.

Caraquet, Gloucester County, is situated on the southern shore of the Baie des Chaleurs, about 42 miles to the eastward of Bathurst, the shire town of the county.

The addition to the outer end of the wharf, built by the Local Government, referred to in the report of last year, has been satisfactorily completed.

SHIPPEGAN.

Shippegan Harbour, Gloucester County, is situated at the southern extremity of Shippegan Sound, an arm of the Baie des Chaleurs, which, together with Shippegan Channel, give access for small craft from the Strait of Northumberland to the Baie des Chaleurs.

The amount appropriated for expenditure during 1883-84 was spent in close-plank for 50 feet the outer end and sides of the breakwater, and in general repairs to the body of the work, and also in close-planking portions of the dam across the East

Gully, where breaches had been made in former years, and in raising it where settlement had taken place. A noticeable improvement has taken place in the depth of water in the channel.

RICHIBUCTO.

The harbour of Richibucto is situated on the strait of Northumberland, forty miles north of Shediac Harbour.

During 1872-75 a breakwater 1,200 feet in length was constructed on the northern side of the entrance. In 1876 it was found that, during easterly storms, the sea was set directly on the point of the north beach, which is composed entirely of sand, and that scouring to a great extent had taken place, and it became necessary, to prevent the encroachment of the sea, to build protection works from the head of the breakwater, and as the encroachment continued, these works were extended during 1880-81-82-83 to a total length of 700 feet.

The amount appropriated for expenditure during 1883-84 was intended for the construction of a further length of 250 feet of protection work, which would have taken it to a point where the beach curves to the northward, but on examination of the breakwater it was found that urgent repairs were needed, which were executed and that work placed in a safe state.

ST. MARY'S.

St. Mary's, Kent County, is situated on the Buctouche River, about 7 miles above the village of Buctouche.

At St. Mary's a highway bridge has been constructed across the river, and at right angles to this bridge a wharf 120 feet in length has been constructed, for the accommodation of the residents of the locality, and to enable them to ship the large quantities of lumber, hemlock bark, wood and general produce, obtained in the neighbourhood.

BUCTOUCHE.

Buctouche, Kent County, is a small village situated on a river of the same name, which empties into the Strait of Northumberland, about 20 miles to the northward from Shediac. It is approached by vessels through a narrow and crooked channel up to the highway bridge, where a wharf 300 feet in length is being constructed, which, at the close of the fiscal year, was about one-half completed.

RIVER MIRAMICHI.

The dredge "St. Lawrence" operated on the "Horse Shoe Shoal" and the "Outer Bar," at the mouth of the Miramichi, from the 6th August until the 1st November. Much work still remains to be done to open a deep draught channel at the places mentioned.

POINT DU CHÊNE.

Point du Chêne, Westmorland County, is the eastern terminus of the New Brunswick division of the Intercolonial Railway, and is the objective point, on the Strait of Northumberland, from and to which shipments are made to ports on the Gulf of St. Lawrence, Prince Edward Island, the United States, Great Britain, etc.

For the protection of the railway wharf, which has on several occasions received much damage during easterly gales, a breakwater has been built on the seaward side, its northern end being connected with the wharf, and in the space thus enclosed vessels deposit their ballast. During 1883, it was found that the face of this ballast wharf had received damage from ice, the effects of the sea-worm, etc. With the amount appropriated, this face has been close-piled and thoroughly secured and repaired, and placed in a safe position.

Between the 1st July and 14th November, 1883, and the 19th and 21st May, 1884, the dredge "Canada" operated in the channel in the harbour, and in increasing the depth of water to 16 feet around the head and sides of the Intercolonial Railway wharf.

TYNEMOUTH CREEK.

Tynemouth Creek enters the northern side of the Bay of Fundy, about 25 miles to the eastward of the harbour of St. John.

Further works in connection with the breakwater constructed during 1882-83, on the western side of the entrance, were built during the year, to prevent an erosion of the sea wall separating the inner basin from the bay.

FORT DUFFERIN.

Fort Dufferin, St. John County, stands on the extremity of Negro Point, at the western entrance to the harbour of St. John.

Owing to the nature of the soil of which the point is composed and the action of the sea at its base during easterly gales, undermining took place, causing several slides, damaging the fort and endangering its stability. In June, 1882 a contract for the construction of a retaining wall, 430 feet in length, at the foot of the cliff, for re-sloping the glacis and draining the fort enclosure, was entered into, and the whole of these works were completed in the spring of 1883.

During the winter of 1882-83 a land slide took place to the eastward of and adjoining the fort, injuring to some extent the work done in 1882, necessitating the construction of a further length of retaining wall of 303 feet, which was placed under contract, and at the end of the year about three-fifths of the work had been completed.

ST. JOHN.

During the year the re-building of the portion of the breakwater extending from Negro Point, at the western entrance to the harbour of Saint John, which was damaged during a gale in January, 1879, was actively prosecuted, though much delay was experienced by the contractors from unfavourable weather and the difficulty of procuring labour.

MISPEC.

Mispec Harbour, at the mouth of Mispec Stream (formerly Ball's Creek), is situated about 10 miles to the eastward of the city of St. John.

For the protection of fishermen, and to facilitate the trade of the place, where manufactures of cotton, lumber, etc., are carried on, the construction of a breakwater 200 feet in length has been commenced, which was fairly under way at the close of the fiscal year.

SALMON RIVER.

Salmon River, Albert County, empties into Salisbury Bay at the head of the Bay of Fundy. In 1883 a contract was entered into for the construction of a breakwater 180 feet in length, on the western side of the entrance to the river, for the purpose of sheltering vessels when making or leaving the harbour and prevent their being carried by the sea upon a reef opposite. At the close of the year this work had been completed in a satisfactory manner.

ROCHER BAY.

Rocher Bay, Albert County, is situated on the northern shore of Chignecto Channel. Here, some years ago, a wharf 157 feet in length was built by the New

Brunswick Government, which only extended a short distance below ordinary high water and did not give any accommodation to vessels.

During 1883 this wharf was extended a distance of 80 feet, and is now available for vessels at or near high water, there being, at its outer end, a depth of 20 feet during spring tides, which rise $40\frac{1}{2}$ feet, neaps $32\frac{1}{2}$ feet.

ANDERSON'S HOLLOW.

Anderson's Hollow, Albert County, is situated on the eastern side of Salisbury Bay, which lies between Cape Enragé and Matthew's Head, on the northern side of the Chignecto Channel, the north-eastern arm of the Bay of Fundy.

In 1879-80 an isolated block of crib-work, 100 feet in length, was constructed at a distance of about 500 feet from the shore, and during the past year a length of 90 feet extending shorewards was placed under contract, and at the close of the fiscal year was brought to completion.

HOPEWELL CAPE.

Hopewell Cape, Albert County, is situated on the western side of the Petitcodiac River about 7 miles below Hillsboro', and the same distance above Grindstone Island, at the mouth of the river. Off this place, vessels in ballast bound for Moncton, Hillsboro' and Dorchester, usually anchor, the depth of water in the channel at low tide varying from 3 to 7 fathoms, and discharge their ballast, and to such an extent has this practice been carried on, that serious injury has taken place. To remedy this evil, the construction of a ballast wharf, 380 feet in length, was commenced in 1883, and at the close of the fiscal year was about two-thirds completed.

Spring tides rise 45 feet; neaps 38 feet. The present outer end of the wharf stands in 12 feet water at spring tides.

FREDERICTON.

The capital of the Province, is situated on the western bank of the River St. John, about 80 miles above its mouth, at the city of St. John.

Between the 17th May and 30th June last, the dredge "New Dominion" was employed in opening a channel to the ferry landing at St. Mary's, on the eastern side of the St. John, to permit the ferry boats from Fredericton plying during the lowest stage of water in the river.

RIVER ST. JOHN.

The amount appropriated for the improvement of the upper portion of the St. John, was expended in improving the tow-paths, between Grand Falls and the mouth of the St. Francis. On the eastern side of the Grand Falls and at the mouth of Little River a "sheer dam" 230 feet in length has been constructed, for the purpose of preventing logs and timber, during the times of freshets, from being stranded, and to direct them in their passage over the Falls. A portion of rock projecting over the Falls has been removed, to destroy the eddy in the basin below, in which yearly a large amount of timber gathers and remains.

Boulders, rocks and sand bars have been removed out of the navigable channel between Edmundston and the St. Francis, and also at Little River Rapids, Dibblee's Bar, Belvizer's Bar, Eel River, Meductic Falls and Nackawic.

TOBIQUE RIVER.

The Tobique empties into the St. John on its eastern side, about 22 miles below the Grand Falls, and 2 miles above Andover, the shire town of the County of Victoria.

A large quantity of ledge rock and numbers of boulders have been removed from the channel at the "Narrows" and at the "Red Rapids."

MADAWASKA RIVER.

The Madawaska is a tributary of the St. John, emptying into it at Edmundston, the shire town of the County of Madawaska.

During the fiscal year the glance pier at Little Falls was completed, and extensive repairs were made to the tow-path, up the river.

QUEBEC.

ÉTANG DU NORD.

Etang du Nord is at the western end of Grindstone Island, one of the Magdalen Islands, Gulf of St. Lawrence.

At the close of 1883 a further length of 225 feet had been added to the break-water under construction at this place, but during a heavy gale in December the stone forming the slope was washed away, together with the superstructure over the whole of the length mentioned. Owing to the geologic formation of the Magdalens, stone fit for ballast cannot be obtained in any of the group, and it has therefore to be brought from points on the mainland, and late in the fall it becomes a very difficult matter to land a cargo at Etang du Nord.

BARACHOIS DE LA MALBAIE.

Situated on the northern shore of the Baie des Chaleurs.

The work done at this place consisted in the removal of points of rock, stones and boulders which obstructed the channel, and prevented the entrance of fishing boats to the basin inside, which affords shelter during all winds.

CARLETON.

Carleton is on the Baie des Chaleurs, County of Bonaventure, 36 miles from Campbellton, N. B.

The works of minor importance in connection with the pier at this place, referred to in the report of last year, have been completed.

NEW CARLISLE.

New Carlisle, on the northern shore of the Baie des Chaleurs, is the chief town of the County of Bonaventure, and is distant 65 miles from Campbellton, N. B.

During the year the further work of constructing the pier at this place was prosecuted; but owing to the insufficiency of the amount available, a further quantity of work is required to complete the structure.

PERCÉ

A contract has been entered into for the supply of timber to be used in the construction of a landing pier at this place.

MATANE.

Matane is on the south shore of the St. Lawrence, 240 miles below Quebec.

Pile protection works for the improvement of the entrance to the harbour at this place were commenced on the eastern side, and the damage done to the pier during the run of ice last spring was repaired.

RIVIÈRE BLANCHE.

The River Blanche flows through the County of Rimouski, and empties into the St. Lawrence on its southern shore, about 26 miles east of the River Métis and 9 miles from Matane.

The works of connecting the block with the shore were completed.

BIC.

Bic, Rimouski County, is situated on the south shore of the St. Lawrence, 180 miles below Quebec.

A contract has been entered into for the delivery of timber for the construction of a pier at this place.

TROIS PISTOLES.

Trois Pistoles is 148 miles below Quebec, and is in the County of Temiscouata, on the south shore of the St. Lawrence.

The amount appropriated was expended in repairing two of the blocks in the pier which had been damaged by the ice, and in further completion of the pier.

ANSE ST. JEAN.

Anse St. Jean is situated on the south-western shore of the River Saguenay, 25 miles above its mouth.

A small expenditure was made during the year in connection with the freight shed erected by the Department on the pier at this place.

ST. ALPHONSE DE BAGOTVILLE.

St. Alphonse is situated at the head of Ha! Ha! Bay, River Saguenay, about 66 miles from its mouth.

During the fiscal year the block, placed at the outer end of the pier at this place, for the purpose of strengthening it, was brought to completion, and the pier itself was raised from 2 to 3 feet over its whole length, thus bringing the flooring well above high water mark, spring tides.

CHICOUTIMI.

The town of Chicoutimi is situated on the southern side of the River Saguenay, at the head of navigation, and 71½ miles from Tadousac.

Between the head of the pier and the shore, a distance of 210 feet, a large quantity of slabs have been placed, thus increasing the width of that portion by 70 feet, and on this a freight shed has been built, the whole being required to meet the increasing trade of the place.

RIVER SAGUENAY.

The dredging through the shoals and removal of rocks and boulders from the navigable channel of this river, below Chicoutimi, were carried on during the year, and 1,050 cubic yards of boulders, etc., were removed, and 5,200 cubic yards of earth, sand and gravel were dredged.

LA GRANDE DÉCHARGE.

The larger of the two channels through which the waters of Lake St. John pass into the Saguenay.

During the year the work of widening this outlet of the lake was prosecuted, the object being to increase the area of the channel and thus permit a greater flow of water at the time of freshet.

TEMISCOUATA ROAD.

The Temiscouata Road extends from Rivèr du Loup (*en bas*) to the boundary line between the Province of Quebec and New Brunswick, and is 67 miles in length. During 1883 twenty-nine culverts were rebuilt and four bridges constructed.

RIVIÈRE DU LOUP (*en bas*.)

Rivière du Loup, in the County of Temiscouata, is situated on the southern shore of the St. Lawrence.

During 1883 further repairs were made to the pier at this place, as it was found that many of the fenders had been cut through and broken by the ice.

A contract has been entered into for the construction of wharfing, 130 feet in length, extending from the eastern end of the pier head, and at the close of the year the work was well under way.

PORT AU SAUMON.

Port au Saumon, in the County of Charlevoix, is situated on the north shore of the St. Lawrence, 12 miles to the eastward of Murray Bay.

A further sum was expended during the year in completing the work of removing boulders obstructing navigation, and the entrance to the harbour has been made easier of access than in past years.

MALBAIE (OR MURRAY BAY).

Murray Bay is situated on the north shore of the St. Lawrence, in the County of Charlevoix, and 84 miles below Quebec.

The iron plates on the corners of the wharf at this place, which were carried away by the ice, have been replaced. A shed covering the landing slip and a portion of the head of the wharf has been erected. A hand rail has been placed to separate the wagon and foot traffic.

LES ÉBOULEMENTS.

The village of Les Eboulements is situated on the northern shore of the St. Lawrence, 69 miles below Quebec.

Needed repairs, in the renewal of iron plating on the corners of the pier, carried away by the ice, and re-laying new flooring, were executed during the summer of 1883.

ILE AUX COUDRES.

An island in the St. Lawrence, near the north side, and 12 miles from Baie St. Paul.

The outer end of the pier at this place having sunk, and the outer face having been damaged by the ice during the previous winter, repairs were executed and the work placed in order.

BAIE ST. PAUL.

Baie St. Paul, County of Charlevoix, is an indentation in the northern shore of the St. Lawrence, about 60 miles below Quebec.

During the year the pier at this place was extended a further distance of 160 feet, and an abutment 170 feet long was built at the shore end, to facilitate the approach. The portion of the work left unfinished during the previous year was completed. A further amount having been appropriated, it is expected that the pier will be fully completed at the close of navigation this year.

ST. JEAN PORT JOLI.

St. Jean Port Joli, in the County of L'Islet, is situated on the south shore of the St. Lawrence, 55 $\frac{3}{4}$ miles below Quebec.

During the year a block 50 feet in length was constructed off the end of the pier at this place and connected therewith by a bridge.

ILE AUX GRUES.

Ile aux Grues, or Crane Island, is opposite Cap St. Ignace, on the St. Lawrence, and 30 miles below Quebec.

Some necessary repairs were executed to the pier at this place.

A contract has been entered into for connecting the block with the shore, and at the close of the year the work was well under way.

RIVIÈRE OUELLE.

In the County of Kamouraska, 25 miles below Quebec, and empties into the southern side of the St. Lawrence.

The raising of the outer end of the pier at Pointe aux Originaux (Rivière Ouelle) was carried on during the year to the amount appropriated for that purpose.

ST. FRANÇOIS D'ORLÉANS.

St. François is situated at the extreme eastern end of the Island of Orleans, below Quebec.

During the year, a further length of 135 feet has been built to the pier, and repairs made to the portion previously built, which had received damage from the ice during the past spring.

QUEBEC MARINE HOSPITAL WHARVES.

These wharves form the eastern and western boundaries of the hospital grounds and, being old, are much decayed.

With the amount available, the work of rebuilding the east wharf was continued during the year.

QUEEN'S WHARF, QUEBEC.

A contract has been entered into for taking down and rebuilding from low water mark the faces of the "Queen's Wharf" at Quebec, occupied and used by the Department of Marine and Fisheries.

RIVER BATISCAN.

The Batiscan empties into the northern side of the St. Lawrence, about 57 miles above Quebec.

During the year, dredging was carried on in the mouth of the river, for the purpose of making a basin for the service of the class of vessels plying on the river.

THREE RIVERS.

Three Rivers is the head of tidal water in the St. Lawrence, 72 miles above Quebec and 92 miles below Montreal.

The Lifting Barge, specially constructed for the removal of anchors and chains and obstructions in the harbour of Quebec, completed the work of removing the large boulders from the shoal in the St. Lawrence opposite Three Rivers.

GRANDES PILES.

At Grandes Piles, on the St Maurice, 30 miles above Three Rivers, the construction of piers and booms have been proceeded with, it being found to be desirable that the logs and timber descending the St. Maurice should be retained at that point, and not permitted to pass directly to the booms at the mouth of the St. Maurice.

NICOLET.

The River Nicolet empties into the St. Lawrence, at the foot of Lake St. Peter, on its southern shore:

The dredging the channel to the main channel of the St. Lawrence was completed, and pile protection work on the western side of the entrance was commenced.

RIVER YAMACHICHE.

The River Yamachiche flows southwardly through the County of St. Maurice, and empties into Lake St. Peter, about 16 miles above Three Rivers.

The river having become blocked by a land slide, which occurred at a point about 15 miles inland, a channel was partially cut through the obstruction to relieve the flood which had taken place.

RIVER ST. FRANCIS.

The St. Francis rises in the County of Wolfe, and, after a course of about 100 miles, empties into Lake St. Peter.

At Spicer's Rapids and Drummondville Falls, the channel of the river has been improved by the removal of points of rocks and boulders, thus greatly facilitating the descent of timber, &c.

Dredging at the mouth of the river was carried on until the close of the fiscal year.

On the Rivière Noire, a branch of the St. Francis, which joins it about a mile below the town of Drummondville, cuts have been made through the rapids Lussier and Lafond, a distance of 2,800 feet, to facilitate the descent of timber and to prevent the flooding of adjacent lands during rainy seasons and times of freshets.

RIVER YAMASKA.

The Yamaska empties, from the south, into the head of Lake St. Peter, River St. Lawrence.

The construction of the lock and dam at Ile à Cardin, $1\frac{3}{4}$ miles below the village of St. Michel de Yamaska, was delayed during the past year, by the abandonment of the work by the contractors, Messrs Gaberty, Brecken and Davis.

At the close of the fiscal year arrangements were in progress for the continuance of works, tenders having been asked for their completion.

CHENAL DU MOINE.

The Chenal du Moine, or "Monk's Channel," as it appears on Bayfield's chart of the St. Lawrence, is one of the channels of that river, about 3 miles below Sorel.

During 1880-81 two ice-piers were built for the purpose of preventing the ice, at its breaking up in the spring, being swept over and damaging the low lying lands along the shore.

During the fall and winter of 1883-84 two more piers were constructed, and during the past spring both were much damaged by the ice, on the breaking up of the river. They, however, whilst receiving injury, prevented damage to the farms, and thus proved their usefulness.

LAKE MEGANTIC.

At Lourdes, County of Compton, situated at the south-eastern corner of Lake Megantic, a pier 190 feet in length has been constructed.

At Agnes, the pier has been completely filled with ballast, and fenders placed, and a shed for the reception of goods has been constructed.

At Piopolis a small freight shed has been erected at the outer end of the pier.

RIVER RICHELIEU.

A wharf has been completed on the eastern side of the river, at the bridge on the road between Lacolle and Clarenceville.

ILE AUX NOIX.

Ile aux Noix is in the River Richelieu, near the southern boundary of the Province, and on it stands Fort Lennox, built by the British Government, and now belonging to the Dominion.

In 1880-81 repairs were made to the road from the public highway at St. Valentin to the river, at which point there is a ferry to the island.

During the past year the piers of the bridge over a dry gully were filled with stone, and the roadway raised and widened, the sides of which were protected by hand-railing.

LAPRAIRIE.

Laprairie, the *chef lieu* of the County of Laprairie, is situated on the southern shore of the St. Lawrence, 7 miles above Montreal.

During the season of 1883, the dredge "Queen" continued the deepening to 7 feet at low water in front of the public wharf and the channel leading thereto from the main channel of the St. Lawrence.

RIVER ST. LAWRENCE.

A large boulder has been removed from the Dorval Channel of the St. Lawrence, at Lachine, which was a serious impediment to navigation at that point.

RIVER CHATEAUGUAY.

This river runs through the whole length of the County of Chateaugay and flows into Lake St. Louis.

In 1876 its entrance was improved by dredging, and a continuation of that work was carried on during 1883.

RIVER ST. LOUIS.

The St. Louis flows eastwardly through the County of Beauharnois, and empties into the St. Lawrence at the town of Beauharnois.

Over eighty years ago the Seigneur, to increase the volume of water for his mills on this river, opened a channel, 4 miles in length, from the St. Lawrence, at Hungry Bay, to the westward of Valleyfield. This excess of water the channel of the St. Louis was not sufficient to carry off during the time of freshets in the spring, and thus many acres of land remained submerged and useless for cultivation. Possession of this channel (feeder) having fallen to the Crown, steps were taken towards the removal of Symond's Dam from the St. Louis, and also to proceed, first, with deepening and widening the feeder, and second, the channel of the river.

ST. TIMOTHÉE.

St. Timothée is in the County of Beauharnois, on the south shore of the St. Lawrence, at the head of the Chute aux Bouleaux Rapids.

The pier lately constructed at this place having been damaged by ice during the breaking up of the St. Lawrence, last spring, a small amount was expended in effecting necessary repairs.

ST. ZOTIQUE.

At the foot of Lake St. Francis, 3 miles from Coteau Landing.

The pier at this place is now 1,150 feet in length, the block referred to in last year's report having been connected with the shore during the year.

VAUDREUIL.

Vaudreuil, a post village, and *chef lieu* of the county of the same name, is situated on the south side of the River Ottawa, about $24\frac{1}{2}$ miles west from Montreal.

The dredge "Nipissing" operated at this place from 3rd September until 6th October, in opening a channel to 7 feet below low water in the Ottawa.

ST. PLACIDE.

St. Placide is a small village in the County of Two Mountains, situated on the northern side of the Ottawa, 9 miles from St. Andrews.

The channel to the public wharf or landing at this place has been completed.

RIVIÈRE À LA GRAISSE.

The Rivière à la Graisse flows through the County of Vaudreuil and empties into the Ottawa on its southern side, about 45 miles above Montreal, the town of Rigaud being situated some 3 miles from its mouth.

The "Nipissing" operated in deepening the channel of this river to 6 feet, from 27th July to 31st August, 1883, and from 24th May until the close of the fiscal year, removing 10,491 cubic yards of sand, clay and gravel.

RIVIÈRE DU NORD.

Rivière du Nord, or North River, rises in the County of Terrebonne and flows through the County of Argenteuil, emptying into the Ottawa at the head of the Lake of Two Mountains.

A small amount was expended in completing the removal of boulders from the channel of the river below the village of St. Andrews.

CALUMET.

Calumet is on the north shore of the Ottawa River, about 60 miles below the city of Ottawa.

The Dredge "Nipissing" was engaged between the 18th and 26th July and the 3rd and 10th November, 1883, in deepening the entrance from the Ottawa to 7 feet at low water, to accommodate the ferry steamer to L'Orignal plying in connection, with the Canadian Pacific Railway.

RIVIÈRE DU LIÈVRE.

The Rivière du Lièvre empties into the Ottawa at Buckingham, about 20 miles below the city of Ottawa.

To facilitate the passage of barges engaged in the phosphate industry on this river up the Little Rapids, a floating stage, carrying a double-gearred winch, with suitable rope, has been placed in the river above the rapids.

UNION SUSPENSION BRIDGE.

This bridge connects the cities of Ottawa and Hull, crossing the River Ottawa immediately below the Chaud'ère Falls.

The wires carrying the roadway have been renewed, and repairs were executed on the toll house, roadway, etc.

DES JOACHIMS BRIDGE.

The Interprovincial Bridge at Des Joachims crosses the Ottawa at the foot of the Des Joachims Rapids, 150 miles above the city of Ottawa, and is being constructed under a contract with Messrs Starrs, Herbert & O'Hanly, and at the close of the fiscal year the whole of the piers and abutments had been completed.

ONTARIO.

L'ORIGINAL.

L'Original, County of Prescott, is situated on the south side of the Ottawa, 6½ miles above Grenville.

In the spring of 1883 the outer portion of the landing pier at this place, which is 1,354 feet in length, was destroyed by the ice, and has been rebuilt.

Between the 8th October and 2nd November, 1883, the "Nipissing" was engaged in dredging in front of the pier to 7 feet at low water.

HAWKESBURY.

Hawkesbury, in the County of Prescott, is situated on the southern side of the Ottawa, about 60 miles below the city of Ottawa.

The "Nipissing" operated at this place between the 1st and 17th July, 1883, dredging to 6 feet at low water and removing 2,542 cubic yards of sand, clay and stone.

OTTAWA RIVER.

From the channel of the Ottawa at the "Lower Narrows," in Lac des Allumettes, 5½ miles above Pembroke, a number of boulders which impeded the navigation of the river at this point have been removed.

KINGSTON.

The work of removing the top of Point Frederick Shoal, to obtain a depth of 15 feet at low water in Lake Ontario, was actively carried on during the working season of the fiscal year.

BELLEVILLE.

Belleville is situated at the mouth of the River Moira which flows into the Bay of Quinté, 43 miles west of Kingston.

A contract was entered in to for deepening the harbour by dredging, the amount appropriated for that purpose being supplemented by a grant of \$4,000 by the city.

CONSECON.

Consecon is at the head of Weller's Bay, Lake Ontario, in the County of Prince Edward.

Further dredging has been done on the shoal obstructing the entrance to the harbour.

COBOURG.

On Lake Ontario, about 96 miles west of Kingston.

During the year a contract was entered into with Mr. J. W. Dinwoodie, for a further length of work in the extension of the eastern pier, which, at the close of the year, was well under way.

Owing to the failure of Mr. Waddell, contractor, to proceed with his work, his assignees took it in hand, and, at the close of the year, had made but little progress.

PORT HOPE.

Port Hope is 63 miles east of Toronto, on the north shore of Lake Ontario. The breakwater from the west pier, under contract with Messrs. McNeely & Walters, was completed in September, 1883, and the damages it received from storms last winter and this spring were repaired.

PETERBORO'.

The work of removing the sawdust and mill refuse obstructing the navigation of the River Otonabee, below the town of Peterboro', was continued, and the relief asked for given.

NEWCASTLE.

Newcastle Harbour, County of Durham, is situated on Lake Ontario, 47 miles to the eastward of Toronto.

The work, under a contract with Messrs. Munson & Rowe, of repairing the piers at the entrance to the harbour, and construction of protection work in the basin, was actively prosecuted during the year.

WHITBY.

Whitby is situated on the north shore of Lake Ontario, about 135 miles above Kingston, and 30 miles from Toronto.

Dredging operations were carried on between the 29th May and 8th September, 1883, in deepening this harbour to 13 feet.

TORONTO.

The harbour of Toronto, on the north shore of Lake Ontario, is 161 miles from Kingston, and 39 miles north-eastwardly from Hamilton.

Satisfactory progress was made during the year with the works on the eastern side of the harbour and southern side of Toronto Island, and where completely finished stood the test of severe storms last spring, and were the means of preserving the whole eastern end of the island from destruction.

The point of the shoal extending from Hanlan's Point having made to so great an extent as to narrow the "Western Entrance" and form an obstruction, it was cut off, and a full width of 300 feet, with 14 feet water, left at the completion of the work.

The water in Lake Ontario remained abnormally high during the year.

MORPETH.

Morpeth, in the County of Kent, is situated on Lake Erie, about 10 miles to the eastward from Rondeau.

A contract was entered into in March, 1884, for the construction of a pier 500 feet long at this place, and at the close of the fiscal year the work was well under way.

RONDEAU.

Rondeau Harbour is on Lake Erie, 140 miles west from Port Colborne, the western entrance to the Welland Canal.

During the year a further amount of dredging has been done to enlarge and deepen the basin immediately within the entrance from the lake. Extensive repairs were made to the eastern pier and breakwater in front of the Lighthousekeeper's dwelling.

KINGSVILLE.

Kingsville, County of Essex, is a port of entry on Lake Erie, between Point Pelee and the Detroit River, and about 25 miles east from Amherstburg.

The works for the construction of a harbour of refuge at this place were commenced in March, 1883, and up to the close of the year were about one-half completed.

The dredge "Challenge" operated here on account of the contractor from the 25th April to the close of the fiscal year. The material removed consisted of fine sand, and much difficulty is experienced in maintaining the depth to which the bottom is dredged.

BELLE RIVER.

Belle River, County of Essex, is situated on the southern side of Lake St. Clair, midway between the mouth of the Thames and Detroit Rivers.

A small length of pile protection work has been built at the mouth of the river, with the view of protecting the shallow channel which has been formed, to permit boats and scows to enter and ascend the river. The municipality has assisted in the construction of these works.

LITTLE BEAR CREEK.

Little Bear Creek empties into the "Chenal Ecarté," on the eastern side of Ste Anne's Island, Lake St. Clair, about 16 miles from Chatham and 7 miles from Wallaceburg.

The work done consisted in dredging the creek to a depth of 8 feet, to permit craft to pass up to the "Bear Line," at which point they can receive and discharge cargo.

SYDENHAM RIVER.

The Sydenham River has its outlet in Chenal Ecarté, the passage between Ste. Anne's Island and the mainland. From its mouth to Wallaceburg it is a navigable stream; above this point it divides into two branches, north to Wilkesport, 14 miles, and east past Dresden 15 miles, the navigation of which has been almost impossible from obstructions caused by sunken logs, etc.

Work has been carried on in the removal of these obstructions, and at the close of the fiscal year a distance of 11 miles of the east branch, and 6 miles of the north Branch had been cleared, giving satisfaction to those using the river.

BAYFIELD.

The village of Bayfield is situated at the mouth of the river of the same name, which empties into Lake Huron, 12 miles south from Goderich.

The entrance to the harbour having silted up to a considerable extent, the dredge "Challenge" removed a quantity of sand from the shoalest places, leaving a depth of 13 feet.

The older portions of the pier work on the northern side of the harbour, built many years ago by the municipality, are much out of repair.

GODERICH.

Goderich is situated at the mouth of the River Maitland, about 68 miles north from Sarnia.

The works for the protection of the beach between the north pier, at the entrance, and the breakwater, abandoned by the Contractor, as mentioned in the report of last year, have been brought to completion. Repairs were made to the breakwater, which had received damage during the high freshet in April, 1883, and to the pier on the south side of the entrance, it having been found that a large quantity of the stone filling had disappeared, by sinking, it is surmised, into the sandy bottom underneath the structure. A quantity of planking has been renewed, and new guard timbers placed where required.

The dredge "Challenge" was employed in dredging in the harbour to 14 feet from the 22nd August until the 20th October, 1883.

PORT ALBERT.

Port Albert is a small harbour formed by piers and dredging at the mouth of Nine Mile Creek, which empties into Lake Huron, about 9 miles north from Goderich.

During the year, repairs have been made to the piers on either side of the entrance, which were damaged during a storm late in 1883. Much of the older portions built in 1871 were damaged during the past winter and spring.

KINCARDINE.

Kincardine Harbour is formed at the mouth of the River Penetangore, which empties into Lake Huron, 31 miles north of Goderich.

During the year, damage was done to the works at the entrance to the harbour. The face of the northern pier has been close-piled from the lighthouse westwardly a distance of 665 feet, and sheathing placed on the north or outer side of the north pier for a distance of 200 feet to prevent the influx of sand into the channel. The outer end of the north pier, carried away by a vessel during a storm, has been repaired and strengthened.

The dredge "Challenge" worked in the entrance to the harbour from the 10th to the 23rd July, 1883, making a depth of 13 feet of water.

PORT ELGIN.

Port Elgin, in the north riding of Bruce, is situated on the eastern shore of Lake Huron, and 24 miles to the northward of Kincardine.

Two groynes of close-pile work, with slopes of brush and stone, have been built with the view of preventing the washing in of sand into the harbour space. Repairs have been executed on the old breakwater, and the pier has been placed in an efficient state.

SOUTHAMPTON.

Southampton is at the mouth of the Saugeen River, in the north riding of the County of Bruce.

During the year a large amount was expended in repairing the breakwater at this place, much of the damage done being due to the careless manner in which the masters of steamers brought their vessels alongside the structure.

In March last, a contract was entered into with Mr. David Porter, for the construction of an additional length of 250 feet to the steamboat pier, and at the close of the year good progress had been made with the work.

CHANTRY ISLAND.

Chantry Island is a small island about one-half mile in length, lying W. S. W., $1\frac{1}{2}$ miles from the mouth of the Saugeen River, and on it is placed one of the principal lights on Lake Huron.

During the past year a groyne, 277 feet in length, was constructed for the protection of the south end of the island, and has proved to be of service.

LION'S HEAD.

Lion's Head is situated on Georgian Bay, about 35 miles to the northward and westward of Wiarton.

The "Challenge," during the first week in July, 1883, completed the dredging through the gravel shoal, to which reference was made in the report of last year.

WIARTON.

Warton is situated at the head of Colpoy's Bay, about 32 miles by water from Owen Sound, and is the northern terminus of the Grand Trunk, Georgian Bay, and Lake Huron Railway, which is operated by the Grand Trunk Railway.

The wharf under contract with Mr. Porter was satisfactorily completed in July, 1883. This wharf is 1,040 feet in length, with from 14 to 18 feet of water along its face. Between it and the shore a large amount of filling has been done, and one of the first points for shipment on Georgian Bay has thus been completed.

OWEN SOUND.

Owen Sound, the chief town of the County of Grey, is situated at the mouth of the Sydenham River, which empties into an arm of Georgian Bay. It is the terminus of the Toronto, Grey and Bruce Railway, now a branch of the Canadian Pacific Railway system, and the point of departure of lines of steamers plying to Port Arthur and ports on Georgian Bay.

During the past fiscal year the channel in the harbour, so called, was dredged to a depth of 16 feet, but owing to the shifting nature of the bottom, a shoaling took place, and soundings taken in March last showed an average depth of 14 feet over the channel opened by the Department.

MEAFORD.

Meaford is 22 miles from Collingwood and 19 miles east from Owen Sound.

The works under contract for repairing the older or inshore portion of the pier at this place were completed in October, 1883. Further repairs are required.

THORNBURY.

Thornbury, in the Township of Collingwood, and County of Grey, is situated at the mouth of the Beaver River, which empties into Georgian Bay, 13 miles west from Collingwood.

The construction of protection works on the eastern side of the basin opened by the Department at this place, was proceeded with during the year.

COLLINGWOOD.

Collingwood is situated on the Southern shore of Georgian Bay, and is a terminus of the Northern and North Western Railway, and a point of departure for steamers plying to ports on Lake Superior.

The length of breakwater referred to in the report of last year was completed on the 18th September, 1883. A contract for a further length of 600 feet was entered into in November last, and at the close of the year about one-half of the work was finished.

The work of dredging the channel at the entrance to the harbour was continued during the year, and the deepening of a basin at the southern end of the harbour was commenced.

LITTLE CURRENT.

Little Current is the channel between Cloche and Manitoulin Islands, on the route to Sault Ste. Marie from Georgian Bay ports, and is distant from Collingwood about 140 miles.

Work commenced on the 21st May, 1883, and continued until the 10th November, when it closed for the winter, 4,266 cubic yards of rock having been blasted and removed during the season.

Operations were resumed in May last, and at the close of the fiscal year were well in hand, and would be continued under the appropriation of the current year.

MANITOBA.

RED RIVER.

The Red River which, taking its rise in the United States, flows past Emerson, Winnipeg and Port Selkirk, and empties into the southern end of Lake Winnipeg, is obstructed at its mouth by a large bar of sand.

During 1883 operations were commenced for the purpose of permitting steamboats and other craft to have entrance and exit, by means of a drag extemporized for the purpose.

This spring, dredging plant was placed at work to open a channel through the bar to 12 feet depth at low water.

RIVER ASSINIBOINE.

Further repairs were made to the wing dams constructed in 1880.

NORTH-WEST TERRITORIES.

RIVER SASKATCHEWAN.

The work of removing obstructions in the river, between Edmonton and the mouth, were carried on under the directions of Mr. C. J. Brydges, of the Hudson's Bay Company, and will be continued during the current year, an appropriation having been made for that purpose.

BRITISH COLUMBIA.

The Report of the Hon. J. W. Trutch, Agent of the Dominion in British Columbia, contains a description of the works carried on in that Province under his directions.

SURVEYS AND EXAMINATIONS.

During the year, surveys and examinations, were made at the undermentioned localities; and, with some exceptions, plans, reports and estimates have been submitted:—

Searltown,	Prince Co.	P. E. I.
Tignish	do	do
Casumpec	do	do
Biddeford	do	do
Princetown	do	do
Kier's Shore	do	do
Summerside	do	do
Tryon	do	do

		P. E. I.
Hurd's Point	Prince Co.	do
Strang's	do	do
Egmont Bay	do	do
Miminigash	do	do
Higgin's Shore	do	do
West Point	do	do
Long River,	Queen's Co.	do
Ross, New London	do	do
Clifton	do	do
Bay View	do	do
North Rustico	do	do
South Rustico	do	do
Wood Islands	do	do
Pinette,	do	do
Belfast,	do	do
China Point	do	do
Pownal	do	do
Gillis' Pier	do	do
Southport	do	do
McConnell's Pier	do	do
Haggarty's Pier	do	do
Red Point	do	do
McEacheren's Pier	do	do
Shaw's Point	do	do
Nine Mile Creek	do	do
Victoria	do	do
Cape Traverse	do	do
Belle Creek	do	do
McAulay's Point	do	do
Port Selkirk	do	do
Vernon River	do	do
Alexandria,	do	do
Appletree Wharf	do	do
Hayden's Wharf	do	do
Cranberry Wharf	do	do
Hickey's Wharf	do	do
Rocky Point	do	do
McPhee's Wharf	do	do
McEwen's Wharf	do	do
DeSable	do	do
St. Peter's Bay,	King's Co.	do
McCallum's	do	do
Campbell's Cove	do	do
Souris West	do	do
Colville Bay	do	do
Rollo Bay	do	do
Ray Fortune, North	do	do
do South	do	do
Poplar Point	do	do
Morrison's Beach	do	do
Lewis point	do	do
Brudenell, North	do	do
do South	do	do
Georgetown,	Queen's Co.	do
Aitken's Shore	do	do
St. Mary's Bay	do	do

	Queen's Co.	P. E. I.
Mink River	do	do
Machon's Point	do	do
Burnt Point	do	do
Bridgetown	do	do
Chapel Point	do	do
Annandale	do	do
Launching Pier	do	do
Cardigan, North	do	do
do South	do	do
Montague	do	do
Stephen's Pier	do	do
Lambert's Pier	do	do
Peter's Shore	do	do
Sturgeon	do	do
Greek River	do	do
South River	do	do
Little Sands,	do	do
McNair's Cove,	Antigonish Co.	N. S.
Tracadie	do	do
Beaver Cove,	Cape Breton Co.	do
Big Pond	do	do
Little Glace Bay	do	do
Mira Bay	do	do
Five Islands,	Colchester Co.	do
Great Village River	do	do
Old Barns	do	do
Brulé,	Cumberland Co.	do
Joggins	do	do
Parrsboro' Pier	do	do
Sand River	do	do
Church Point,	Digby Co.	do
Meteghan River	do	do
Trout Cove	do	do
Wesport	do	do
Canso Tittle,	Guysboro' Co.	do
Fox Island,	Halifax Co.	do
Campbell's Cove,	Inverness Co.	do
Cheticamp	do	do
Mabou	do	do
Margaree	do	do
Smith's Island	do	do
Whycocomagh	do	do
Chipman Brook,	King's Co.	do
Harbourville	do	do
Kingsport	do	do
Morden	do	do
Ogilvie Pier	do	do
Pickett's Pier	do	do
Wolfville	do	do
New Dublin,	Lunenburg Co.	do
East River,	Pictou Co.	do
Pictou Island	do	do
Brooklyn,	Queen's Co.	do
Grand Digue,	Richmond Co.	do
Hay Cove	do	do
L'Ardoise	do	do
Middle L'Ardoise	do	do

Barrington Passage,	Shelburne Co.	N. S.
Wood's Harbour	do	do
Boularderie,	Victoria Co.	do
Jamesville	do	do
South Ingonish	do	do
Cranberry Head,	Yarmouth Co.	do
Green Cove	do	do
Tasket Wedge	do	do
West Pubnico	do	do
Hillsborough,	Albert Co.,	N. B.
West Isles,	Charlotte Co.	do
Clifton,	Gloucester Co.	do
Richibucto,	Kent Co.	do
Coal Branch	do	do
Bass River	do	do
Nicholas River	do	do
Oromocto Island,	Sunbury Co.	do
Grand Falls,	Victoria Co.	do
Belliveau,	Westmoreland Co.	do
Dover	do	do
Pré du Haut	do	do
Pointe du Chêne	do	do
Lanoraie,	Berthier Co.,	Quebec
Caplan,	Bonaventure Co.	do
Point Pritchard	do	do
Maria	do	do
Lourdes,	Compton Co.	do
Lake St. John,	Chicoutimi Co.	do
St. Alexis	do	do
La Petite Rivière St. F. X.,	Charlevoix Co.	do
Grand Casapedia,	Gaspé Co.,	do
Ste. Anne de Bellevue,	Jacques Cartier Co.	do
Ste. Anne de la Pocatière,	Kamouraska Co.	do
Kamouraska	do	do
St. André	do	do
Berthier (<i>en bas</i>),	Montmagny Co.	do
Rivière du Sud	do	do
Bras St. Nicholas	do	do
Ste. Anne de Montmorency,	Montmorency Co.	do
Chateau Richer	do	do
Rivière du Lièvre,	Ottawa Co.	do
Portage du Fort,	Pontiac Co.	do
Ste. Félicité,	Rimouski Co.	do
Escoumains,	Saguenay Co.	do
River St. Francis,	Yamaska Co.	do
Rivière Noire de Bulstrode	do	do
Rivière Marasse	do	do
River Yamaska	do	do
Wilson's Rock,	Algoma,	Ontario
Sault Ste. Marie	do	do
Goderich,	Bruce Co.	do
Bayfield	do	do
Kincardine	do	do
Port Elgin	do	do
Oxenden	do	do
Lion's Head	do	do
Saugeen River	do	do

River Canard,	Essex Co.	Ontario
Kingsville	do	do
Morpeth,	Elgin Co.	do
Owen Sound,	Grey Co.	do
Belleville,	Hastings Co.	do
Chatham,	Kent Co.	do
McGregor's Creek	do	do
Buckhorn	do	do
L'Orignal,	Prescott Co.	do
Penetanginsheue,	Simcoe Co.	do
River St. Clair		do
River Thames		do
Lower Narrows, River Ottawa		do
Galt and Dundas Road		do
Port Arthur.		do

Surveys were also made and plans prepared for the Chief Architect's Branch, of sites for public buildings, at—

Amherst,	Cumberland Co.,	N. S.
North Sydney,	Cape Breton Co.	do
Baddeck,	Victoria Co.	do
Yarmouth,	Yarmouth Co.	do
St. Stephens,	Charlotte Co.,	N. B.
Bathurst,	Gloucester Co.	do

DREDGING.

THE "ST. LAWRENCE."

At the commencement of the fiscal year this dredge was engaged at Little Glace Bay, Cape Breton County, N. S., and remained until the 12th July, removing, to that date, 2,012½ cubic yards of mud, stone, etc., making a total of 4,900 cubic yards. On the 16th July, work was resumed in the East River of Pictou, and up to the 1st August, removed 7,175 cubic yards of mud, and much old timber. Work was commenced on the Horse Shoe Shoal, at the mouth of the River Miramichi, N. B., on the 6th August, and up to the 20th, removed 6,650 cubic yards of sand. On this last date, this dredge was removed to and begun work on the "outer bar," remaining until 1st November, and removing 4,900 cubic yards of sand. Owing to their exposed positions, much delay was experienced in working at the two last named places.

Work in the East River of Pictou was again taken up on the 6th November, and continued until the 12th, 1,750 cubic yards of mud and shells having been removed. Between the 14th November and 4th December, 4,375 cubic yards of clay were removed from around the Intercolonial Railway wharves and slips at Pictou Landing, Pictou Harbour.

During the winter, the engines, boiler, dredging machinery, winches, and buckets were repaired, and the hull overhauled and painted inside.

Work for the season of 1884 commenced on the 24th April, at McKenzie's Point, East River, Pictou Harbour, and up to the 5th May, 3,500 cubic yards of mud were removed. On this last date, work was begun in the river, below McKenzie's Point, and up to 21st May, 3,500 cubic yards of mud were removed. Between 21st May and 12th June, dredging to the extent of 7,000 cubic yards of mud and clay was done in the Middle River, Pictou Harbour. On the 18th June, operations on the "outer bar," Miramichi River, N. B., were begun, and up to the 30th June, 1,837½ cubic yards of fine sand had been removed.

The total quantity removed by this dredge during the year amounted to 42,700 cubic yards, at a cost of 34½ cents per yard.

THE "CANADA."

On the 1st July, 1883, this dredge was working at Pointe du Chêne, Shediac Harbour, N. B., and continued there until the 14th November, removing 22,230 cubic yards of mud and shells, improving the channel in the harbour, and increasing the depth of water around the head and sides of the Intercolonial Railway Wharf to 16 feet.

Whilst in winter quarters the engines and machinery received repairs, and the hull was scraped and painted inside.

On the 19th May, 1884, moorings were again laid at Point du Chêne, and up to the 21st, a further quantity of 630 cubic yards of mud was removed. After a stormy and much delayed passage to Mabou, Cape Breton, work was commenced on 2nd June and continued until the 28th, on the shoal off the entrance to the harbour, when 7,740 cubic yards of sand and gravel were removed.

At the close of the fiscal year, this dredge was on the marine slip at Pictou, N.S., being cleaned and painted preparatory to leaving for Rimouski, Quebec.

During the year, 30,600 cubic yards of material were removed, at a cost of 27¹⁸/₁₀₀ cents per yard.

THE "NEW DOMINION."

This dredge remained at Digby, N. S., until the end of July, 1883, operating off the end of the public pier, and removed 2,850 cubic yards of blue clay, mud and stone. On 1st August work was commenced in front of the railway wharf at Annapolis, and continued until the 8th September, when the rock having been reached and 2,825 cubic yards of stone and clay removed, work of the dredge ceased, to be resumed of the 9th of September at Digby, where, up to 3rd November, a further quantity of 3,500 cubic yards of clay was removed. At the last mentioned date, the dredge was taken to St. John, N. B., and placed in winter quarters.

During the winter necessary repairs were made to the dredge and scows.

On the 17th May, 1884, work was commenced in the River St. John, at St. Mary's Ferry, opposite Fredericton, and up to 30th June, 10,810 cubic yards of sand and saw dust were removed, and the work brought to completion.

The total quantity dredged during the year was 19,985 cubic yards, at a cost of 57⁹/₁₀₀ cents per yard.

Owing to the great rise and fall of tide at Digby and Annapolis, work could only be carried on for a few hours at and near low tide, which will account for the small quantity of work done during the year.

The sum of \$3 was received for a piece of oak and placed to the credit of the Receiver-General.

THE "CAPE BRETON."

At the commencement of the fiscal year the "Cape Breton" was operating at Mabou, Cape Breton, and remained there until 31st August, when 15,415 cubic yards of gravel, clay and sand had been removed, and a passage partially opened through the shoal off the entrance to the harbour.

After much delay, caused by stormy weather, the dredge arrived and commenced work on the 11th September, at St. Peter's Canal, and remained there until 17th November, having dredged the foundation for the protection wall on the eastern side of the canal at its northern end, removing 6,275 cubic yards of clay and boulders, and also operated in the channel leading from the canal to the Bras d'Or Lake, where 7,150 cubic yards of clay were removed.

This dredge wintered on the marine slip at Port Hawkesbury, Strait of Canso, and extensive repairs were made on the dredge and scows.

On the 28th, May 1884, work was commenced in opening a passage through the shoal in the Bras d'Or Lake, off Benacadie Pond, and up to the close of the fiscal year, 14,425 cubic yards of sand, gravel and mud were removed.

The total quantity removed during the year was 43,265 cubic yards, at a cost of 33 $\frac{67}{100}$ cents per yard.

The sum of \$24.49, a refund from wages was placed to the credit of the Receiver General.

THE "PRINCE EDWARD."

This dredge continued at work from 1st July to 15th September 1883 in opening a channel at Rocky Point, for the ferry service from Charlottetown, P. E. Island, and removed 40,560 cubic yards of clay. Work at the South Port Ferry Wharf, Charlottetown Harbour, was carried on from 17th to 20th September, and from 30th September to 24th November, removing 21,540 cubic yards of soft mud. Between 20th and 29th September, 2,430 cubic yards of soft mud were removed from around Pownal Wharf, Charlottetown.

During the winter the dredge and scows were repaired, and a house for the accommodation of the crew built on the dredge.

On the 8th May last, work was resumed on the South Port Ferry route and completed on the 16th June, 11,475 cubic yards of soft mud having been removed.

From the 17th to the 30th June, work to the amount of 3,745 cubic yards was executed at the Princess Street ferry slip, Charlottetown.

The total quantity removed by this dredge during the year is 79,750 cubic yards, at a cost of 16 $\frac{3}{4}$ cents per yard, the material dredged being principally soft mud.

The sum of \$10.90 was received from the sale of surplus coal, and placed to the credit of the Receiver General.

THE "GEO. MCKENZIE."

At the commencement of the fiscal year this dredge was operating at the Deep Water Terminus of the Intercolonial Railway, at Halifax, N. S., and continued until the 19th July, removing 3,432 cubic yards of mud, stone, clay and old wharfing and ballast.

After needed repairs were executed, work at Jeddore, Halifax County, was commenced on the 7th August and brought to completion on the 22nd October, the work done consisting in cutting a passage through a shoal of sand to connect the eastern and western channels, for the use and benefit of the fishermen of that locality.

On the 27th October work was commenced in Lunenburg Harbour, N. S., and continued until 21st December, resulting in the removal of 18,400 cubic yards of mud and stone.

During the winter a new crane was placed on the dredge, and extensive repairs were executed to the plant generally.

On the 7th May operations were resumed at Lunenburg and, up to the close of the fiscal year, a further quantity of 19,260 cubic yards of mud and stone had been removed.

The total quantity removed during the year was 62,607 cubic yards, at a cost of 23 $\frac{14}{100}$ cents per yard.

From the sale of old iron and rope the sum of \$26.45 was derived, and from the Intercolonial Railway, the sum of \$10,746.81 was received for service at Halifax, the whole being deposited to the credit of the Receiver General.

THE "CHALLENGE."

The "Challenge" remained at Lion's Head Harbour, near the northern end of the Bruce Peninsula, until the 3rd July, 1883, and completed the channel through the gravel shoal to admit vessels into the deep water on the north side of the harbour. After a stormy passage, Kincardine was reached on the 6th, and some slight repairs having been made, work at that place was commenced on the 10th, and continued until the 23rd July, removing 3,800 cubic yards of sand and mud, and leaving 13 feet in the entrance to the harbour. Work at Bayfield commenced on the 26th and con-

tinued until the 10th August, and consisted in the removal of 1,750 cubic yards of sand, and making 13 feet of water in the shallow part inside of the piers.

Owing to extremely rough weather. it was not found possible to commence work at Goderich until the 22nd August. Up to the 20th October, 8,400 cubic yards of sand and gravel were removed and 14 feet of water obtained.

This dredge, and attendant tug and scows, were placed in winter quarters in Sarnia, where necessary repairs were executed.

On the 26th April, 1884, work on account of the contractor was commenced at Kingsville, Lake Erie, in dredging a foundation for the western pier, and in deepening over the area enclosed for a harbour; and up to the close of the fiscal year, 12,565 cubic yards of sand, clay, and a few boulders, were removed.

The total quantity removed by this dredge during the year was 26,515 cubic yards, at a cost of 28.14 cents per yard.

THE "NIPISSING."

At the close of the fiscal year 1883, this dredge was at work at Hawkesbury, Ont., and remained there until the 17th July, making 6 feet of water and removing 2,542 cubic yards of clay and sand. Between the 18th and 26th July, work to the extent of 2,116 cubic yards was done in the channel at Calumet, Quebec, leading from the Ottawa to the landing pier, for the benefit of the ferry steamer plying to L'Original in connection with the Canadian Pacific Railway.

The deepening of the channel of the Rivière à la Graisse to 6 feet was continued from the 30th July until the 31st August, when 8,610 cubic yards of clay had been removed.

At Vaudreuil, dredging commenced on the 3rd September and was completed on the 6th October, when 7 feet of water had been made and 5,943 cubic yards of clay removed.

Off the end of the pier at L'Original, a depth of 7 feet at low water in the Ottawa has been obtained, dredging having been carried on between the 11th October and the 2nd November, 1883, and 3,250 cubic yards of clay removed.

This dredge was again sent to Calumet for further work in the channel, and operated there from the 3rd to the 10th November, removing 2,092 cubic yards of clay.

Repairs were made during the winter to this dredge, her tug and scows, at Ottawa, where they wintered in the Rideau Canal Basin.

On the 24th April, 1884, work was resumed on the Rivière à la Graisse, and continued until the close of the fiscal year, a further quantity of 8,375 cubic yards of gravel, clay and sand having been removed.

A total quantity of 33,028 cubic yards of materials of different kinds were removed during the year, at a cost of 21 $\frac{56}{100}$ cents per yard.

"THE QUEEN OF CANADA."

At the beginning of the fiscal year this dredge was working at Laprairie, around the public wharf at that place and the channel leading thereto from the navigable channel of the St. Lawrence, obtaining a depth of 7 feet at low water. Operations ceased on the 30th September, owing to decayed state of the hull.

During the winter the machinery of this dredge was removed into a new hull and placed in good working order, and on the 9th June, 1884, work was resumed at Laprairie, and was being carried on at the close of the year.

The total amount of materials removed during the year was 9,346 cubic yards of hard-pan, clay and gravel, at a cost of \$1.27 cents per yard.

"THE ST. LOUIS."

This dredge was built for enlarging the feeder from the St. Lawrence at Hungry Bay, above the head of the Beauharnois Canal at Valleyfield, to the River St. Louis

Work to the extent of 3,110 cubic yards of hard-pan and clay was executed up to the close of the year, at a cost of 23 $\frac{7}{10}$ cents per yard.

“ THE WINNIPEG.”

This dredge has been placed for work on the shoal in Lake Winnipeg, which obstructs the entrance to the Red River, and at the close of the year had only made a commencement of the work to be done.

“ THE ONTARIO.”

This dredge was about completed at the end of the fiscal year, but had not been placed for work.

“ THE DREDGER ”—BRITISH COLUMBIA.

The operations of this dredge during the year are detailed in the report submitted by the Hon. J. W. Trutch, C.M.G., Agent of the Dominion in British Columbia.

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	“ New Dominion,” and seven scows.
“	“ Cape Breton,” and five scows.
“	“ Prince Edward,” and six scows.
“	“ Geo. McKenzie,” and four scows.

In Quebec.

The dipper dredge—	“ Queen of Canada,” two scows and stone lifter.
“	“ Nipissing,” two scows and steam tug “ Denis.”
“	“ St. Louis.”
The stone lifter	“ Baillairgé.”

In Ontario.

The dipper dredge—	“ Challenge,” two scows and steam tug “ Trudeau.”
“	“ Ontario,” three scows and steam tug “ Sir John.”

In Manitoba.

The dipper dredge—“ Winnipeg,” two scows and tug “ Sir Hector.”

In British Columbia.

An elevator dredge and six scows.
The steam tug “ Georgio.”

CLASSIFICATION of Disbursements of the following Dredges, during the Year ended 30th June, 1884.

"ST. LAWRENCE."

Items.	July.	August.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	Grand Totals.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Wages.....	520 49	507 99	515 54	506 76	505 65	493 19	380 33	384 08	580 33	471 80	507 50	447 16	5,820 76
Coal.....	357 10	450 50	450 50	198 00	79 20	79 20	90 68	72 29	112 61	.....	306 00	286 80	1,877 60
Provisions.....	374 19	103 24	206 37	226 52	59 72	129 40	.....	.....	.....	.....	211 96	91 18	1,677 16
Stores.....	98 62	.....	.....	8 98	.....	16 00	.....	.....	.....	.....	.....	83 16	206 56
Equipment.....	10 00	19 26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	29 26
Water.....	3 00	.....	.....	.....	.....	9 60	.....	.....	.....	.....	.....	.....	12 60
Repairs.....	21 56	.....	.....	291 12	339 71	.....	340 72	.....	.....	1,044 28	.....	1,960 18	4,003 51
Photage.....	126 67	55 00	60 00	265 03	72 50	7 50	.....	.....	.....	.....	67 50	131 05	775 22
Contingencies.....	31 21	.....	2 54	34 22	4 62	.....	2 21	.....	25 29	.....	3 25	.....	103 34
Totals.....	1,545 68	666 23	1,253 21	1,533 54	982 20	731 89	813 94	456 37	518 23	1,516 08	1,096 21	2,989 43	14,106 01
Working expenses.....	1,521 18	666 23	1,253 21	1,239 42	642 49	731 89	.....	.....	.....	.....	1,096 21	1,029 26	8,182 88
Repairs, ordinary.....	.....	.....	.....	.....	.....	.....	473 21	456 37	518 23	.....	.....	.....	1,447 82
do extraordinary.....	24 50	.....	.....	294 12	339 71	.....	340 72	.....	.....	1,516 08	.....	1,960 18	4,475 31
Totals.....	1,545 68	666 23	1,253 21	1,533 54	982 20	731 89	813 94	456 37	518 23	1,516 08	1,096 21	2,989 43	14,106 01

"CANADA."

Items.	July.	August.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	Grand Totals.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Wages.....	415 33	400 78	423 73	358 56	390 33	390 33	390 33	390 33	390 33	387 52	408 51	415 33	4,761 41
Coal.....	160 80	.....	.....	.....	.....	.....	.....	.....	.....	.....	205 70	.....	365 50
Provisions.....	198 69	121 82	89 72	88 90	130 32	91 68	82 59	101 46	87 08	.....	165 51	.....	1,147 77
Stores.....	.....	.....	15 57	.....	8 35	8 35	.....	.....	.....	.....	.....	.....	23 82
Equipment.....	20 00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	23 25
Repairs.....	.....	4 15	.....	.....	33 61	13 68	43 26	.....	.....	625 07	.....	478 55	1,203 32
Pilotage.....	65 00	67 50	62 50	67 50	35 00	.....	.....	.....	.....	.....	.....	60 00	357 50
Contingencies.....	.....	13 50	.....	.....	.....	11 59	.....	5 00	.....	.....	.....	31 82	61 91
Totals.....	859 82	607 75	591 52	514 96	594 26	518 88	516 18	496 79	477 41	1,012 59	769 72	985 70	7,945 68
Working expenses.....	859 82	607 75	591 52	514 96	555 65	514 88	472 93	496 79	477 41	.....	769 72	507 15	4,406 87
Repairs, ordinary.....	.....	.....	.....	.....	.....	.....	43 26	.....	.....	1,012 59	.....	478 56	1,962 00
do extraordinary.....	.....	.....	.....	.....	38 61	4 00	.....	.....	.....	.....	.....	.....	1,577 01
Totals.....	859 82	607 75	591 52	514 96	594 26	518 88	516 18	496 79	477 41	1,012 59	769 72	985 70	7,945 68

Classification of Disbursements of the following Dredges, &c.—Continued.

“NEW DOMINION.”

Items.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	Grand Totals.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Wages.....	486 58	487 75	477 01	483 26	374 90	145 00	147 50	142 50	145 00	272 54	487 75	468 87	4,118 69
Coal.....					19 50						145 75		165 25
Provisions.....					3 90								3 90
Stores.....											189 23		189 23
Equipment.....	23 72												23 72
Water.....			475 00		7 35						9 60		491 95
Repairs.....	22 95	20 38			4 25		1 05			60 00	521 73	611 19	1,871 62
Towage.....	1,500 00	540 00	700 00	800 00	325 00						150 00	282 00	4,557 00
Wharfage.....	31 50		45 00										77 50
Contingencies.....		13 50			7 25	13 47					9 60		43 92
Totals.....	2,125 75	1,061 64	1,697 04	1,283 26	742 25	158 47	148 55	142 50	145 00	332 54	1,823 72	1,301 06	11,052 78
Working expenses.....	2,102 80	1,061 64	1,697 04	1,283 26	742 25	158 47	148 55	142 50	145 00		1,001 93	755 66	8,614 58
Repairs, ordinary.....	22 95									332 54		636 40	1,813 68
do extraordinary.....													
Totals.....	2,125 75	1,061 64	1,697 04	1,283 26	742 25	158 47	148 55	142 50	145 00	332 54	1,823 72	1,392 06	11,052 73

“CAPE BRETON.”

Wages.....	495 97	709 94	486 51	495 62	483 93	210 76	147 50	2 5 07	145 00	695 11	445 40	513 75	5,045 56
Coal.....	2 7 20	171 60	93 56		1 00						117 15		6 0 45
Provisions.....					3 60								3 60
Stores.....	1 92	510 76			8 24							56 26	668 91
Equipment.....					31 36								8 24
Water.....	55 73	165 95	34 81	74 38	8 24							33 12	435 36
Repairs.....		1 25	39 51	52 25	21 07		100 00	100 76	787 64	593 26		606 64	2,362 41
Pilotage.....													12 00
Towage.....	1,307 25	1,100 00	625 00	675 00	415 00						125 00	592 50	4,539 75
Wharfage.....					8 00								8 00
Contingencies.....	10 58						19 68						30 26
Totals.....	2,129 65	2,671 50	1,339 37	1,297 25	972 20	210 76	267 18	315 83	932 64	1,288 37	687 55	1,802 27	13,914 57
Working expenses.....	2,129 65	2,671 50	1,242 33	1,245 00	964 70		167 18		145 00		687 55	1,195 63	10,136 36
Repairs, ordinary.....			97 04	52 25	7 50	210 76	100 00	315 83	787 64	1,288 37		606 64	3,255 27
do extraordinary.....													
Totals.....	2,129 65	2,671 50	1,339 37	1,297 25	972 20	210 76	267 18	315 83	932 64	1,288 37	687 55	1,802 27	13,914 57

"PRINCE EDWARD."

Wages	523 95	525 34	521 25	487 75	511 86	145 00	147 50	142 50	143 00	167 34	477 41	431 25	4,276 18
Coal .....	.....	419 55	21 98	.....	94 65	.....	.....	.....	.....	.....	.....	190 58	726 79
Stores .....	.....	.....	330 04	.....	15 55	.....	.....	.....	.....	.....	.....	.....	330 04
Equipment .....	.....	287 66	.....	.....	310 72	.....	.....	.....	.....	.....	77 28	52 99	15 55
Water .....	.....	.....	311 14	.....	16 75	255 42	165 43	.....	.....	11 50	.....	787 41	798 65
Repairs .....	.....	150 00	1,085 09	525 00	500 00	.....	.....	.....	.....	.....	475 00	775 00	1,547 65
Towage .....	.....	.....	.....	.....	2 19	.....	.....	.....	.....	.....	.....	.....	5,116 00
Contingencies .....	.....	13 50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	15 69
Totals	673 95	2,852 05	2,269 41	1,012 75	1,451 75	400 42	312 93	142 50	145 00	178 84	1,029 72	2,287 23	12,756 55
Working expenses	673 95	2,852 05	1,958 27	1,012 75	1,435 00	.....	.....	.....	.....	.....	1,029 72	1,499 82	10,461 56
Repairs, ordinary .....	.....	.....	.....	.....	.....	145 00	147 50	142 50	145 00	.....	.....	.....	580 00
do extraordinary .....	.....	.....	311 14	.....	16 75	255 42	165 43	.....	.....	178 84	.....	787 41	1,714 99
Totals	673 95	2,852 05	2,269 41	1,012 75	1,451 75	400 42	312 93	142 50	145 00	178 84	1,029 72	2,287 23	12,756 55

"GEO. MCKENZIE."

Wages	481 50	491 25	481 25	421 02	450 78	459 73	496 09	251 32	163 41	555 37	482 90	442 75	5,276 37
Coal .....	.....	172 60	.....	109 29	.....	103 00	.....	.....	.....	.....	103 50	.....	498 39
Stores .....	.....	269 21	.....	.....	.....	.....	.....	.....	.....	.....	.....	89 40	349 61
Equipment .....	.....	.....	.....	5 71	.....	.....	.....	.....	.....	.....	.....	.....	5 71
Water	47 51	.....	.....	12 38	67 38	31 63	.....	.....	.....	.....	56 38	79 79	295 07
Repairs	29 70	171 21	.....	.....	.....	122 07	69 27	.....	339 94	457 12	.....	167 13	1,356 44
Towage	1,875 00	625 00	450 00	850 00	625 00	375 00	.....	.....	.....	.....	525 00	550 00	5,875 00
Wharfage .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	50 00	50 00
Contingencies	4 50	.....	.....	.....	37 45	27 40	.....	14 07	2 40	.....	.....	.....	85 83
Totals	2,441 21	1,723 27	931 25	1,461 40	1,210 61	1,118 83	565 36	265 39	505 75	1,012 40	1,167 78	1,379 07	13,782 41
Working expenses	2,441 21	1,552 06	931 25	1,461 40	1,210 61	996 76	.....	.....	165 81	.....	1,167 78	1,211 94	11,138 82
Repairs, extraordinary .....	.....	171 21	.....	.....	.....	122 07	565 36	265 39	339 94	1,012 49	.....	167 13	2,643 59
Totals	2,441 21	1,723 27	931 25	1,461 40	1,210 61	1,118 83	565 36	265 39	505 75	1,012 49	1,167 78	1,379 07	13,782 41

CLASSIFICATION of Disbursements of the following Dredges, &c.—Continued.

“CHALLENGE.”

Items.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	Grand Totals
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Wages.....	324 35	360 33	352 71	323 87	291 22	40 00	40 00	40 00	40 00	324 97	430 00	430 00	2,997 45
C. al.....	154 00	43 50	102 75	108 89	25 00	.....	.....	.....	.....	121 85	308 33	329 00	1,192 31
Wood.....	70 00	.....	111 00	33 00	.....	.....	.....	.....	.....	13 50	13 50	80 00	307 10
Provisions.....	123 13	124 65	116 55	130 60	39 40	.....	.....	.....	.....	123 74	108 07	110 00	866 19
Stores.....	10 75	4 10	.....	51 85	.....	.....	.....	.....	.....	.....	153 89	4 63	226 21
Equipment.....	365 30	67 51	5 00	19 05	4 38	.....	.....	.....	.....	102 33	237 21	15 00	815 83
Repairs.....	63 79	20 75	98 48	28 51	73 28	.....	.....	.....	.....	138 43	19 14	505 11	947 47
Contingencies.....	3 03	9 32	9 27	10 07	.....	.....	.....	.....	.....	65 20	14 45	5 56	116 86
Totals.....	1,114 46	629 16	795 74	696 81	433 28	40 00	40 00	40 00	40 00	876 57	1,284 59	1,479 30	7,469 94
Working expenses.....	1,050 67	603 41	697 28	668 33	350 00	40 00	40 00	40 00	40 00	738 14	1,265 45	974 19	6,632 47
Repairs, ordinary.....	63 79	20 75	98 46	28 51	16 90	.....	.....	.....	.....	.....	.....	475 73	704 14
do extraordinary.....	.....	.....	.....	.....	56 38	.....	.....	.....	.....	138 43	19 14	29 38	243 33
Totals.....	1,114 46	629 16	795 74	696 81	433 28	40 00	40 00	40 00	40 00	876 57	1,284 59	1,479 30	7,469 94

“NIPISSING.”

Wages.....	361 37	431 59	409 62	400 13	419 26	38 75	38 75	36 25	38 75	2,225 00	309 51	524 00	3,235 98
Coal.....	77 05	.....	.....	.....	.....	.....	.....	.....	.....	.....	531 82	23 00	631 87
Wood.....	.....	318 95	165 50	135 00	260 13	.....	.....	.....	.....	.....	16 50	67 75	933 83
Provisions.....	3 45	62 00	3 72	17 40	1 38	.....	.....	.....	.....	.....	64 84	110 50	175 34
Stores.....	.....	.....	17 64	.....	.....	.....	.....	.....	.....	151 75	63 23	5 83	310 76
Equipment.....	5 50	13 20	4 10	2 40	5 84	20 00	.....	.....	.....	67 20	109 53	343 05	537 42
Repairs.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	248 66	273 31	292 86	1,240 85
Contingencies.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2 10	28 71
Totals.....	450 37	825 74	604 38	577 74	686 61	58 75	58 75	36 25	413 73	692 61	1,370 74	1,359 09	7,114 76
Working expenses.....	444 87	812 54	600 28	575 34	630 77	38 75	38 75	36 25	38 75	443 95	1,087 43	1,066 23	5,873 91
Repairs, ordinary.....	5 50	13 20	4 10	2 40	5 84	20 00	.....	.....	.....	72 68	253 31	292 86	719 85
do extraordinary.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	176 00	20 00	.....	521 00
Totals.....	450 37	825 74	604 38	577 74	686 61	58 75	58 75	36 25	413 73	692 61	1,370 74	1,359 09	7,114 76

"QUEEN."

Wages.....	491 74	517 39	228 98	37 50	38 75	38 75	219 50	358 88	798 31	1,153 54	508 42	4,956 03
Coal.....	240 50	664 27	.....	.....	.....	.....	.....	.....	.....	.....	142 90	383 70
Wood.....	.....	90 00	.....	.....	.....	.....	.....	.....	.....	.....	.....	80 00
Provisions.....	.....	65 27	.....	.....	.....	.....	.....	.....	.....	.....	102 04	102 04
Stores.....	.....	28 70	.....	.....	.....	.....	.....	.....	.....	.....	6 65	191 41
Equipment.....	3 00	21 31	.....	.....	.....	.....	.....	.....	.....	.....	87 36	285 06
Repairs.....	28 05	10 45	.....	.....	.....	.....	.....	.....	.....	.....	309 76	5,737 96
Towage.....	.....	.....	150 00	.....	.....	.....	.....	.....	.....	.....	.....	150 00
Contingencies.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3 50	3 50
Totals.....	763 59	729 99	378 98	37 50	38 75	38 75	2,262 74	559 10	1,039 94	3,538 10	1,160 63	11,899 70
Working expenses... Repairs, ordinary... do extraordinary, including new hull.....	735 54 28 05	719 51 10 45	378 98	37 50	38 75	38 75	219 50 12 00	358 88 102 13	917 34	1,298 69 76 70	859 87 161 59	6,161 74 433 77
Totals.....	763 59	729 99	378 98	37 50	38 75	38 75	2,262 74	559 10	1,039 94	3,538 10	1,160 63	11,899 70

"ST. LOUIS."

Wages.....	.....	.....	.....	5 00	5 00	5 00	5 00	5 00	5 00	178 32	145 00	353 32
Provisions.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	47 75	44 00	91 75
Stores.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	34 34
Repairs.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	71 32	93 50	221 68
Contingencies.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	16 65	.....	16 65
Totals.....	.....	.....	.....	5 00	5 00	5 00	5 00	5 00	96 20	314 04	282 50	717 74
Working expenses... Repairs, ordinary... .....	.....	.....	.....	5 00	5 00	5 00	5 00	5 00	39 34 56 86	242 72 71 32	189 00 93 50	496 06 221 68
Totals.....	.....	.....	.....	5 00	5 00	5 00	5 00	5 00	96 20	314 04	282 50	717 74

CLASSIFICATION AND QUANTITIES OF MATERIALS REMOVED BY THE FOLLOWING DREDGES, DURING THE YEAR ENDED 30th JUNE, 1884.

"ST. LAWRENCE."

DESCRIPTION OF MATERIAL DREDGED.	July.	August.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	Grand Totals.
Clay.....	.....	7,875	2,275	.....	4,200	175	.....	.....	.....	1,050	4,200	1,750	Cubic yds. 11,375
Sand, ordinary.....	.....	.....	.....	1,400	.....	.....	.....	.....	.....	.....	.....	1,837½	11,650
do very fine.....	.....	.....	.....	.....	1,750	.....	.....	.....	.....	1,050	4,200	1,750	1,837½
Mud and old timber.	9,187½	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	17,937½
Totals.....	9,187½	7,875	2,275	1,400	5,950	175	.....	.....	.....	2,100	8,400	5,337½	42,700

"CANADA."

Gravel.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,350
Sand, ordinary.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6,390
Mud.....	4,860	5,580	5,130	4,860	1,800	.....	.....	.....	.....	.....	650	.....	22,860
Totals.....	4,860	5,580	5,130	4,860	1,800	.....	.....	.....	.....	.....	650	7,740	30,690

"NEW DOMINION."

Clay.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Clay and stone.....	.....	2,350	1,300	2,000	200	.....	.....	.....	.....	.....	.....	.....	3,500
Sand, ordinary.....	.....	.....	262	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,612
do and sawdust.	.....	.....	213	.....	.....	.....	.....	.....	.....	.....	.....	.....	213
Mud.....	2,850	.....	.....	.....	.....	.....	.....	.....	.....	.....	205	10,805	10,810
Totals.....	2,850	2,350	1,775	2,000	200	.....	.....	.....	.....	.....	205	10,605	19,985

"CAPE BRETON."

Boulders.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gravel.....	1,960	292	800	850	500	.....	.....	.....	.....	.....	1,425	6,451	2,150
Clay.....	.....	1,518	2,615	5,260	3,400	.....	.....	.....	.....	.....	.....	.....	10,128
Sand, ordinary.....	7,030	4,615	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,081	12,793
Mud.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4,468	13,726
Totals.....	8,990	6,425	3,415	6,110	3,900	.....	.....	.....	.....	.....	1,425	13,000	43,285

DREDGE STATEMENT, showing Material removed at different Localities; Total Annual Expenditure on each Dredge, and Average Cost per cubic yard.

"CHALLENGE."

Localities.	Hard Pan.	Clay and Stone.	Sand, Ordinary.	Sand, Fine.	Clay.	Gravel.	Boulders.	Mud.	Totals.
Kincardine	3,300	.....	.....	.....	.....	500	3,800
Bryfield	1,750	.....	.....	.....	.....	.....	1,750
Goderich	1,525	350	.....	6,525	.....	.....	8,400
Kingsville	820	10,695	.....	900	.....	150	.....	12,965
.....	820	17,270	350	900	6,525	150	500	26,515

Total annual expenditure..... \$7,469.91 Cost per cubic yard..... 28 $\frac{2}{3}$ cents.

"NIPISSING."

Hawkesbury .....	.....	.....	974	.....	280	.....	.....	.....	2,542
Calumet .....	.....	1,283	.....	140	4,068	.....	.....	.....	4,208
Rigaud .....	.....	.....	2,288	.....	14,497	200	.....	.....	16,985
Vaudreuil .....	.....	.....	.....	.....	5,943	.....	.....	.....	5,943
L'Original .....	.....	1,288	3,262	140	3,350	300	.....	.....	3,350
.....	.....	1,288	.....	.....	28,138	300	.....	.....	33,028

Total annual expenditure..... \$7,114.76 Cost per cubic yard..... 21 $\frac{1}{2}$ cents.

"QUEEN."

Laprairie	1,525	.....	300	.....	5,059	2,462	.....	.....	9,346
.....	1,525	.....	300	.....	5,059	2,462	.....	.....	9,346

Total annual expenditure, inclusive of cost of new hull... \$11,989.70 Cost per cubic yard..... \$1.27 $\frac{1}{2}$

"ST. LOUIS."

River St. Louis	1,410								1,700													3,110
	1,410								1,700													3,110

Total annual expenditure..... \$717.24 Cost per cubic yard..... 23 ¹/₃ cents.

EXPENDITURE for Dredging in Prince Edward Island for the Twelve Years ended 30th June, 1884.

County.	Locality.	Total for the Eleven Years ended 30th June, 1883.		For the Year 1883-84.		Total Quantity.	Total Cost.	Cost for each County.
		Quantity.	Cost.	Quantity.	Cost.			
		C. yds.	\$ cts.	C. yds.	\$ cts.			
King's.....	Grand River.....	46,110	8,963 97			46,110	8,963 97	
	Montague River.....	106,140	17,119 43			106,140	17,119 43	
	Murray Harbour, South.....	44,430	7,378 33			44,430	7,378 33	33,481 73
	Charlottetown Railway Wharf	41,303	10,264 56			41,303	10,264 56	
	do Ferry.....	300	43 48	3,745	627 13	4,045	670 61	
Queen's.....	Crepaud.....	75,970	19,151 46			75,970	19,151 46	
	Pownal.....	41,970	9,137 62			44,400	9,604 55	
	Rocky Point.....	50,880	7,868 92	2,430	408 93	53,310	8,277 85	
	Vernon River.....	17,860	6,326 72	4,560	6,792 24	22,420	13,118 96	
	Wood Islands.....	2,780	548 00			2,780	548 00	
	Nine Mile Creek.....	31,650	6,288 46			31,650	6,288 46	
	Hickey's Wharf.....	750	150 51			750	150 51	
	Carr's Point.....	12,165	2,441 28			12,165	2,441 28	
	Pinette.....	3,825	756 24			3,825	756 24	
	Fort Augustus.....	3,195	631 68			3,195	631 68	
	Southport Ferry.....			33,015	5,528 75	33,015	5,528 75	77,021 98
		479,328	97,128 66	79,750	13,355 05	559,078	110,483 71	110,483 71

EXPENDITURE for Dredging in Quebec for the Twelve Years ended 30th June, 1884, from Appropriations for Maritime Provinces.

Magdalen Islands, Gaspé Co.	House Harbour.....	6,800	2,392 92			6,800	2,392 92	
	Amherst Harbour.....	495	242 06			495	242 06	2,634 97
Témiscouata Co.	Rivière du Loup.....	2,587½	825 47			2,587½	825 47	825 47
		9,862½	3,460 44			9,862½	3,460 44	3,460 44

EXPENDITURE for Dredging in Nova Scotia, for the Twelve Years ended 30th June, 1884.

County.	Locality.	Total for Eleven Years ended 30th June, 1883.		For the Year 1883-4.		Total Quantity.	Total Cost.	Cost for each County.
		Quantity.	Cost.	Quantity.	Cost.			
		C. yds.	\$ cts.	C. yds.	\$ cts.			
Antigonish.....	Antigonish.....	22,025	3,649 15	22,025	3,649 15	22,025	3,649 15	.....
	Harbor au Bouché.....	10,568	2,498 48	10,568	2,498 48	10,568	2,498 48	.....
	Tracadie.....	2,580	6,822 89	2,580	6,822 89	2,580	6,822 89	.....
Annapolis.....	Annapolis.....	.....	.....	2,825	1,635 68	2,825	1,635 68	1,635 68
Cape Breton.....	Lingan.....	22,267	9,275 56	.....	.....	22,267	9,275 56	.....
	Sydney.....	54,600	17,781 54	.....	.....	54,600	17,781 54	.....
	Little Glace Bay.....	25,200	8,788 92	2,012½	696 02	27,212½	9,484 94	.....
	Port Caledonia.....	17,412½	8,242 21	14,425	4,856 92	17,412½	8,242 21	.....
	Benacadie Pond.....	.....	.....	.....	.....	14,425	4,856 92	49,621 17
Colchester.....	Tatamagouche.....	43,500	10,864 31	.....	.....	43,500	10,864 31	10,864 31
Cumberland.....	Parrsboro'.....	37,135	10,304 68	5,460	2,500 00	42,595	12,804 68	.....
	Wallace.....	50,885	9,908 28	.....	.....	50,885	9,908 28	22,712 96
Digby.....	Digby.....	6,235	1,379 64	6,350	3,676 65	12,585	5,056 29	5,056 29
Guyssboro'.....	Guyssboro'.....	5,400	1,413 53	.....	.....	5,400	1,413 53	.....
	Larry's River.....	26,230	6,546 70	.....	.....	26,230	6,546 70	.....
	Port Mulgrave.....	2,160	783 00	.....	.....	2,160	782 00	.....
	Sherbrooke.....	1,260	496 49	.....	.....	1,260	496 49	9,238 72
Halifax.....	Chezetcook.....	3,920	2,593 71	.....	.....	3,920	2,593 71	.....
	Halifax Ferry.....	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	792	182 53	2,989	985 59	.....
	Richmond Wharf.....	.....	.....	.....	.....	.....	.....	182 53
	Roche's Wharf.....	1,750	620 28	.....	.....	1,750	620 28	.....
	Halifax Railway Terminus.....	16,650	5,578 94	2,640	608 44	19,290	6,187 38	.....
	Jeddore.....	.....	.....	21,515	4,958 56	21,515	4,958 56	20,606 48
Inverness.....	Obetcamp.....	54,135	11,731 08	.....	.....	54,135	11,731 08	.....

EXPENDITURE for Dredging in Nova Scotia, for the Twelve Years ended 30th June, 1884—Concluded.

County.	Locality.	Total for Eleven Years ended 30th June, 1883.		For the Year 1883-4.		Total Quantity.	Total Cost. \$ cts.	Cost for each County.
		Quantity. C. yds.	Cost. \$ cts.	Quantity. C. yds.	Cost. \$ cts.			
Inverness	Mabou	17,952	10,367 48	23,155	7,294 33	41,107	17,661 81	29,392 89
Lunenburg	Lunenburg	29,070	10,849 66	37,660	8,679 51	66,730	19,529 17	5,958 65
	Mahone Bay	21,844	5,958 65			21,844	5,958 65	30,563 35
	Vogler's Cove	11,610	5,075 53			11,610	5,075 53	
Pictou	Acadia Coal Co.'s Wharf	10,240	3,560 26			10,240	3,560 26	
	Albion Mines	9,475	2,181 25			9,475	2,181 25	
	East River	88,870	19,559 53	15,925	5,507 69	104,795	25,067 22	
	Halifax Coal Co.'s Wharf	1,650	359 90			1,650	359 90	
	Pictou Public Wharf	31,920	7,433 56			31,920	7,433 56	
	do Railway do	29,889	9,264 29			29,889	9,264 29	
	do Landing	2,970	1,368 91	4,375	1,513 09	7,345	2,880 01	
	Vale Colliery Wharf	1,595	682 16			1,595	682 15	
	River John, Shipyard and Bar	81,132	19,591 55			81,132	19,394 55	
	Middle River	6,400	1,853 71	7,000	2,420 95	13,400	4,274 66	
	New Glasgow	26,310	5,705 09			26,310	5,705 09	80,802 94
Queen's	Liverpool	12,940	4,762 38			12,940	4,762 38	4,762 38
Richmond	D'Esouse and Cape la Ronde	7,000	2,535 20			7,000	2,535 20	
	St. Peter's Canal	72,616	22,161 76	6,275	2,112 80	78,891	24,277 56	
	St. Peters			7,150	2,407 41	7,150	2,407 41	
	(Grand Goulet	23,584	5,570 49			23,584	5,570 49	
	River Bourgeois	18,920	4,463 87			18,920	4,463 87	39,263 53
Shelburne	Lockport	20,825	6,331 85			20,825	6,334 85	6,334 85
Yarmouth	Yarmouth	42,517	13,687 25			42,517	13,687 25	13,687 25
Hants	Windsor	5,450	1,627 60			5,450	1,627 60	1,627 60
		999,765½	288,938 71	157,559½	49,060 68	1,157,328	837,989 29	337,989 29

EXPENDITURE for Dredging in New Brunswick, for the Twelve Years ended 30th June, 1884.

County.	Locality.	Total for Eleven Years ended 30th June, 1883.				For the Year 1883-84.				Total Quantities	Total Cost.	Cost for each County.
		Quantity.		Cost.		Quantity.		Cost.				
		C. yds.	\$ cts.	\$ cts.	C. yds.	C. yds.	\$ cts.	\$ cts.	\$ cts.			
Gloucester.....	Bathurst.....	72,607½	20,629 52	20,629 52	72,607½	.....	.....	.....	.....	72,607½	20,629 52	20,629 52
Kent.....	Richibcto.....	47,735	14,299 54	.....	.....	.....	.....	.....	.....	47,735	14,299 54	.....
	Cocagne.....	14,580	4,831 02	.....	.....	.....	.....	.....	.....	14,580	4,831 02	.....
	Buctouche.....	13,005	4,934 24	.....	.....	.....	.....	.....	.....	13,005	4,934 24	.....
	do Priest's Point.....	3,510	1,110 70	.....	.....	.....	.....	.....	.....	3,510	1,110 70	.....
	do Chapel Point.....	4,140	1,310 07	.....	.....	.....	.....	.....	.....	4,140	1,310 07	.....
	do Robertson's Wharf.....	45	14 23	26,499 80	.....	.....	.....	.....	.....	45	14 23	26,499 80
Northumberland.....	Horse Shoe Shoal.....	153,767½	42,294 23	42,294 23	6,650	2,299 90	.....	.....	.....	160,417½	44,594 13	.....
	Outer Bar.....	.....	.....	.....	6,737½	2,330 17	4,630 07	.....	.....	6,737½	2,330 17	46,924 30
Queen's.....	Grand Lake.....	34,160	6,375 44	.....	.....	.....	.....	.....	.....	34,160	6,375 44	.....
	do McMann's Cove.....	20,440	4,522 82	.....	.....	.....	.....	.....	.....	20,440	4,522 82	.....
	Jemseg.....	45,720	10,256 88	.....	.....	.....	.....	.....	.....	45,720	10,256 88	.....
	Washademoak.....	48,975	6,340 83	27,495 97	.....	.....	.....	.....	.....	48,975	6,340 83	27,495 97
St. John.....	L. C. Railway Terminus.....	139,810	37,130 01	.....	.....	.....	.....	.....	.....	139,810	37,130 01	.....
	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 & Murrays.....	9,310	1,360 93	45,619 51	.....	.....	.....	.....	.....	9,310	1,360 93	45,619 51
Sunbury.....	Oromocto.....	107,003	22,671 12	22,671 12	.....	.....	.....	.....	.....	107,003	22,671 12	22,671 12
Westmorland.....	Pointe du Chêne.....	10,890	3,217 70	3,217 70	22,860	6,214 30	6,214 30	.....	.....	33,750	9,432 00	9,432 00
York.....	Fredericton.....	39,395	7,699 15	7,699 15	.....	.....	.....	.....	.....	39,395	7,699 15	7,699 15
	do St. Mary's.....	.....	.....	.....	10,810	6,259 01	6,259 01	.....	.....	10,810	6,259 01	13,958 16
*Dredge "New Dominion," 1880-81.....	.....	.....	777 84	777 84	.....	.....	.....	.....	.....	.....	777 84	777 84
	.....	801,318	196,904 84	196,904 84	47,057½	17,103 38	17,103 38	.....	.....	848,375½	214,008 22	214,008 22

*Dredge not in commission, 1880-81; the above expenses for caretaking and repairs.

DETAILS of Dredging in the Maritime Provinces

DREDGE.	LOCALITY.	COUNTY.	NEW BRUNSWICK.		
			Quantity.	Cost.	Total Cost.
			C. yds.	\$ cts.	\$ cts.
" New Dominion "	Digby.....	Digby			
	Annapolis.....	Annapolis			
	St. Mary's.....	York.....	10,810	6,259 01	6,259 01
" Canada "	Pointe du Chêne.....	Westmoreland	22,860	6,214 30	6,214 30
	Mabou.....	Inverness.....			
" Cape Breton "	Mabou.....	do			
	St. Peter's Canal.....	Richmond.....			
	St. Peters.....	do			
	Benacadie Pond.....	Cape Breton.....			
" Prince Edward "	Rocky Point.....	Queen's			
	Southport.....	do			
	Pownal.....	do			
	Charlottetown.....	do			
" St. Lawrence "	Little Glace Bay.....	Cape Breton			
	East River.....	Pictou.....			
	Horseshoe.....	Northumberland	6,650	2,299 90	
	Outer Bar.....	do	6,737½	2,330 17	4,630 07
	Pictou Landing.....	Pictou.....			
	Middle River.....	do			
" Geo. McKenzie "	Halifax Railway Terminus.....	Halifax			
	Richmond Wharf.....	do			
	Jeddore	do			
	Lunenburg.....	Lunenburg.....			
" Parrsboro " (by hand).....	Partridge Island River	Cumberland			
			47,057½		17,103 38

DREDGE.	NEW BRUNSWICK.		NOVA SCOTIA.	
	Quantity.	Cost.	Quantity.	Cost.
	C. yds.	\$ cts.	C. yds.	\$ cts.
" New Dominion "	10,810	6,259 01	9,175	5,312 33
" Canada "	22,860	6,214 30	7,740	2,104 06
" Cape Breton "			43,265	14,567 40
" Prince Edward "				
" St. Lawrence "	13,387½	4,630 07	29,312½	10,137 75
" Geo. McKenzie "			62,607	14,429 04
	47,057½	17,103 38	152,099½	46,550 58

for the Year ended 30th June, 1884.

NOVA SCOTIA.			PRINCE EDWARD ISLAND.			Quantity by each Dredge.	Total Expenditure.
Quantity.	Cost.	Total Cost.	Quantity.	Cost.	Total Cost.		
C. yds.	\$ cts.	\$ cts.	C. yds.	\$ cts.	\$ cts.	C. yds.	\$ cts.
6,350	3,676 65						
2,825	1,633 68	5,312 33					
						19,985	11,571 34
7,740	2,104 06	2,104 06				30,600	8,318 36
15,415	5,190 27						
6,275	2,112 80						
7,150	2,407 41						
14,425	4,856 92	14,567 40				43,265	14,567 40
			40,560	6,792 24			
			33,015	5,528 75			
			2,430	406 93			
			3,745	627 13	13,355 05	79,750	13,355 05
2,012½	696 02						
15,925	5,507 69						
4,375	1,513 09						
7,000	2,420 95	10,137 75				42,700	14,767 82
2,640	608 44						
792	182 53						
21,515	4,958 56						
37,660	8,679 51	14,429 04				62,607	14,429 04
5,460	2,500 00	2,500 00				5,640	2,500 00
157,559½		49,050 58	797 50		13,355 05	284,367	79,509 01

PRINCE EDWARD ISLAND.		Total Quantity.	Expenditure Dredging.	Super-intendence.	Total Expenditure.	Cost. per Cubic yard.
Quantity.	Cost.					
C. yds.	\$ cts.	C. yds.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
		19,985	11,052 78	518 56	11,571 34	0·57900
		30,600	7,945 58	372 78	8,318 36	0·27184
		43,265	13,914 57	652 80	14,567 40	0·33870
79,750	13,355 05	79,750	12,756 55	598 50	13,355 05	0·16746
		42,700	14,106 01	661 81	14,767 82	0·34585
		62,607	13,782 41	646 63	14,429 04	0·23047
79,750	13,355 05	278,907	73,557 90	3,451 11	77,009 01	0·27407

STATEMENT of Dredging in the Maritime Provinces, showing Quantities removed by and Expenditure of each Dredge for the Twelve Years ended 30th June, 1884.

DREDGE.	TOTAL QUANTITIES AND COST FOR THE ELEVEN YEARS, FROM 1872-73 TO 1882-83.				1883-84.				TOTAL FOR TWELVE YEARS ENDED 30TH JUNE, 1884.			
	Total Quantity.	Total cost. \$ cts.	Per cubic yard. \$ cts.	C. yds.	Quantity. C. yds.	Cost. \$ cts.	Per cubic yard. \$ cts.	Quantity. C. yds.	Cost. \$ cts.	Per cubic yard. \$ cts.		
" New Dominion "	421,173	83,999 36	0-19944	19,985	11,571 34	0 57900	441,158	95,570 70	0-2166			
" Canada "	340,289	114,026 19	0-33608	50,600	8,318 36	0-27184	370,889	122,344 55	0-3298			
" Cape Breton "	408,963	98,991 23	0-24205	43,263	14,567 40	0-33670	452,228	113,558 63	0-2511			
" Prince Edward "	490,163	98,879 59	0-20173	79,750	13,355 05	0-16746	569,913	112,234 64	0-1969			
" St. Lawrence "	365,829	121,020 96	0-30574	42,700	14,767 83	0-34385	436,529	135,788 78	0-3096			
" Geo. McKeuzie "	191,300	57,580 09	0-30099	62,607	14,425 01	0-23047	253,907	72,009 13	0-2836			
Totals.....	2,247,717	574,497 42	0-25650	278,907	77,009 01	0-27407	2,526,624	651,506 43	0 2578			

STATEMENT of Dredging, showing Quantities removed in each Province, and cost of such Dredging for the Twelve Years ended 30th June, 1884.

FISCAL YEAR.	NEW BRUNSWICK.		NOVA SCOTIA.		QUEBEC.		PRINCE EDWARD ISLAND.		Total Quantity.	Total Expenditure.	Cost per cubic yard.
	Quantity.	Cost.	Quantity.	Cost.	Quantity.	Cost.	Quantity.	Cost.			
	C. yds.	\$ cts.	C. yds.	\$ cts.	C. yds.	\$ cts.	C. yds.	\$ cts.	C. yds.	\$	cts.
1872-73	38,060	13,240 50	23,280	8,422 70	.....	.....	.....	.....	61,320	21,663 20	0-3532
1873-74	57,725	14,395 57	18,600	6,545 61	6,800	2,391 92	.....	.....	83,125	23,334 10	0-2807
1874-75	76,223	17,325 05	24,416	13,238 83	.....	.....	.....	.....	121,294	40,456 77	0-3335
1875-76	79,935	17,040 52	91,974	21,885 90	.....	.....	.....	.....	230,192	49,818 22	0-2164
1876-77	97,690	25,161 90	127,785	34,846 74	.....	.....	.....	.....	299,935	70,766 91	0-2359
1877-78	81,070	23,323 92	106,857	29,607 91	.....	.....	.....	.....	270,787	64,943 04	0-2398
1878-79	132,555	27,400 22	116,307	28,267 59	.....	.....	.....	.....	295,352	64,831 88	0-2195
1879-80	63,540	16,581 79	127,684	34,765 84	.....	.....	.....	.....	228,379	64,396 69	0-2819
1880-81	41,315	12,385 85	87,117½	23,061 61	.....	.....	.....	.....	180,085	46,439 46	0-2623
1881-82	79,640	18,626 87	89,566½	33,363 71	.....	.....	.....	.....	216,531½	61,347 15	0-2833
1882-83	48,565	13,422 70	143,616½	42,995 93	.....	.....	.....	.....	260,716½	67,500 00	0-2589
1883-84	47,057½	17,103 38	157,559½	49,050 58	.....	.....	.....	.....	284,367	79,609 01	0-2796
Totals.....	849,379½	214,008 27	1,114,743	326,051 01	9,882½	3,460 44	559,083	110,483 71	2,532,084	654,006 43	0-2582

APPENDIX No. 7.

REPORT

ON THE

LEVELLING

BETWEEN

LAKE CHAMPLAIN and

TIDEWATER in the ST. LAWRENCE.

BY

H. F. PERLEY, CHIEF ENGINEER,

AND

R. STECKEL, ASSIST. ENGINEER.

 APPENDIX No. 7.

 REPORT ON THE GEODETIC LEVELLING, FROM LAKE CHAMPLAIN TO
 TIDE WATER IN THE ESTUARY OF THE ST. LAWRENCE.

(Ref. No. 53,265.)

OTTAWA, 7th November, 1884.

SIR,—Herewith I transmit a report by Mr. R. Steckel, C.E., on the levelling operations between Lake Champlain and tide-water in the St. Lawrence, carried on by him up to 30th June, 1884.

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

HENRY F. PERLEY,
Chief Engineer.

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

DEPARTMENT OF PUBLIC WORKS,
 OTTAWA, 26th June, 1884.

SIR,—I have the honor to submit the following progress report for the fiscal year, 1883-84, relative to the levelling operations between Lake Champlain and tide-water in the St. Lawrence estuary, which you placed under my charge about the middle of July last (1883). Owing to unavoidable delays, experienced in procuring the proper instruments, etc., as fully explained hereunder, the operations could only be commenced on the 3rd September; and on account of the inclemency of the weather and the necessity of my returning to Ottawa to attend to more pressing Departmental duties, the field work had to be closed for the season, on the 31st October following.

Besides the correct determination of the surface declivity of the Richelieu River and the establishment of reliable permanent bench marks along this international highway of navigation, for convenient reference and use, in the discussion of projected improvements to provide more water power for manufacturing purposes and a greater depth for the accommodation of vessels, etc., especially in regard to interference with the natural drainage of the fertile low-lying lands along both shores of the stream, another important object of this work, as you are aware, is the completion of a circuit of levellings many hundreds of miles in length, from the waters of the Atlantic Ocean in the Hudson River back to the same waters in the St. Lawrence estuary. This circuit is to be formed in conjunction with the spirit levelling that has already been satisfactorily completed, and other operations about to be carried out, under the supervision of the United States Coast and Geodetic Survey authorities; the engineers in charge of the canals of the State of New York, etc., between tide-water, in the Hudson River, and the lower or northern extremity of Lake Champlain, near the boundary line between Canada and the United States.

Furthermore, I understand, it is the intention that the levels under consideration should be taken with a view to their use in connection with the series of tidal observations and gaugings that have been made and duly recorded in years passed at

various points along the St. Lawrence, supplemented with any additional measurements that may be required for the construction of longitudinal profiles of the characteristic fluvial tide waves, exhibiting in a striking manner, for navigation and scientific purposes, the complex tidal phenomena of the St. Lawrence estuary together with the correct elevation and declivity of the water surface, for high and low stages of the river proper above Lake St. Peter.

In these conditions it became evident at the outset, that in order to perform the proposed work with a fair prospect of success, great precision as well as unflinching means of promptly detecting and correcting gross mistakes were indispensable, such in fact as were not to be secured by following the methods ordinarily resorted to for ascertaining differences in elevation with the common spirit levelling instruments, however well these might be adapted to the every day wants of the engineering profession.

Upon full consideration of the subject, I determined, therefore, to avail myself of the signal advantages offered in these respects by the more refined method of measuring heights, with the Vienna or "Stampfer" pivot level, which has been adopted on the United States Coast and Geodetic Survey, where both the levelling instrument and the rods used with it have been brought to a high degree of perfection, within the last few years, by Mr. Hilgard, the present distinguished Superintendent, as may be seen by referring to the valuable appendices annexed to the interesting official reports issued every year by that institution, notably those for 1877-79 and 1880.

With your sanction I communicated, in the early part of August last, with M. M. Fauth & Co., of Washington, D.C., the justly reputed instrument makers for the C. & G. S., with the object of procuring a precision pivot level, with all the latest additions in the accessory parts, and a set of metrical rods of the most approved pattern, together with the requisite number of foot plates, pias, &c.

The firm just named intimated to me that, on account of the great pressure of other business, they were unable to have the level and rods, etc., ready for delivery, and guarantee satisfaction, in less than six weeks; and that, possibly, a little more time might have to be given them, in case of any unforeseen contingencies arising in the stipulated interval. From this answer it was clear that, if the order was given in full, as originally intended, no field operations could be commenced before the 3rd week in September, and perhaps not even then, in which case the very best part of the season available for such work would be lost.

After examining more closely into the matter, with a view of advancing the date of completion of the instruments required, I came to the conclusion that the elaborate metrical rod and accessories, described in Appendix No. 15, C. & G. S. Report for 1879, the proper construction of which involves considerable labor and time, might advantageously be dispensed with, as its use might lead to vexatious errors and delays when placed in the hands of an unexperienced and unattentive rodman having little or no interest in his work, such as have often to be employed in this country.

I therefore ventured to devise a substitute that would answer our purpose equally well, and could be got ready in Canada during the time required by the Washington makers for the satisfactory completion of the level only, which time M. M. Fauth & Co., in a second communication, had set down at three weeks instead of six.

A full description of the perfected pivot levelling instrument, improved rods, plates, etc., used, and of the methods that were followed in observing and recording the levellings, etc., and computing the correct relative elevations of the turning points, inclusive of specimen sheets of the level book, rodman's book and computation sheets, together with abstracts of results containing description of bench-marks, etc., will be furnished in a second report on this work. This report I will submit to you, with the illustrations required to render it intelligible, after all the operations contemplated along the Richlieu River, from Lake Champlain to Sorel shall have been brought to a satisfactory close, in the ensuing fall, and the corresponding computations and abstracts of results completed.

The total number of miles levelled in 1883 is 35·5869, which are made up as follows, viz. : 1st Section, No. 1. Main continuous line, St. John's, P.Q., to Rouses Point, State of New York, 27·2476 miles, check lines included ; 2nd, cross sections from this line eastward to the River Richelieu, 4·1377 miles ; 3rd. From St. John's, over the railway bridge on the Richelieu, to Iberville or St. Athanase, thence northward on the east side of the river, 3·6235 miles ; 4th. cross sections to the river along this last stretch, 0·5781 mile.

In order to prevent, in a measure, the gradual accumulation of error, supposed to arise from working constantly in the same direction, alternate sections of 25 miles in length, more or less, will be levelled in opposite directions. On Section No. 1, between St. John's and Rouses Point, the probable error per mile is found to be 0·0053 ft., and that for the whole distance of about 25 miles, 0·0265 ft. These rates of error fall within the limits accepted by the American and European authorities for precision levelling, notwithstanding that the field work was occasionally proceeded with during high winds, and that the personnel had no experience in the operations to be performed.

From the mouth of the Richelieu it is proposed to continue the levellings eastward along the south shore of the River St. Lawrence, to a point on its estuary where, as opposite Quebec, for instance, or still better, below the Island of Orleans, the tide waves are comparatively little affected by the volume of fresh water carried by the river, and the position of the mean sea level can be deduced with some degrees of certainty, from available records of tidal observations and corresponding gaugings of the fresh water supply.

Above Sorel, the levels and water measurements should be continued westward, with a view of establishing the limit beyond which the fluctuations of the water level are absolutely independent of tidal influences. The city of Three Rivers is generally represented as being situated at the head of tidal water, but this is not strictly the case, for it has been observed that fluctuations of one foot or so obtain regularly every year in the elevation of Lake St. Peter and the St. Lawrence near Sorel, during the intervals from spring to neap tides, or *vice versa*.

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

R. STECKEL.

H. F. PERLEY, Esq.
Chief Engineer, Department Public Works.

APPENDIX No. 8.

—

STATEMENT

OF THE

DREDGING PLANT

OF THE

DOMINON.

APPENDIX No. 8.

Ref. No. 54,127.

STATEMENT showing the Number of Dredges, Dredge Tugs, Scaws, and Stone-Lifters, belonging to the Department, with Number of Crew, average Wages per month for the Year 1883, cost of Construction, &c.

Province where used.	Name of Vessel.	Description of Vessel.	Number of Crews.	Average Wages per Month.	Cost of Construction.	Remarks.
				\$ cts.	\$ cts.	
Nova Scotia and New Brunswick	St. Lawrence	Steam hopper dredge	15	495 97	116,389 48	This is an iron hull elevator dredge, built in Glasgow in 1874-76.
do	Canada	do	11	370 85	42,778 44	This is an iron hull elevator dredge, built in Glasgow in 1871-73.
do	New Dominion	Dipper dredge and 8 scaws	11	238 76	30,826 51	A wooden hull spoon dredge, built in 1871-72.
do	Cape Breton	do	13	287 66	19,744 33	do do purchased in 1879.
do	George McKenzie	do	11	271 47	15,000 00	do do
Prince Edward Island	Prince Edward	do	11	322 21	23,582 07	Transferred from Local Government, P.E.I., at Confederation, on payment of \$22,000.
Quebec	Queen of Canada	do	8	223 49	15,000 00	A wooden hull spoon dredge.
do	Scaws	2 scaws	.....	198 02	.....	Wooden hull spoon dredge, purchased prior to Confederation.
do	Nipissing	Dipper dredge and 2 scaws	8	260 60	15,501 57	These scaws being flat decked require from 8 to 12 additional men.
do	Dennis	Steam tug	3	142 28	2,000 00	Wooden built dipper dredge
do	Bailarge	Stone-lifter and scaw	9	300 00	1,600 00	Purchased July 1880.
do	St. Louis	Dipper dredge	8	145 00	6,635 83	Wooden built at same time as "Nipissing." Built in 1881-82 for working in swift currents. Consists of two flat-bottomed barges 42 ft. by 8 ft. by 3 ft., pointed at both ends, and placed 7 feet apart, joined at top by a timber platform, 23 ft. by 26 ft., Catamaran style, carrying a frame 14 ft. high, and provided with hoisting machinery.
Ontario	Challenge	do and 2 scaws	6	219 03	31,211 32	Wooden hull spoon dredge, built at Lockport, N.Y. 1883.
do	Frudeal	Steam tug	3	117 73	6,847 06	Re-built 1873-74. Purchased in 1876.

do	Ontario	Dipper dredge and 2 dump scows	7	270 00	20,950 00	Wooden hull spoon dredge, built at Lockport, N. Y., 1884. Built at Lockport, N. Y., 1884.
do	Sir John	Steam tug	3	125 00	12,000 00	
Manitoba	Winnipeg	Dipper dredge and 2 dump scows	6	320 00	26,011 49	Wooden hull spoon dredge, built at Lockport, N. Y., 1883-84.
do	Sir Hector	Steam tug	4	215 00	15,775 00	Built at Lockport, N. Y., 1883-84.
British Columbia	Dredger	Elevator dredge and 6 scows.	10	566 54	60,000 00	Built by Local Government 1865. and trans- ferred to Dominion at Confederation.
do	Georgie	Steam tug .....	.....	.....	6,250 00	Purchased in 1875.

APPENDIX No. 9.

QUEBEC HARBOUR IMPROVEMENTS.

REPORTS ON THE PRINCESS LOUISE EMBANKMENT AND DOCK
WORKS, RIVER ST. CHARLES; AND ON THE
GRAVING DOCK, LEVIS,

BY

THE [QUEBEC HARBOUR COMMISSIONERS.

 APPENDIX No. 9.

 QUEBEC HARBOUR IMPROVEMENTS—RIVER St. CHARLES; AND
 GRAVING DOCK AT LEVIS.

 HARBOUR COMMISSIONERS' OFFICE,
 QUEBEC, 20th October, 1884.

Ref. No. 52,705.

SIR,—In compliance with your request, conveyed in your letter of the 14th May last, I have the honor to transmit to you herewith the Chief Engineer's Report, both on the Harbour and the Graving Dock Works for the fiscal year ended 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 Department Public Works.

OTTAWA, 17th October, 1884.

SIR,—I have the honor to submit the following with reference to the progress of the Harbour Works up to the 30th June last.

LOUISE BASIN.

The dredging for a foundation of the cross-wall, which will eventually separate the wet and tidal basins, has been proceeded with, the total quantity of material (sand) removed, being 130,000 cubic yards, which has been utilized in filling the embankment. The contractors have provided a second powerful dredge, which commenced work at the latter end of June. The construction of the crib-work which will form a portion of the cross-wall below low-water mark, is progressing in a satisfactory manner.

GRAVING DOCK, LEVIS.

The leaks in the cofferdam and under the wing-walls at the entrance, which have hitherto delayed the prosecution of this work so seriously, are now so far under control, that I do not anticipate any further trouble. Special arrangements having been made with the contractors, they have assumed all further risk, and will push the work to a speedy completion, and at the close of the fiscal year had made good progress on the main portion of the dock, sparing no expense to overcome the many difficulties they have to contend against.

Arrangements have been made for the erection of the caisson, the parts of which have been on the ground for some time.

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

HENRY F. PERLEY,
Chief Engineer, Harbour Works, Quebec.

A. H. VERRET, Esq.,
 Secretary-Treasurer, Harbour Commission,
 Quebec.

APPENDIX No. 10.

REPORT ON DEEPENING THE CHANNEL

BETWEEN

MONTREAL AND QUEBEC,

BY

THE MONTREAL HARBOUR COMMISSIONERS.

APPENDIX No. 10.

REPORT OF THE MONTREAL HARBOUR COMMISSIONERS ON THE
DEEPENING OF THE CHANNEL BETWEEN
MONTREAL AND QUEBEC.

Ref. No. 53,842.

HARBOUR COMMISSIONERS OF MONTREAL,
SECRETARY'S OFFICE,
MONTREAL, 20th November, 1884.

SIR,—Herewith I beg to send you the report of the Chief Engineer on the new channel dredging operations for the fiscal year ended 30th June.

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

H. D. WHITNEY,
Secretary.

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

HARBOUR COMMISSIONERS OF MONTREAL,
CHIEF ENGINEER'S OFFICE,
MONTREAL, 20th November, 1884.

DEAR 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, 1884:

On the 14th of June, 1883, the Harbour Commissioners were authorized by Government to deepen the ship channel $2\frac{1}{2}$ feet, so as to obtain $27\frac{1}{2}$ feet depth at low water, instead of 25 feet, as it then was. Dredging was commenced under this authorization on the 18th of June, and by the 1st of July, the beginning of the fiscal year, the new work was fairly under way, and except for the necessary interruption during winter, it has been vigorously carried on to the present time.

The following are the details of the works accomplished up to the 30th June last:—

CAP CHARLES.

Dredging was commenced on the 7th July, 1883, and after a projecting point on the north side of the channel was cut away, a new cut, to the depth of 26 feet at low water was begun at the lower edge of the shoal, on the north half breadth of the channel. Dredging was continued with one dredge, assisted, when required, by a stone-lifter, until 3rd November, 1883, when the dredge and stone-lifter were removed.

Quantities raised, 15,120 cubic yards shale, and 139 cubic yards boulders. Total, 15,259 cubic yards.

POUILLIER RAYER.

Work was begun with one stone-lifter, 4th July, 1883, and continued until the 3rd November. One dredge also worked from 17th October until 3rd November, when both were removed.

On 21st May, 1884, one dredge and a stone-lifter were again set to work. Up to the end of the fiscal year the boulders were cleared from an area 150 feet wide and about 1,700 feet in length, on the north half of the channel. Dredging was done to a depth of 26 feet at low water over about 750 feet length of the north half of the channel.

Quantity dredged, 20,610 cubic yards stiff clay, with imbedded boulders. Raised by stone-lifter, 3,838 cubic yards large boulders. Total, 24,448 cubic yards.

CAP-À-LA-ROCHE.

Work was begun early in July, 1883, with two dredges and one stone-lifter, and carried on steadily till the first week in November, when the plant was removed to less exposed localities.

On 21st May, 1884, one dredge was again put to work. A second dredge followed on the 25th June. A stone-lifter was in attendance, as before.

Up to the 30th June, 1884, an area on the north half of the channel 150 feet wide and 4,300 feet long, and on the south side an area 100 feet wide and 350 feet long, was deepened to 23½ feet at low water, the quantities raised being 41,010 cubic yards shale rock and 44 cubic yards boulders. Total, 41,054 cubic yards.

CHAMPLAIN POINT.

On examination of the dredged channel through the small shoal at Champlain Point, it was found that the sand had again filled in at two points, to a depth of 1 to 2½ feet. A dredge was set to work to clear it out in August, commencing on the 6th and finishing on the 28th, when the channel was restored to its former depth. Quantity dredged, 5,940 cubic yards coarse sand.

LAKE ST. PETER.

Nothing was done in the lake until the 15th May, 1884, when one dredge was set to work upwards from the head of the Nicolet Traverse, and still continued at work at the close of the fiscal year. Quantity raised, 82,500 cubic yards of blue clay.

CONTRECEUR.

Two dredges were at work on 1st July, 1883, enlarging the Bell mouth, in order to ease the curvature to 1¼ miles radius instead of ½ mile radius, as before. The enlargement was completed to 25 feet depth, tested and buoyed out for the use of navigation on the 21st September, 1883.

The two dredges continued the regular deepening to 27½ feet at low water, until the 25th October, and one continued until 1st December. Quantity dredged, 249,360 cubic yards stiff blue clay.

PLUM ISLAND.

One dredge began work on the 26th October, 1883, and finished the work on the 13th November. The narrow shoal which extended across the channel was cut through to 27½ feet depth at low water. Quantity dredged, 5,460 cubic yards stiff clay and boulders.

POINTE MARIE.

A dredge was put to work on the 14th November, 1883, and continued until removed to winter quarters on 1st December, deepening the channel to 27½ feet at low water. Quantity dredged, 6,810 cubic yards stiff clay and boulders.

POINTE AUX TREMBLES.

On the 9th November, 1883, one of the rock-working dredges was placed to take out the small piece of black limestone opposite the village. This was accomplished, and the dredge continued working in ordinary dredging until sent to winter quarters on 1st December. Quantity dredged, 1,455 cubic yards clay and rock.

MONTREAL.

Three rock-working dredges, brought up from Cap Charles and Cap-à-la-Roche to escape the stormy fall weather, were put to work on the main channel through the harbour early in November, 1883, and continued until sent to winter quarters on 1st December. These, with the addition of four spoon-dredges, during the greater part of the summer, were employed in deepening the channel to 27½ feet at low water. A stone-lifter was also employed during November. Quantities raised, 113,531 cubic yards stiff clay and boulders and 163 cubic yards large boulders. Total 113,694 cubic yards.

The aggregate quantity of dredging done at all points during the Government fiscal year ended 30th June, 1884, is 545,931 cubic yards.

The floating plant employed in the work, in 1883, consisted of two elevator dredges for working in earth, one having buckets of 16 cubic feet capacity, and the other having buckets of 4 feet capacity; four elevator dredges for working in rock, one of these having strong toothed buckets of 16 feet capacity, and the other two similar buckets of 4 feet capacity; four spoon-dredges part of the time; two stone-lifters; seven screw tugs; four barges, used as coal tenders and smiths' shops; eighteen hopper-bottomed scows and three flat scows.

During the winter of 1883-84, important alterations were made in three of the ship channel dredges. The dredging machinery proper of one of the elevator dredges, with the small buckets, for working in earth, was much altered; the bucket frame being lengthened and strengthened, for working to the increased depth of the channel; the main gearing and tumblers were changed; one steam breasting winch was replaced by a larger one, and the dredge was furnished with buckets of 1 cubic yard capacity, instead of the former set of 4 feet capacity. This dredge, as improved, was not in use until after 30th June, 1884. Two of the dredges for working in rock were also much altered, almost the whole of the machinery, except engines and boilers, being made new and of increased strength, and the dredges finished with very strong, solid cast-steel buckets, armed with teeth, and of a new pattern. The alterations to the machinery were completed in the spring, and the dredges began work, as usual, in May; but the new buckets not having been received, were not put on until after 30th June, 1884. Some of the tugs, scows and barges also received extensive repairs during winter.

Yours respectfully,

JOHN KENNEDY,
Chief Engineer.

APPENDIX No. 11.

REPORT

ON THE

Saguenay District Slide and Booms,

FOR THE FISCAL YEAR ENDED 30TH JUNE, 1884,

BY

HENRY F. PERLEY, CHIEF ENGINEER

AND

JOSEPH ROSA, SUPERINTENDENT.

APPENDIX No. 11.

SLIDE, BOOMS, &c.—SAGUENAY DISTRICT.

CHIEF ENGINEER'S OFFICE,
OTTAWA, 15th November, 1884.

Ref. No. 53,632.

SIR,—Herewith I transmit a report by Mr. Joseph Rosa, Assistant Engineer, relating to the Saguenay Slide for the fiscal year ended 30th June last.

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

HENRY F. PERLEY,
Chief Engineer.

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

QUEBEC, 5th October, 1884.

SIR,—I have the honor to submit to you my report on the Saguenay Slide for the year 1883-84.

During the fiscal year ended 30th June last, 1,000 feet of slide have been reconstructed. Temporary repairs have been made to Dam No. 6, which should be rebuilt. Repairs have also been made to other dams, to the main boom (La Grande Estacade) and to the Superintendent's house.

Thirty-four thousand logs, from fourteen to thirty feet in length, passed through the slide during the fiscal year.

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

JOSEPH ROSA,
Superintendent.

H. F. PERLEY, Esq.,
Chief Engineer, Department Public Works.

APPENDIX No 12.

REPORT

ON THE

ST. MAURICE DISTRICT SLIDES AND BOOMS,

FOR THE FISCAL YEAR ENDED 30TH JUNE, 1884.

BY

HENRY F. PERLEY, Chief Engineer

AND

CHARLES LAJOIE, Superintendent.

APPENDIX No. 12.

SLIDES AND BOOMS—ST. MAURICE DISTRICT.

CHIEF ENGINEER'S OFFICE,

OTTAWA, 17th October, 1884.

Ref. No. 52,625

SIR,—Herewith I transmit a report by Mr. C. Lajoie, Superintendent of the St. Maurice, on the works under his charge, for the fiscal year ended 30th June last.

I have the honor to be, Sir,

Your obedient servant,

HENRY F. PERLEY,

Chief Engineer.

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

(Translation)

THREE RIVERS, 3rd July, 1884.

SIR,—I beg to forward, for the information of the Hon. Minister of Public Works, a report on the works under my superintendence for the year ended 30th June last.

The waters of the St. Maurice were not very high this spring, and the floating of timber seems to go on satisfactorily. The quantity of logs to enter the booms this year will not exceed 200,000.

At Grand Mere, a section of 200 feet of slide was broken by the ice, and I had to get it removed at once.

Wages have been so high that it has been impossible for me, with the amount voted to meet the outlay for maintenance, even with the greatest economy in expenditure. The sum voted was \$14,000.00, and the outlay is \$14,824.55, or \$824.55 more than the amount voted, and a reduction of \$436.37 on the previous year.

The amount voted at the same Session for repairs, was \$5,500, out of which there has been expended \$2,833.10, leaving a balance unexpended of \$2,666.90, which would be sufficient to defray the outlay for repairing all the damages caused by the ice, and for some other slight repairs required.

The repairs effected at the several stations may be briefly described as follows:—

CAP AUX CORNELLLES.

Rebuilt a shed.
Repaired the store-house.
Four toise of stone put in piers.

SHAWENEGAN.

Covered 1,210 feet of boom with 3-inch deals.
Repaired the flood gate and pier of slide.

Repaired the great dam of the chute throughout its whole length.

Repaired pier at foot of slide.

Put eight yards of stone in the other part of the pier. Built a house 30 x 25.

The old storehouse which served as a dwelling for the man, being no longer suited to the purpose, has been left to serve as a shed. There is still some work to be done to finish the house.

Repaired 300 feet of cribwork at Grand Remon.

Repaired upper parts of piers Nos. 1, 2, 3, 4, 6, 8, and 12.

Repaired platforms of piers Nos. 4, 8 and 12.

Faced the angles of piers Nos. 1, 2, 3, 4, 5, 6, 7, 8, 10, 11 and 12.

Slight repairs to house pier.

GRANDE MÈRE.

Renewed 300 feet of boom.

Replaced a few pieces of single boom.

LES PILES.

Repaired the old booms from LaTuque.

Repaired a scow.

Built barge for this new station.

Respectfully submitting the foregoing,

I have the honor to be, Sir,

Your obedient servant,

CHARLES LAJOIE,
Superintendent.

H. F. PEBLEY, Esq.,

Chief Engineer, Department Public Works,

APPENDIX No. 13.

REPORT

ON THE

Ottawa District Slides and Booms,

FOR THE FISCAL YEAR ENDED 30TH JUNE, 1884.

BY

HENRY F. PERLEY, Chief Engineer

AND

Geo. P. BROPHY, Superintending Engineer.

APPENDIX No. 13.

SLIDES AND BOOMS—OTTAWA DISTRICT.

CHIEF ENGINEER'S OFFICE,

OTTAWA, 17th October, 1884.

Ref. No. 52,624.

SIR,—Herewith, I transmit the Annual Report, by Mr. George P. Brophy, Superintending Engineer, on the works under his charge on the Ottawa River and tributaries, for the fiscal year ending 30th June, last.

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

HENRY F. PERLEY,
Chief Engineer.

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

OTTAWA, 15th July, 1884.

SIR,—I have the honor to submit to the Department, the following report on the state of the works under my charge, on the Ottawa River and tributaries, for the fiscal year ended 30th June last:—

Towards the end of the season of navigation of 1883, the water in the Ottawa, which in the spring and summer months had been at a very favorable pitch for the passage of timber and saw logs, fell, although not to the same low stages that it had reached within the last five or six years; and such of the foundations of the slides, dams and piers as showed symptoms of decay, or were worn by the season's drives, were strengthened and repaired. The work of dredging certain sand-bars in the Ottawa River, near Portage du Fort, was prosecuted during the autumn, while in the winter of 1883-84 and last spring, repairs were executed at stations on the main stream as follows:—

Sault au Recollet.—Booms and piers.

Ottawa or South Chaudière.—Slides, booms, bulkheads and aprons.

Union Suspension Bridge.—Suspension wires, roadway and toll-house.

Hull Slide.—Bulkheads, piers and booms.

Hull Bridge.—Planking and railing of approach.

Chats Slide.—Bottom sills, side piers, aprons and station house.

Head of Chats Rapids.—Snubbing piers topped where damaged by ice.

Cheneaux Boom.—Support piers, anchor piers and floating platform.

Portage du Fort Slide.—Side and bottom plank and guide-booms.

Mountain Slide.—Side piers, planking and booms.

Calumet Slides.—Apron, booms and bottom planking.

Rocher Capitaine Slide.—Side piers and bottom and removal of boulders.

On the following tributaries of the Ottawa, the work of overhauling and repairing consisted of:—

On the South Nation.—Excavation of rock from the "pitch off," above the entrance to the slide at the village of Plantagenet, and strengthening support piers and guide-booms.

Gatineau.—Strengthening and repairing the main boom and floating platforms, and clearing away *debris* from creek and outlets.

Madawaska.—The booms and piers at the mouth extended and improved, and at Table Rock, Nettleton's Chute and Barrett's Chute, below High Falls, the side-dams were strengthened and repaired, and stanchied where necessary.

Coulouge.—The long slide was patched, braced and made serviceable for this season's work, but the repairs were only of a temporary nature in view of a thorough renewal of the superstructure to be carried out before the opening of the navigation in 1885.

Black River.—The slide and guide-booms were repaired, and the side of the slide, near the lower end, strengthened by the insertion of blocks of hardwood, with the ends taking the friction of the passing timber.

Petewawa.—The slides at the first, second and third chutes, and the dam at Half-Mile Rapid on the lower reach, were repaired in their timbers and planking; while the slide at McDonald's Rapids was thoroughly overhauled and had its planking renewed.

Dumoine.—The single stick slide at High Falls, which is the longest constructed by your Department in the Ottawa valley, was underpinned and strengthened in its foundations, and had the bottom and side planking made good where the saw-logs had worn or partially displaced the same.

The work of reconstruction covered the renewal of the Crooked Chute slide and a portion of the Lake dam, on the Petewawa River; the renewal of the Palmer Island dam, on the Madawaska, about ten miles from the mouth, and the thorough renewal, change of grade and increase of the capacity of the slide at High Falls—an independent station about 35 miles from the mouth of the Madawaska.

At this last mentioned place, where the large drives of square timber and saw-logs from the well stocked upper limits have to pass, a supply of water better under the control of the slide master and his assistants throughout the running season, had long been a desideratum. To bring about this desired improvement, the width at the entrance of the new slide was increased to 18 feet—6 feet having been the width of the old one, and the grade of the slide bottom, at a distance of 700 feet from the head-works, was lowered 12 feet, involving the excavation of about 1,700 cubic yards of the hardest granite or unstratified rock, that has ever been encountered on these works; and the supply of water is now further regulated by an additional bulkhead and stop logs, together with a waste-weir, 12 feet wide, placed at a distance of 250 feet from the entrance. These changes have had the effect of maintaining a sufficient depth of water above the "pitch off," and a clear run for logs where, in former years, jams took place, and the bottom planking, although 6 inches thick and of hardwood, required constant renewal, on account of the abrasion of the half-floated logs.

The works chargeable to construction, consist of (1st) a glance pier 270 feet long by 12 feet wide by $8\frac{1}{2}$ feet high, with the timbers of white pine, stone filled at Sutherland's Shoal on the Madawaska River, about twelve miles from the mouth of the stream. At this point great inconvenience was experienced by the lumbermen through their logs and timber being left from high water and stranded, and which necessitated on the arrival of the "tail" of the drive, the rolling of logs, &c., for very considerable distances; (2nd) a snubbing pier at the head of Paquet's Rapids, in the Ottawa River, about ninety miles above this city. This pier, which is, 35 by 35 feet at the base, tapers to 9 by 9 feet on the top, and is 28 feet high; the timber, which is laid up as crib-work, is stone filled and the pier has appliances for mooring purposes. The running of timber at this rapid, which is situated at the outlet of Allumette Lake, an expansion of the southerly branch of the Ottawa River has, from the earliest history of the lumber trade, been attended with danger to life and property, during stormy or foggy weather. The improvement now described, will enable the raftsmen to have their timber towed to this snubbing pier, where they can tie up in a safe position and pass their cribs or bands, at their convenience through the rapids below.

All of these repairs, renewals and new structures were completed in due time; and the works were ready for the spring's business. The depth of snow in the Ottawa

County last winter, made it apparent that there would be high water during early spring in the tributaries; and such was the case, and although logs &c., on the remote streams and creeks were well started and under way with fair prospects of reaching the main stream. I regret to say that on some of the rivers, such as the Coulonge, the freshets ran off without maintaining a sufficient depth of water to pass the tail of the drives, consequently quantities of logs and timber were abandoned for the season; but this was before they had reached the Government works.

The great bulk of the timber and logs passed the upper improvements on the tributaries without difficulty and reached the Ottawa River in due time, and I am glad to say that the works under my charge received no further damage than that incidental to ordinary tear and wear. On the 10th day of June last, some cribs of cedar poles, rafted to a depth of too many tiers, plunged into the bottom and cross sill of Mountain Slide on the Ottawa River, and ripped off the covering plank for a distance of about 100 feet. The water was immediately shut from the slide, as far as this could be accomplished, by putting stop-logs in the bulkhead, but as there was backwater from the foot of the slide, to a depth of about 6 feet, in addition to a considerable leakage through the side piers, it was found to be impossible to execute the necessary repairs until a lower pitch of water obtains in the Ottawa, later in the season. Some delay was experienced by parties passing timber, which was unavoidable under the circumstances; but every thing was done by the slide staff, to assist them in their operations, as far as the flow of water in the slide could be controlled.

By dint of constant watchfulness and the adoption of measures of a precautionary nature, to steady and brace the lofty superstructure of the long slide at High Falls, on the Coulonge River, it was possible to pass all the timber and logs that reached its entrance this season. Authority having been given to proceed with the re-construction of the superstructure of this slide and to thoroughly overhaul and strengthen its foundations, no time will be lost in carrying out these much required improvements.

At the Carillon main dam, which was built across the Ottawa by the Department of Railways and Canals as a means of feeding the new canal, a break occurred last year and as extensive coffer dams, and other works had to be placed in the river in order to successfully close the gap and repair the dam, a strong cross current was thrown in the direction of the slide entrance, rendering it impossible for cribs to pass there this season; therefore the timber and logs in bands, had to be locked down through the canal. However, as soon as these temporary works are removed and an extension has been made by that Department to the line of safety booms and piers above the entrance, it is fair to assume that the expeditious running of timber through the slide, will be attended with neither danger nor difficulty.

In the expansion of the Ottawa River, known as the Chats Lake, at the mouth of the Madawaska, it was found necessary—on account of the extensive operations of Messrs. McLacklin Bros., at the booming grounds in connection with their new saw mills—to make some alterations by way of extending the rafting area and changing some of the Government booms and piers. Under the new system, greater facilities are afforded to the lumbermen for their rafting operations; and the logs are not so likely to be shot under the booms as formerly, when the swift current of the Madawaska, at its confluence with the Ottawa, was crossed by the upper section of the retaining boom.

The following statements show the quantities of the various descriptions of timber that passed through the Government Works on the Ottawa River and its tributaries, together with the revenue accrued, during the fiscal year:—

Square and Flatted Timber.	Saw Logs.	Revenue Accrued.
217,548 pieces.....	2,943,804 pieces.....	\$ cts. 94,806 99

Analysis of the foregoing Square and Flatted Timber.

	No. of Pieces.		No. of Pieces.
White pine.....	169,952	Basswood.....	32
Red pine.....	9,477	Butterwood.....	30
Dimension.....	10,055	Birch.....	18
Cedars.....	8,013	Hemlock.....	1
Traverses.....	1,923	Oak.....	8
Piles.....	1,213	Whitewood.....	3
Ash.....	457	Red pine spars.....	32
Elm.....	41	*129,818 railway ties.....	16,227
Tamarac.....	66		

Total pieces.....	217,548
“ cribs shingle wood.....	113
“ sawn lumber.....	3

* Eight railway ties are charged as equal to one piece of flat timber.

In submitting the above,

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

GEO. P. BROPHY,
Superintending Engineer, Ottawa River Works.

APPENDIX No. 14.

—
REPORT

ON THE

NEWCASTLE DISTRICT SLIDES AND BOOMS,

FOR THE FISCAL YEAR ENDED 30TH JUNE, 1884.

BY

HENRY F. PERLEY, Chief Engineer

AND

R. B. ROGERS, Acting Superintending Engineer.

 APPENDIX No. 14.

 SLIDES AND BOOMS—NEWCASTLE DISTRICT.

Ref. No. 52,718.

 CHIEF ENGINEER'S OFFICE,
 OTTAWA, 17th November, 1884.

Sir,—Herewith I transmit the Annual Report of Mr. Richard B. Rogers, Acting Superintending Engineer, on the works under his charge in the Newcastle District, for the fiscal year ended 30th June last.

I have the honour to be, Sir,
 Your obedient servant,
 HENRY F. PERLEY,
Chief Engineer.

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

 ENGINEER'S OFFICE,
 PETERBORO, 17th October, 1884.

SIR,—I have the honor to submit the Annual Report on the works temporarily under my charge, for the fiscal year ended June 30th, 1884.

The water on the several stretches was maintained at a height of about six inches above the average till the close of the season.

The water commenced to rise rather earlier in the fall than usual, and continued to rise till about the first week in December. It attained the greatest height about the first of May, when it was slightly above the average spring height.

During the latter part of August and the months of September and October, the water falls very rapidly, and the want of such, is severely felt by the owners of crafts, and mill owners. Especially is this the case, if any of the saw log drives coming down happen to be at all late in the season, when the surplus water has passed off, then they require a portion of the water that has been retained for the benefit of navigation and mill owners. It would obviate this difficulty if all "drives" were required to be down by a certain date, before the water had fallen to its ordinary height, and if the control of the store reservoirs and feeders that regulate these waters were assumed by the Government, and put under the control of one person. If this were done there need be no scarcity of water, even in the driest of seasons. From the great depth of snow last winter, it was anticipated a great flood would follow, but the water passed off very gradually, and did nothing more than the usual amount of damage to the works under the control of this Department. The nature and dimensions of the several works in this district have been fully described in former reports. I shall describe the nature and extent of the repairs executed at the different stations in this district.

 FENELON FALLS.

The dam at this station retains the water of Cameron's Lake at a navigable height. The dam is private property, as well as the guide booms and piers above the

dam, which are in a very dilapidated condition. I would not recommend replacing or repairing these piers and booms, as it may be found, upon the completion of the Government works now under construction at this point, that the position of the piers and booms will have to be re-arranged. The slide, which is the property of this Department, was, last year, re-planked with maple. It required no further repairs, except the wall on the south side, which acts as a retaining wall for Smith's mill, and which is in a very decayed state. The line of booms below the dam has been allowed to drift out of position, and several of the anchors have become detached. New anchors are now being attached, and the boom put in order, in view of the opening of the new locks at this station next year. This line of boom divides the log channel from the steamboat channel.

BOBCAYGEON.

There are two channels at this station, the south, "Little Bob" being used for the logs, and the north, "Big Bob," for navigation. There are two slides, one at the ends of each of these channels, which received no repairs. During the latter part of June, two drives of logs passed down "Big Bob" channel, contrary to regulations, and used and wasted so much water, that it was found impossible to get the water up again to its proper height. This will be prevented in future by a line of booms and piers being placed across the mouth of "Big Bob" channel.

BUCKHORN.

The works at this station, under the control of this Department, consist of a slide, boom and piers. The new Government works at this station, consisting of a lock and canal, are about completed, and it will be necessary to change the position of some of the piers and booms, in consequence of these new works. The slide, which was of unnecessary width, is being reduced to effect a saving of water while "drives" are passing through.

BURLEIGH.

The works at this station originally consisted of a slide, dam, boom and piers, but they having received no repairs for years, have become in a very dilapidated condition. The Department of Railways and Canals is building new works at the station. It will be necessary to alter the position of these piers and booms on their completion.

YOUNG'S POINT.

The Government have assumed control of the dam at this station, as well as the dam at Lakefield, and new dams are under construction at both these points. A difficulty has always existed between this point, and Lakefield, between the lumbermen and steamboat owners, on account of the drives of logs blocking the whole channel of the river and lake, and stopping navigation. This trouble will be obviated in future, by the complete booming off of the two channels, the east channel being for logs, and the west for navigation. The construction of this line of booming is at present going on. Thirteen hundred feet of boom (single stick) were placed in Katchewanoe Lake last fall, and attached to two piers that were in position before. The position of this boom was not satisfactory, and it was cut by some person, and allowed to drift to shore. The position of this will be altered in the new line at present being constructed.

LITTLE LAKE.

This lake, which is situated at the south end of the town of Peterboro, is one mile in width and breadth. There is a three stick retaining boom at this point, which received some repairs. This lake, a few years ago, had an average depth of thirty (30) feet, but owing to the immense deposits of sawdust and mill refuse, it

has become so shallow that an ordinary log will not float in many places at the ordinary height of water. If this nuisance is not stopped at once, this lake will cease to serve the purpose it serves at present, viz., a receptacle for logs.

CROW BAY.

The retaining boom was repaired and partly rebuilt.

HEELY'S FALLS.

The works, here consist of a slide, boom and piers. Anticipating a high freshet, part of the appropriation for Crow Bay and Percy Boom was taken to build a new pier and a new two stick boom to replace the old one, which was in a very delapidated condition. Part of the planking on the dam was taken off during the spring, and requires replacing. The walls of the slide are in a decayed state, and require renewing.

MIDDLE FALLS.

A new glance boom was built, and the pier about rebuilt from the water. The basin wall of the slide was repaired, and the leaks in the slide were stopped.

CHISHOLM'S RAPIDS.

The dam was gravelled, and broken blanks replaced by new ones.

PERCY BOOM.

This boom which acts as a retaining boom for logs, was partly renewed and partly repaired. A new pier was also placed in position, but being too small, was turned over by the ice during the spring.

Below is a statement showing the number of pieces of timber that passed through the slides, for the year ending 30th June last.

I have the honor to be, Sir,

Your obedient servant,

RICHARD B. ROGERS,

Acting Superintending Engineer.

H. F. PERLEY, Esq.,
Chief Engineer, Department Public Works.

STATEMENT showing the number of pieces of Timber, &c., which passed over the different slides on the River Trent and Newcastle District Works, during the fiscal year ended 30th June, 1884.

Station.	Saw Logs.	Boom Timber.	Square Timber.	Cedar.	Total.
Fenelon Falls	143,542	840	3,009	.....	147,391
Bobcaygeon	93,412	790	3,009	.....	97,241
Buckhorn	95,942	1,050	3,057	.....	100,049
Burleigh	95,942	1,050	3,057	.....	100,049
Young's Point.....	190,942	1,800	3,057	8,000	203,799
Lakefield.....	180,942	1,600	48	8,000	190,590
Peterboro'.....	115,000	1,050	.....	8,000	124,050
Hastings	95,000	750	.....	8,000	103,750
Heely's Falls.....	101,239	1,410	49	55,872	158,370
Middle Falls.....	273,615	1,740	516	204,545	480,416
Chisholm's Rapids.....	273,615	1,740	516	204,545	480,416

APPENDIX No. 15.

STATEMENT OF STAFF EMPLOYED

ON THE

SLIDES AND BOOMS

THROUGHOUT THE DOMINION.

APPENDIX No. 15.

Ref. No. 54,141.

STATEMENT showing the Names, Dates of Appointment, Salaries, &c., of persons employed on the different Slides and Booms.

Name.	Position.	Where Employed.	Date of Appointment.	Salary.	Remarks.	
<i>* Saguenay District.</i>						
Arthur Boulanger	Superintendent	Saguenay	19th May, 1881	475 00 per annum...	Employed the whole year.	
Calixte Fortin	Asst-Superintendent	do	13th do 1881	30 00 per month...		
Fras. Trapanier.....	Carpenter	do .....	.....	1 50 per day ...	
<i>† St. Maurice District.</i>						
Charles Lajoie.....	Superintendent	Three Rivers	7th Oct, 1878	1,200 00 per annum...		
J. B. Normand.....	Boom Master.....	Mouth St. Maurice.	12th April, 1858	3 00 per day		
L. E. Gervais	Paymaster	Three Rivers.....	22nd Sept, 1881	50 00 per month...		
Cyrac Lymburner	Foreman	Mouth St. Maurice.	25th April, 1881	565 00 per annum...		
Jos. Paqé	Boom Keeper	Cap aux Corvelles	10th Dec, 1879	452 50 do		
Arthur Rouseau	Deputy Slide Master.	Shawanegan.....	12th April, 1858	3 00 per day		
Charles Langlois	Foreman	do	13th Jan., 1880	444 00 per annum...		
Edmond Duchesne.....	do	Grand Mère	7th July, 1880	394 00 do		
Theophile Larue.....	Boom Keeper	Grand Mère	18th Mar., 1872	2 00 per day		
H. Therien.....	do	Grand Piles .....	.....	.....
<i>Richelieu District.</i>						
Azaire Bienvenue.....	Boom Master.....	Belcail Station.....	1st June, 1882	100 00 per annum...		
<i>† Ottawa District.</i>						
G. P. Brophy.....	Superintendent	Ottawa.....	6th July, 1873	2,200 00 do		
D. Scott.....	Accountant	do	1st Oct., 1884	900 00 do		

Wm Kane	Messenger	do	1st Aug., 1867	1 25 per day	Employed about the works for 20 or 25 years.
Moses Aubrey	Foreman	do	do	2 00 do	Actively employed about 7 months. Oversees repairs in winter.
R. McPhaden	Deputy Slide Master.	Carillon	1st July, 1860	1 25 do	
D. Noonan	Boom Master	Gatineau	21st Mar., 1878	500 00 per annum	
W. J. Macdonald	Deputy Slide Master.	Chaudière	23rd April, 1876	635 00 do	Employed about 6 months.
J. McDonell	do	Hull	1st Mar., 1877	1 25 per day	
R. Chamberlin	do	Deschenes	13th April, 1871	1 00 do	Employed about 6 months during navigation. Looks after repairs in winter.
D. McFarlane	do	Chats	27th Mar., 1860	480 00 per annum	Employed during running season.
John Harvey	Slide Master	Arnprior	12th July, 1882	2 50 per day	
James Brown	Foreman	do	do	39 00 per month	
Alex. Thompson	Asst. Foreman	do	do	32 50 do	
Jos. McCrea	Boom Master	Springtown	15th May, 1880	200 00 per annum	Employed about 3 months during the season of navigation.
James Barry	Deputy Slide Master.	High Falls, Madawaska	29th Mar., 1854	480 00 do	Employed 4 or 5 months during the season of navigation. Looks after repairs in winter.
Duncan McLaren	do	Portage du Fort	7th Sept., 1881	200 00 do	Employed about 6 months.
J. G. Poupore	do	Black River	15th Oct., 1880	480 00 do	Employed about 4 months passing timber. Looks after repairs in winter.
James Rowan	do	Lower Petewawa.	18th April, 1858	480 00 do	do
Wm. Thompson	do	Mountain	1st Oct., 1879	1 00 per day	Actively employed about 6 months during the season of navigation. Looks after repairs in winter.
D. Carmichael	do	Calumet	— Aug., 1848	40 00 per month	Actively employed about 6 or 7 months during the season of navigation. Looks after repairs in winter.
A. Proudfoot	do	Coulonge	1st April, 1865	1 00 per day	Actively employed 4 months. Looks after repairs in winter.
Hugh Corley	do	Crooked Chute	1870	1 75 do	Employed 3 or 4 months each year.
A. McDougall	do	Joachims	6th Nov., 1871	300 00 per annum	Employed about 4 months passing timber. Looks after repairs in winter.
Jos. Dufrault	Boom Master	Dumoine	26th April, 1882	1 50 per day	Employed during timber season.
Hugh Grant	Deputy Slide Master.	do	12th do 1872	300 00 per annum	Employed during navigation, about 3 months. Will inspect works if required.
A. McSwan	do	Rocher Capitaine.	1st May, 1874	480 00 do	do
T. Boulienger	Boom Master	Sault au Recollet.	22nd April, 1879	1 00 per day	Employed about 7 months each year.
J. Soulière	Deputy Slide Master.	Chaudière	1868	1 80 do	Paid during the season of navigation only, about 7 months. Attends to winter repairs.
A. H. Johnson	Boom Master	Cheneaux	1865	2 00 do	do
<i>Newcastle District Works.</i>					
T. D. Belcher	Superintendent	Peterboro'	10th July, 1878	1,000 00 per annum	
G. H. Giroux	Clerk Supt.'s Office.	do	1st do 1882	500 00 do	
Robert Armstrong	Slide Master	Chisholm's Rapids	1st do 1883	200 00 do	

APPENDIX No. 15--Statement showing the Names, &c., of persons employed on the different Slides and Booms--Concluded.

Name.	Position.	Where Employed.	Date of Appointment.	Salary.	Remarks.
<i>Newcastle District Works</i> --Concluded.					
John Ingram	do	Fenelon Falls	1st do 1883	\$ 200 00	do
H. Deacon.....	do	Heely's Falls	1st do 1878	200 00	do
W. H. Hall.....	do	Buckhorn	1st May, 1879	200 00	do
Nelson Simmons.....	do	Middle Falls.....	1st July, 1884	200 00	do

* *Saguenay Works.* In addition to the Superintendent, there are employed on the Saguenay works 4 flagmen, at 70 cents per day each, during the passing of the logs over the slides, which lasts one or two months.
 † *St. Maurice Works.* Every year during the timber running season, the officers in charge of the various stations employ 25 to 30 men driving three or four months, at the rate of 80 cents to \$1.10 per working day, inclusive of 40 to 50 cents per day per man, paid for board to the Deputy Slide Masters and Boom-keepers; also, one clerk and foreman at \$1 per day, two watchmen and one gate-keeper.
 ‡ *Ottawa River Works.* In addition to the above officers, &c., there are employed during the running season, one foreman on slide at \$1.50 and one assistant foreman at \$1.25 per day; also, 25 to 30 labourers at from \$1 to \$1.40 per working day.

APPENDIX No. 16.

REPORT

ON

PUBLIC WORKS

IN

British Columbia,

FOR FISCAL YEAR ENDED 30TH JUNE, 1884.

BY

Hon. J. W. TRUTCH, C.M.G., Resident Agent.

 APPENDIX No. 16.

 REPORT ON PUBLIC WORKS IN BRITISH COLUMBIA.

Ref. No. 49,953.

VICTORIA, B.C., 21st July, 1884.

SIR,—I beg to submit, for your information, the following Report upon the Public Works in this Province, carried on under my supervision during the fiscal year ended the 30th June last, accompanied by a tabular statement thereof:—

DREDGING AND DREDGE VESSEL REPAIRS.

Dredging operations were resumed off Shoal Point, Victoria Harbour, on the 1st July, 1883, and were continued there until the 19th October following, when, for reasons fully reported to you in my letter dated 23rd October last, the dredger was moved into the inner harbour, and employed in dredging out a berth for ships in James' Bay, until the 15th June last, when the dredge and attendant vessels were laid up, for the purpose of being generally overhauled and repaired, preparatory to this year's work.

I enclose a tabular statement showing the amount of work done, and the cost per cubic yard of dredging and removing the material.

VICTORIA HARBOUR EXAMINATION.

A careful and detailed survey of the shore of this harbour has been made with exact soundings of the depth of water throughout the harbour, and a chart thereof constructed on a scale of 200 feet to the inch, a copy of which was forwarded to the Chief Engineer on the 1st March last. In connection with this survey, and particularly referring to the removal of Dredger Rock, I had the honour of addressing you fully in my letter of 30th January last.

NEW WESTMINSTER POST OFFICE BUILDING.

The main portion of this building was reported as having been completed on the 23rd May of last year, since which date the upper storey has been finished, and the necessary fittings and furniture provided for the offices of the several Departments to which they were allotted, and the building has since been in occupation of the Post Office, Savings Bank, Custom House and Telegraph Department.

NANAIMO POST OFFICE BUILDING.

Messrs. Smith & Clark completed their contract for the erection of this building on the 9th January last, and the final certificate for the work contracted for by them was forwarded to the Department on the 17th January last. In pursuance of your instructions by telegram of 23rd February last, from the Chief Architect, tenders were invited for the erection of area and retaining walls, and approaches to the building, and the contract for that work was awarded to Mr. G. H. Frost, of Nanaimo, by whom it has been completed satisfactorily. Pursuant to your further instructions by telegram of 28th May, from the Chief Architect, tenders were also

invited on the 10th June for the interior fittings, &c., of the building, and the tender of Mr. Frost being the lowest, the contract was given to him for this work, to be completed by the 20th July, 1884.

BRITISH COLUMBIA PENITENTIARY.

Certain necessary repairs have been made at the Penitentiary, and closets and fittings placed in the Warden's quarters and in the basement of the prison wing, in compliance with authority conveyed to me in a telegram dated 22nd November, 1883.

REPAIRS, FURNITURE, HEATING, &c., DOMINION PUBLIC BUILDINGS.

Various necessary repairs of the Public Buildings in this Province have been executed during the year, and certain furniture supplied where required, pursuant, in most cases, to special directions and authorization.

COTTONWOOD CANON, FRASER RIVER.

Tenders for the removal of certain rocks, impeding navigation, at Cottonwood Canon, were called for. The only tender received was that of Mr. T. F. Sinclair, who offered to remove the rocks at the rate of \$24.85 per cubic yard; and this price being about the rate at which I estimated the work should be undertaken, the contract was awarded to Mr. Sinclair, and the work has been completed to the satisfaction of Mr. W. A. Johnston, the officer appointed to superintend these operations. I have fully reported on this work in my letters dated 24th January and 5th February last.

COWICHAN RIVER.

The work of improving this river, directed by letter of 14th June, 1883, has been carried out under the immediate charge of Mr. W. C. Duncan, as foreman, acting upon instructions given to him by myself on the ground. A channel was made in two places, which the river, in its rise in November, adopted, with the beneficial result of straightening its course, and thus reducing the undermining and wastage of its banks, and the overflow of adjoining lands. Several heavy drift piles also have been cut out and burnt, by which means the facilities for driving timber down the river are materially improved, and the risk of the formation of timber dams greatly lessened.

COURTNEY RIVER.

The sum authorized by letter of 14th June, 1883, for expenditure on the improvement of this river, has been spent in the cutting out and removing drift timber and snags, which work was performed under the charge of Mr. N. H. Grieve, as foreman.

LILLOET RIVER.

The sum of \$500.00 has also been spent in cutting out and removing drift timber from this river, under your authority by letter No. 20441, of 8th September last; this work having been carried out by day's labour, under Mr. J. Towle, as foreman.

GENERAL REPAIRS AND IMPROVEMENTS OF HARBOURS AND RIVERS.

The expenditure of \$1,000.00 of the amount appropriated for this service, authorized by No. 9930, of 28th March last, to be made on the improvement of Nimpkish River, in removing snags, was entrusted to Mr. Thomas Earle, of the firm of Earle & Spencer, as reported by me in letter to you, dated 16th April last, and has been carried out under his superintendence. By letter from Mr. Earle, dated the 19th inst., the sum of \$999.63 was reported to have been expended on this work, under the superintendence of their firm, and receipted vouchers for this expenditure, certified by them, were transmitted, and have been paid by cheque in their favour.

SNAG BOAT.

In accordance with your authorization, by telegram of 17th October last, from the Chief Engineer, tenders were invited for the construction of a snag boat, upon plan and specification prepared in this office, and contracts entered into with Mr. W. B. Bolton for the hull of the vessel, and with the Albion Iron Works for the boiler and engines, both of which contracts have been completed in a satisfactory manner. On completion of the vessel, her outfit, consisting of rope, blocks and galley stove and furnishings, crockery, bedding, &c., &c., were purchased, and a crew shipped, under authority of telegrams from the Department of 16th and 21st April last, and the vessel proceeded, on the 27th April, to the Courtney River, where she was employed in removing snags until the 8th May, when she was taken to Frazer River, and was employed there in similar service until the 16th June, upon which date she was, by your direction, placed at the disposal of the Marine and Fisheries Department, for the purpose of replacing the buoys in the channel at the mouth of the Frazer River. A full report on this vessel was made to you by my letter of 1st May last.

TÉLEGRAPH MAINTENANCE.

Mr. Superintendent Wilson's Annual Report on this service is transmitted by me to-day, with covering letter to Mr. Gisborne, which renders any special comment from me in this report unnecessary.

ESQUIMALT GRAVING DOCK.

This work has been specially reported upon by me in various letters of the several dates detailed in the accompanying statement.

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

JOSEPH W. TRUTCH,
Dominion General Agent.

The Honorable

Sir HECTOR L. LANGEVIN, C.B., K.C.M.G.,
Minister of Public Works,

BRITISH COLUMBIA.—PUBLIC WORKS OF CANADA.

STATEMENT of Public Works carried on in the Province of British Columbia, during the Fiscal Year 1883-84.

Name of Work.	District or County.	Number and Date of Letters authorizing Expenditure.	Expenditure Authorized.	Expenditure or liability incurred from 1st July, 1883, to 30th June, 1884.	Letters and Telegrams from the Dominion Government Agent to the Honorable the Minister of Public Works.
			\$ cts.	\$ cts.	
1. Dredging Victoria Harbour		7,113, 14th June, 1883.....	15,000 00	12,738 96	Letters 21st Oct., 1883. Telegram 13th June, 1884.
1a. Dredge vessel repairs.....		do do	3,600 00	3,598 32	
1b. New dredging plant		do do	1,500 00	3,644 00	
do do		Tel., April 16, 1884 (2)	2,100 00	2,788 42	Letter March 2nd, 1884.
2. Victoria Harbour examination		Letter 7,113, 14th June, '83	3,000 00	4,500 00	Letters 26th June. Telegrams June 13th and 26th, July 14th, Aug. 27th, Oct. 15t., Dec. 5th and 21st, 1883.
3. New Westminster Post Office, etc., complete.....		Tel., 27th Aug., 1883.....	.....	.....	Letters Aug. 17th, Sept. 3rd, 1883; Jan. 7th, Feb. 18th, 1884. Telegrams June 11th, Aug. 17th, Sept. 13th, Dec. 21st, 1883 Telegrams Jan. 4th, March 6th, May 22nd, June 3rd, 1884.
4. * Nanaimo Post Office.....		24,750 00	23,707 37	.....
5. British Columbia Penitentiary..		Tel., Nov. 22nd, 1883.....	390 00	390 00	.....
6. Repairs to furniture, hearings, etc., Dominion Public Buildings		do 27th, 1883.....	175 30	175 00	.....
.....		General authority .....	.....	608 00	.....
.....		Letter, Sept. 27th 1883.....	90 00	.....	.....
.....		Tel., Oct. 25th, 1883.....	300 00	.....	.....
.....		Tel., Dec. 6th, 1883.....	.....	.....	.....
.....		Tel., Dec. 20th, 1883	75 00	3,871 28	Telegrams Aug. 27th, Oct. 26th, Dec. 11th and 15th, 1883.
Harbours and Rivers.	
7. Cottonwood Canon.....		Letter 7,113, June 14th, '83	10,000 00	9,840 42	Letters Jan. 24th, Feb. 5th, March 19th, 1884. Telegrams Sept. 13th, 1883; March 17th, 1884.
8. Cowichan River.....		do do	1,200 00	1,035 39	Letters Sept. 13th, 1883.

9. Courtenay River	Letter 7, 311, Aug. 29th, '83	500 00	801 65	Letter 16th April, 1884.
10. Lillooet River	Letter 7, 113, June 14th, '83	500 00	500 00	Letters July 21st, Aug. 22nd, 1883. Tele-grams Aug. 27th, Oct. 16th, 1883. Letters March 8th.
<i>General Repairs and Improvements, Harbours and Rivers.</i>				
11. Nimpkish River	Letter 9, 950, Mar. 28th, '84	1,000 00	999 63	Letters May 1st, 1884. Telegrams Feb. 22nd, March 22nd, April 6th, 8th, 16th, 19th, June 6th and 13th, 1884.
12. Snag boat, construction of	Letter 7, 113, June 14th, '83	1,500 00	14,993 80	Letters July 23rd and 24th, Aug. 24th and 31st, Sept. 7th, Nov. 24th, 28th and 29th, Dec. 8th, 1883.
<i>Dredging Generally.</i>				
13. Snag boat, running expenses of	Tel., April 21st, 1883	37,000 00	2,051 62	Letters Jan. 8th and 19th, Feb. 22nd, March 7th, 11th and 17th, April 22nd, June 14th and 16th, 1884.
14. Telegraph maintenance	General authority	1,500 00	1,035 00	Telegrams Dec. 19th, 1883: Feb. 4th and 5th, March 10th, 11th and 13th, June 14th, 1884.
15. Esquimalt Graving Dock .....	.....	7,500 00	7,778 56	

* Note.—Smith & Clark's contract completed 9th Jan., at contract price, with extras.

(Duplicate.)

JOSEPH W. TRUTCH.

(Signed)

VICTORIA, B.C., 21st July, 1884.

VICTORIA HARBOUR IMPROVEMENTS.

TABULAR STATEMENT of the Work Performed by the "Dredge" in Victoria Harbour, B.C., from the 1st July, 1883, to 30th June, 1884.

Month.	No. of P.	Material, Sand or Mud.	Dredged Material, Cubic Yards.	Cost.	Cost per Cubic Yard.	Working Days.	Dredging Days.	Stormy Days.	Repairing Days.	Wind.	Remarks.
1883.											
July.....	83	S.	2,095	\$ cts.	.....	.....	25	12	5	S.W.	.....
August.....	161	S.	3,618	.....	.....	.....	27	18	7	S.W.	.....
September.....	105	S.	2,910	.....	.....	.....	25	12	10	S.W.	.....
October.....	134	S. & M.	4,410	.....	.....	.....	27	16	9	S.W.	.....
November.....	214	M.	13,063	4,136 06	0,316	.....	25	21	0	S.W.	.....
December.....	148	M.	5,100	.....	.....	.....	25	17	4	S.W.	.....
January.....	210	M.	7,770	.....	.....	.....	25	22	3	S.W.	.....
February.....	200	M.	7,330	.....	.....	.....	25	19	1	N.	.....
March.....	220	M.	7,740	.....	.....	.....	26	18	4	N.	.....
April.....	266	M.	9,250	.....	.....	.....	26	22	1	S.W.	.....
May.....	186	M.	6,800	.....	.....	.....	26	17	3	S.W.	.....
June.....	84	M.	54,060	8,602 90	0,159	.....	26	9	14	S.W.	.....
Totals.....	.....	.....	.....	67,123	12,738 96	0,189	.....	.....	.....	.....	.....

Cost, including \$3,593.22 for Repairs=\$16,337.18=0-24-3 cts. per cubic yard.

F. C. GAMBLE,
Assistant Engineer.

VICTORIA, B.C., 14th July, 1884.

APPENDIX No. 17.

STATEMENT

SHOWING THE

GOVERNMENT PIERS AND WHARVES

IN THE PROVINCES OF

ONTARIO AND QUEBEC.

GOVERNMENT PIERS AND WHARVES.
PROVINCE OF QUEBEC.

Names of Places.	Counties.	Total Length.	Width.		Height at end.	Block.		Depth of Water at end.		Date of Completion of Work.	Remarks.
			Feet.	Feet.		Length.	Width.	E. L. W.	E. H. W.		
Etang du Nord, Magdalen Islands.....	Gaspé.....	450	28	22	Feet.	Feet.	Feet.	Feet.	1881	This work is still in progress.	
New Carlisle.....	Bonaventure.....	500	25	.....	.....	.....	.....	.....	1881	Work completed. Municipality granted \$2,500 towards its construction.
Carleton	do	225	20	17	90	20	4½	12½	1881	Pier completed. Municipality supplemented the Parliamentary grant with \$2,500 towards the work.	
Matane	Rimouski.....	580	30	20	.....	.....	1½	15½	1878	In 1883, 100 feet of oilwork were built on the east side of the channel.
Rivière Blanche	do	655	20	20	150	30	2	16	1876	This work was completed at the end of the fiscal year.	
Rimouski	do	2,500	20	25	150	30	8	28	1853	This pier is kept in good repair by the Inter-colonial Railway.	
Trois-Pistoles.....	Témiscouata	980	30	.....	.....	.....	.....	.....	1881	This work will be soon completed.
Rivière du Loup	do	1,641	30	42	254	50	14	34	1882	An extension to the block of 130 feet by 50 feet is under contract.	
Anse du Portage.....	Chicoutimi	108	18	28	104	24	4	21	1882	It was completed in 1884.	
Anse St. Jean.....	do	366	26	29	50	40	7½	24½	1875	Built in 1875-76-77 by Provincial Government and Municipality. Since 1879, the works have been continued by the Dominion Government.	
St. Alphonse de Bagotville	do	445	24	49	77	55	29	47	1860	Built by Municipality in 1860; burnt in 1870; rebuilt by Government in 1875. This pier has lately been extended.	
Chicoutimi	do	282	70	28	127	30	7	19	1873	Built in 1873 by the St Lawrence Steam Co. In 1874 the Government took possession of it, and has made repairs since 1880.	
Rivière Ouëlle	Kamouraska	1,219	28	42	237½	51	14	32	1852	Completed in 1856. This pier has been raised 2 feet within the last few years. Lighthouse at end of pier.	
Malbaie, Cap à l'Aigle	Charlevoix	158	35	42½	.....	.....	18	37	1880	Work finished in 1881.
Malbaie, Pointe au Pic.....	do	500	30	46	108	70	24	44	1850	Completed in 1850.	
Eboulements.....	do	900	30½	36	80	45	15	34	1852	Work completed in 1853.	

GOVERNMENT PIERS AND WHARVES—Continued.
PROVINCE OF QUEBEC—Concluded.

Names of Places.	Counties.	Total Length.	Width.	Height at end.	Block.		Depth of Water at end.		Date of Commencement of Work.	Remarks.
					Length.	Width.	E.L.W.	E.H.W.		
		Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.		
Baie St. Paul, Cap aux Corbeaux.....	do	850	30	36	.....	.....	12	29	1881	Work in progress. Dimensions to be as given when work is completed.
Baie St. Paul Block..	do	200	30	.....	.....	.....	12	31	1874	Lighthouse on block.
Ile aux Coudres.....	do	263	32	42	.....	.....	16½	33½	1881	Built with the Parliamentary grant by the inhabitants.
St. Jean Port Joli ..	L'Islet.....	432	20	24	.....	.....	6	24	1875	A block 30 x 30 was built by the inhabitants; the remainder was built by the Government.
L'Islet.....	do	1,104	31	34	48	51	7½	25½	1852	Completed in 1855. The superstructure was rebuilt in 1876-78.
Ile aux Grues.....	Montmagny.....	642	25	32	75	36	6	24	1882	the shore portion is under contract.
Grosse Ile, East Wharf	do	315	25	36	.....	.....	10	31	.....	Completed in 1866. An addition was built in 1882.
do West do	do	345	48	.....	.....	.....	.....	.....	.....	Completed in 1848.
St. Thomas.....	do	100	25	19	.....	.....	.....	25	1879	Commenced in 1879, and completed in 1882.
Berthier (en bas).....	do	566	32	34	59	27	12	30	1852	An extension of 100 feet is under contract.
St. Michel.....	Bellechasse.....	1,091	30	27	50	37	6	22	.....	Built by Municipality by means Municipal Loan Fund.
St. François I. d'Orl.	Montmorenci.....	400	30	18	.....	.....	.....	.....	1882	Not completed.
Ste. Famille do	do	460	30 & 25	24	90	30	.....	20	1879	There are 6½ feet at half neap and 8½ at half spring tides. It was completed in 1882.
St. Jean do	do	651	30	.....	50	44	7	23	.....	This pier was built by the Municipality, and is owned by a company. The Government having built a lighthouse on it, the Department has kept the pier in repairs ever since.
St. Laurent do	do	583	20	.....	104	32	.....	23	.....	There is a lighthouse at the end of this pier.
Quebec, Queen's Wharf	Quebec.....	175	66	.....	.....	.....	.....	.....	.....	This wharf is being repaired; the contract is not finished.
Ecureuil.....	Portneuf.....	70	20	16	.....	.....	.....	12	1881	Dry at low water. There are, at high water (neaps), 7 feet; and high water (spring), 12 feet of water.
Nicolet.....	Nicolet.....	3,500	10	.....	.....	.....	.....	.....	.....	These works consist of 2 parallel piers forming a channel way from deep water, St. Lawrence River to the harbour at the mouth of the river.

Yamachiche.....	St. Maurice.....	1,460	12	10	98	43	5	1880	Commenced in 1892, and completed in 1893. There are four ice piers at south side of Chenal du Moine. Two were built by contract in 1893.
Chenal du Moine.....	Richelieu.....	30	20	16					A wharf.
Berthier.....	Berthier.....				186	66	10		This work is under contract.
Lavaltrie.....	do.....	183	20	17	54	33	10		Built in 1882.
Lanoraie.....	do.....			22½	70	30	9½		Built in 1882.
Agnes Lake Megantic.....	Compton.....	435	30	13	80	20	6		Built in 1883.
Pionolis.....	do.....	165	12	13	20	20	6		
Lourdes.....	do.....	190	18	14	30	20	6		
L'Assomption.....	L'Assomption.....	101	69						
St. Sulpice.....	do.....	195	20	18	54	33	10		
Cascades Pier.....	Soulanges.....				70	20	7½	1856	Built in 1882.
St. Timothée.....	do.....				100	24	8	1882	Built in 1884 by contract.
Beauharnois.....	Beauharnois.....	100	100	16				1884	This landing pier was built in 1881.
Lacolle.....	Missisquoi.....				115	34	7½	1881	do do 1880.
Cedars.....	Soulanges.....	64	24		73	24	15	1880	A road from the king's highway to the wharf has been made by the R. and O. Navigation Co ; its length is 800 feet.
St. Dominique.....	do.....	104	20		249	24	13		850 feet of the pier were built in 1883. It is not yet completed.
Coteau Landing.....	do.....								On the south shore of Lake St. Francis.
St. Zotique.....	do.....	1,126	12	14	100	24	9	1884	
St. Anicet.....	Huntingdon.....	31 & 18						1862	

GOVERNMENT PIERS AND WHARVES—Continued.

PROVINCE OF ONTARIO.

Names of Harbours.	Counties.	Lakes.	Length.		Revetment or Pilework.	Breakwater.	Total Wharfing.	Width.	Depth of Water at Entrance.		Expenditure by Government, Municipal Authority or Harbour Commissioners.	Remarks.
			North or East Pier.	South or West Pier.					E. L. W.	H. W.		
			Feet.	Feet.	Feet.	Ft.	Feet.	Feet.	Feet.	Feet.		
L'Original	Prescott.....	River Ottawa..	.....	.....	.....	.....	1,354 .....	.....	7	21	Local Municipality and Government.	Built in 1858. Portions above low water reconstructed in 1883-84.
Cobourg	West North-umberland.	Lake Ontario..	1,390	1,650	1,050	.....	4,090	{	15, E.P.	19	Company and Town.	The works were commenced in 1829. An extension of 200 feet to the east pier is now under contract.
Port Hope.....	East Durham..	do	1,471	1,641	6,663	500	9,974	20-30	22, W.P.	26	Company, Commis-sioners and Gov-ernment.	The works were commenced in 1832. An addition of 200 feet is being made.
Newcastle	West Durham.	do	880	600	730	.....	2,210	15-30	.....	16	Company, Commis-sioners and Gov-ernment.	This harbour is now in a good state of repair, the piers hav-ing been rebuilt and the chan-nel being protected by pilework.
Port Darlington.	do	do	1,180	1,620	.....	.....	2,800	20-30	.....	16	Company, Commis-sioners and Gov-ernment.	
Oshawa	South Ontario.	do	.....	.....	.....	.....	815	20-30	.....	15	Company and Gov-ernment.	
Whitby	do	do	390	645	1,760	.....	2,795	20-30	.....	15	Harbour Commis-sioners and Govern-ment.	The works were commenced in 1843.
Pickering	do	do	685	835	.....	.....	1,460	15-30	.....	16	Township, Harbour Commissioners and Government.	
Toronto(Queen's Wharf).	York	do	.....	.....	.....	.....	1,091	30	.....	16	Government and Har-bour Commis-sion-ers.	This wharf was commenced in 1833.
Toronto Harbour Improvements.	do	do	.....	.....	13,130	.....	.....	11	.....	.....	Government.....	This work is under contract. Messrs. Cooke & Jones are the contractors. Operations were commenced in 1863.
Oakville	Halton	do	640	500	422	.....	1,562	15-60	7	11	Wm. Chisholm and Government.	The works were commenced in 1829.

Burlington Piers	Wentworth	do	2,307	2,710	5,017	20-40	14	18 $\frac{1}{2}$	Government	The works were commenced in 1829. They are kept in repair by the Department of Railways and Canals. These piers form the entrance of the Broad Creek of the Welland Canal. These works were commenced in 1833-34. The works were commenced in 1837.
Port Maitland	Monck	Lake Erie	1,500	1,500	3,000	.....	10	13	Government and Harbour Commission.	These works were commenced in 1833-34.
Port Dover	South Norfolk	do	1,020	1,020	2,040	.....	10	13	Government and Harbour Commission.	These works were commenced in 1833-34.
Port Burwell	East Elgin	do	576	850	2,520	15-30	9	12	Harbour Company and Government.	The works were commenced in 1837.
Port Bruce	do	do	700	750	1,450	.....	.....	.....	do	.....
Port Stanley	do	do	1,150	1,870	3,740	20-30	11 $\frac{1}{2}$	14 $\frac{1}{2}$	Government Commissioners, Government; also by the London and Port Stanley Railway Company.	The works were commenced in 1827.
Morpeth	do	do	400	500	900	.....	10	13	E. Hill, East Pier, and Government, West Pier.	This work is under contract.
Rondeau	Kent	do	780	1,080	3,860	30-40	18	21	Government	The works were commenced in 1844.
Kingsville	South Essex	do	880	400	2,070	20-50	12	15	Municipal Authority and Government.	This work has been completed.
Bayfield	South Huron	Lake Huron	820	875	1,695	20-30	11	14 $\frac{1}{2}$	Government and Township of Hanley.	The pier inside the harbour, on the north side, is much in need of repairs.
Goderich	West Huron	do	1,320	1,520	3,560	30	14	17 $\frac{1}{2}$	Government	A harbour of refuge.
Port Albert	do	do	290	120	410	20	5	8 $\frac{1}{2}$	Government and Municipality.	Built in 1856 and 1857.
Kincardine	West Bruce	do	905	880	3,590	30	12	15 $\frac{1}{2}$	Government and Municipality.	An extension is being made to the breakwater.
Inverhuron	do	do	380	.....	450	15-30	16	19 $\frac{1}{2}$	Government and Local Company.	Built in 1856 and 1857.
Port Elgin	do	do	570	.....	600	20	12	16 $\frac{1}{2}$	Government and Local Company.	An extension is being made to the breakwater.
Southampton & Chantry Island	do	do	.....	.....	4687	20-30	14	17 $\frac{1}{2}$	The Municipality, aided by a Government grant, built the pier. The breakwater, &c., were built by the Government.	The Government has the control of the harbour Southampton piers were commenced in 1858 and those of Chantry Island in 1856.
Wiaaton	North Grey	Georgian Bay	.....	.....	1,235	20	14	17 $\frac{1}{2}$	Government	Built in 1863.
Bay	do	do	.....	.....	452	14-25	11 $\frac{1}{2}$	15	Local authority and Government.	Built in 1877 and 1881.
Uwau Sound	do	do	.....	.....	2,470	20	14	17 $\frac{1}{2}$	Town Council and Government.	This work was built in 1881-82.

GOVERNMENT PIERS AND WHARVES—Concluded.

PROVINCE OF ONTARIO—Concluded.

Names of Harbours.	Counties.	Lakes.	Length.		Revetment or Pilework.	Breakwater.	Total Wharfrage.	Width.	Depth of Water at Entrance.		Expenditure by Government, Local Companies, Municipal Authority or Harbour Commissioners.	Remarks.
			North or East Pier.	South or West Pier.					Feet.	Feet.		
Meaford	East Grey	Georgian Bay.	775 .....	.....	895	10	2,080	20-30	14	17½	Municipal Council and Government.	The works were commenced in 1836.
Thornbury	do	do .....	.....	.....	.....	.....	420	15-30	12	15½	Municipality and Government.	The breakwater, 790 feet in length, was built in 1874-75.
Collingwood	North Simcoe.	do .....	.....	.....	.....	.....	2,590	20-24	11	14½	Government and Northern Railway Co.	An extension to the East Pier, 600 feet in length, is under contract.
Port Arthur	Algoma	do	640 .....	.....	.....	2000	2,640	20-30 .....	.....	14	Government	Pier built in 1870, and cost included in the expenditure incurred in the construction of the Dawson Route. The breakwater, 2,000 feet in length, is under contract.

APPENDIX No. 18.

TABULAR STATEMENTS.

SHOWING THE DATES OF THE

OPENING AND CLOSING OF NAVIGATION

AT THE

PRINCIPAL PORTS OF CANADA,

ON THE SEABOARD, AND ON THE GULF, RIVER, AND
LAKES OF THE ST. LAWRENCE;

ALSO

PORTS WHICH ARE ALWAYS OPEN.

Ref. No. 54,403.

APPENDIX No. 18.

No. 1.—STATEMENT of the Closing of Navigation in the Fall of 1883, and of the Opening in the Spring of 1884.

Name of Port.	Location.	Closed in 1883.	Opened in 1884.	Remarks.
Charlottetown, P.E.I.	Gulf of St. Lawrence	Dec. 23...	April 24...	Depth of water at the head of wharves 16 to 20 feet ; in channel from 36 to 60 feet ; at entrance to harbour 70 to 80 feet. Spring tides rise 9½ feet ; neaps rise 8 feet. Steamer "M. A. Starr" cleared for Halifax on the 19th Dec., 1883. Steamer "Summerside" sailed for Pictou on the 24th April, 1884, but had to return. Succeeded in arriving at Pictou on the following day.
Georgetown, do	do	... Jan. 12, '84	do 24...	Depth of water at low tide in channel from opposite railway wharf to Wheeler's Bar buoy, 3½ miles, is from 30 feet, deepening gradually to 80 feet. Spring tides rise 5½ feet ; neaps 4 feet. Continuous N.E. winds from 1st to 22nd April. Steamer left for Pictou, N.S., and laid off harbour in ice ; sailed on 23rd; arrived at Pictou at 1.30 p.m., and returned to Georgetown on 24th April.
Pictou, N.S.	do	... Dec. 23...	do 17...	Depth of water on bar at low tide 17 feet ; in channel in harbour 36 feet. Tides rise 6 feet. The Intercolonial Railway ferry steamer "Mayflower" continued her trips across the harbour until Jan. 15th, 1884, and resumed them on March 29th, 1884. S.S. "Northern Light" continued her trips between Pictou and P.E.I. until 16th Jan., 1884, and resumed on 13th March, 1884, but did not succeed in crossing regularly. She cut her way up to Pictou Landing, 31st March.
Sydney, do	do	... Jan. 3, '84	do 26...	Depth of water from 30 to 60 feet. Tides rise from 4 to 5 feet North Sydney opens earlier and closes later than Sydney, being nearer the sea. No drift ice to speak of last spring.
Shediac, N.B.	do	... Dec. 1...	May 12...	Spring tides rise 4½ feet. Vessels load at the wharf down to 16 feet at high water. The depth at the "Deep Hole" where the largest vessel finish loading, is 19 feet. Navigation opened much later than usual this season, owing to heavy ice from the north.

No. 1.—STATEMENT of the Closing of Navigation, &c.—Continued.

Name of Port.	Location.	Closed in 1883.	Opened in 1884.	Remarks.
Bathurst,	N.B. Gulf of St. Lawrence	Nov. 29...	April 28...	The ice was all clear in the harbour on 28th April, but there was a great quantity of driftice from Labrador in the bay for 3 weeks after that date, and vessels for this port were caught in it for 2 weeks.
Gaspé,	P.Q. do	... Dec. 11...	May 5...	A steamer might have left as late as 15th to 20th Dec. Navigation opened earlier than usual in spring of 1884.
Percé,	do do	... Nov. 23...	April 25...	The last vessel cleared on 23rd Nov., but navigation could have been continued for a month later, as no ice had formed.
Campbellton, Rimouski,	N. B. Baie de Chaleurs..... P.Q. River St. Lawrence.	Dec. 4... do 15...	April 27... March 15...	Depth of water at wharf, low spring tides, 7 feet. Spring tides rises 16 to 17 feet.
Tadoussac,	do do	.....	.....	The Saguenay River generally closes from the 20th to the 25th of November, and opens about the 10th or 12th of May. The harbour of Tadoussac is open all the winter. It occasionally fills with small ice with an easterly wind for a tide, but it being small batture ice, a steamer of moderate power can pass through.
Quebec,	do do	... Nov. 24...	April 30...	The average depth of wter in the harbour of Quebec is 14 fathoms, about two cables length from the wharf. In mid-channel the average is from 16 to 18 fathoms, and towards the south shore 25 fathoms. Spring tides rise 18 feet, neaps 12 feet. Flood runs 4 hours 45 minutes; ebb runs 4 hours 40 minutes. With a strong easterly wind the tide rises much more. The first winter steam ferry boat, the "Unity," began to run in 1857 from Quebec to Levis.
Sorel, St. John,	do River Richelieu..... do do	do 28... do 30...	do 9... do 16...	These dates show last departure in 1883 and first arrival in 1884. The Richelieu River was open for a week later in the autumn and two weeks earlier in the spring.
Montreal, Kingston,	do River St. Lawrence. Ont Lake Ontario.....	Dec. 16... do 31...	do 22... do 19...	The depth of water in the harbour and at the landing piers and wharves varies from 12 to 15 feet; the rocky bed of the river at the entrance is being deepened to 15 feet, the least being now 10 feet.
Belleville,	do do	do 14...	do 19...	Depth of water in harbour 8 to 12 feet.

No. 1.—STATEMENT of the Closing of Navigation, &c —*Concluded.*

Name of Port.	Locality.	Closed in 1883.	Closed in 1884.	Remarks.
Port Hope,	Ont Lake Ontario.....	Dec. 13...	April 1...	Vessels can load in the new harbour and put out drawing 11 feet; and in the old harbour drawing 9½ feet. The elevation of the water-level fluctuates from 6 to 12 inches.
Toronto,	do do	do 21...	March 30...	Depth of water in harbour from 11 to 16 feet.
Port Stanley,	do Lake Erie.....	do 28...	April 1...	Ten feet depth of water at entrance of harbour.
Port Dover,	do do	Nov. 30...	do 17...	The depth of water fluctuates owing to the wind. The usual depth is 10 feet, but with a strong southerly wind it rises at least four feet.
Windsor,	do Detroit River.....	Dec. 17...	March 15...	Average depth of water at docks 15 feet; average at mid-channel, 40 feet. The dates given indicate the arrival and departure of vessels from and to outside ports, but ferry boats cross the river at all seasons.
Sarnia,	do Lake Huron.....	Jan. 3, '84	do 31...	The season of navigation is opened by the first trip of the river line of steamers, and closes with the last trip.
Goderich,	do do	Dec. 3...	April 20...	Depth of water inside piers 14 to 15 feet. Just outside of piers in rough weather only about 12 feet.
Kincardine,	do do	Nov. 28...	May 6...	Depth of water in inner harbour 9 feet and at entrance about 11 feet.
Owen Sound,	do Georgian Bay.....	do 17...	April 26...	Depth at low water, 10 feet 6 inches. Water level fluctuates from 18 to 24 inches.
Collingwood,	do do	Dec. 10...	do 23...	The depth in the harbour at low water from 1867 to 1877 was 11 feet 6 inches; 1878-79, 12 feet; 1880-81, 12 feet 6 inches; 1882-83, 13 feet.
Sault Ste. Marie,	do Lake Superior.....	do 9...	do 25...	The first steamer for 1884 arrived from Shabanagan, Mich., 25th April. First Canadian steamer arrived 3rd May.
Port Arthur,	do do	do 22...	May 6...	The bay is very deep, being as much as 200 or 300 fathoms in some places. The deepest part is by Hare Island, near Thunder Cape. Depth of water at docks, 14 feet.
Winnipeg,	Man Red River	Nov. 10...	April 24...	

No. 2.—STATEMENT showing some of the ports in the Dominion which are open to Navigation the whole year.

Name of Port.	County.	Province.	Depth of Water at Low Water.	Remarks.
Annapolis.....	Annapolis.....	Nova Scotia.....	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 feet in harbour.
Liverpool.....	Queen's.....	do.....	7	On bar. At Brooklyn 24 feet.
Lockport.....	Shelburne.....	do.....	8	
Lunenburg.....	Lunenburg.....	do.....	12	
Parrsboro.....	Cumberland.....	do.....	.....	Dry in harbour at low water.
Shelburne.....	Shelburne.....	do.....	40 to 60	
Yarmouth.....	Yarmouth.....	do.....	13	
St. Andrews.....	Charlotte.....	New Brunswick.	14	In inner harbour.
St. John.....	St. John.....	do.....	20	At entrance of harbour. 60 feet in harbour.
St. Stephen.....	Charlotte.....	do.....	6	30 feet at the ledge, 4 miles below the town.
*Tadoussac.....	Saguenay.....	Quebec.....	30 to 50	
Windsor.....	Essex.....	Ontario.....	.....	Ferry boats cross Detroit River all winter.

*See remarks respecting Tadoussac Harbour in Appendix No. 8 of general report 1867-1882.

Victoria, Nanaimo, Burrard Inlet and all other ports in British Columbia, up to Skeena River, are always open. New Westminster is liable to be closed 7 to 15 days. See telegrams No. 34,027 from Hon. J. W. Trutch, 3rd May, 1883.

Tides in British Columbia.—At Victoria ordinary springs rise from 7 to 10 feet, neaps 5 to 8 feet; at Nanaimo ordinary springs rise 14 feet, neaps 11 feet; at Westminster ordinary springs rise 7 feet, neaps 4 feet; at Hastings, Burrard Inlet, ordinary springs rise 16 feet, neaps 12 feet; at Port Moody ordinary springs rise 10 to 12 feet, neaps 5 to 6 feet. See telegram from Hon. J. W. Trutch, 25th Oct., 1883, No. 39,810.

APPENDIX No. 19.

COMPARATIVE STATEMENT

OF THE

NUMBER OF VESSELS,

THEIR

AGGREGATE TONNAGE,

AND THE

NUMBER OF MEN EMPLOYED

WHICH HAVE

ARRIVED FROM SEA,

AT THE PORTS OF HALIFAX, N.S., ST. JOHN, N.B., CHARLOTTETOWN,
P.E.I., QUEBEC AND MONTREAL, PROVINCE OF QUEBEC,
AND VICTORIA, B.C., FROM 1863 TO 1883.

Ref. No. 54,402.

APPENDIX No. 19.

STATEMENT of the Number of Vessels and their Aggregate Tonnage, and Number of Men employed, which have arrived *from Sea*, to 30th June each year since Confederation, at the Port of Halifax, N.S.; St. John, N.B.; Charlottetown, P.E.I.; Quebec, Montreal, P.Q.; Victoria, B.C.

Port.	Year.	No. of Vessels.	No. of Tons.	No. of Men.	Remarks.	
Halifax,	N.S.	1868	1,089	274,089	16,562	Nova Scotia entered Confederation on 1st July, 1867.
		1869	1,292	288,682	16,022	
		1870	1,251	311,357	16,319	
		1871	1,266	302,338	16,581	
		1872	1,387	363,847	20,211	
		1873	1,384	372,985	19,803	
		1874	1,074	316,955	15,800	
		1875	1,215	354,274	18,188	
		1876	1,067	374,705	16,621	
		1877	1,076	494,638	20,358	
		1878	917	473,423	18,862	
		1879	959	391,448	18,725	
		1880	1,070	529,668	21,143	
		1881	1,157	601,398	23,630	
		1882	1,168	575,529	23,806	
		1883	1,079	540,583	21,166	
				18,451	6,565,724		302,797
St. John,	N.B.	1868	993	374,429	10,046	New Brunswick entered Confederation on 1st July, 1867.
		1869	1,423	502,083	13,320	
		1870	1,613	471,297	13,382	
		1871	1,575	442,837	12,371	
		1872	1,562	420,860	12,056	
		1873	1,470	406,442	11,537	
		1874	1,320	480,473	12,563	
		1875	1,131	377,614	10,593	
		1876	994	376,939	8,090	
		1877	1,115	421,060	10,051	
		1878	1,206	396,330	9,867	
		1879	1,055	376,919	9,711	
		1880	1,424	462,880	12,337	
		1881	1,444	444,546	12,548	
1882	1,536	493,783	14,059			
1883	1,632	468,743	13,777			
		21,593	6,925,505	187,758		
Charlottetown, P.E.I.		1874	173	51,478	2,116	Prince Edward Island entered Confederation on the 1st July, 1873.
		1875	196	57,609	2,176	
		1876	184	68,521	2,305	
		1877	350	79,893	3,391	
		1878	288	65,716	2,932	
		1879	429	79,330	3,832	
		1880	255	64,281	2,598	
		1881	288	64,322	2,635	
		1882	196	50,038	2,018	
		1883	125	41,282	1,660	
		2,483	622,480	25,663		

STATEMENT of the Number of Vessels and their Aggregate Tonnage, and Number of Men employed, which have arrived *from Sea*, to 30th June, &c.

Port.	Year.	No. of Vessels.	No. of Tons.	No. of Men.	Remarks.	
Quebec,	Que	1868	910	628,866	18,520	Quebec entered Confederation on 1st July, 1867.
		1869	952	640,087	19,205	
		1870	1,091	756,078	21,931	
		1871	844	623,474	18,741	
		1872	1,002	783,316	21,730	
		1873	917	734,937	20,827	
		1874	971	789,433	22,658	
		1875	854	639,235	19,818	
		1876	949	744,252	20,107	
		1877	983	855,101	21,489	
		1878	910	802,930	19,499	
		1879	642	602,490	15,610	
		1880	657	665,638	17,221	
		1881	783	802,186	19,888	
		1882	642	676,327	17,675	
	1883	682	737,059	18,687		
		12,789	11,491,009	318,556		
Montreal,	do	1868	253	160,553	7,339	
		1869	261	168,824	7,921	
		1870	340	228,121	9,366	
		1871	343	247,313	10,300	
		1872	435	311,567	11,724	
		1873	422	307,453	11,867	
		1874	384	306,782	11,623	
		1875	354	297,363	10,972	
		1876	337	285,609	9,881	
		1877	303	279,197	1,208	
		1878	325	309,261	9,679	
		1879	300	349,712	10,763	
		1880	374	427,057	13,269	
		1881	400	484,028	13,754	
		1882	347	373,412	11,934	
	1883	318	405,496	12,541		
		5,181	4,941,748	164,141		
Victoria,	B. C	1872	292	131,696	4,487	British Columbia entered Confederation on the 20th July, 1871.
		1873	408	160,414	5,829	
		1874	401	156,197	5,744	
		1875	453	193,481	7,090	
		1876	524	302,199	11,706	
		1877	523	312,155	11,569	
		1878	488	358,924	11,443	
		1879	514	377,705	10,891	
		1880	471	356,649	10,132	
		1881	467	338,996	9,297	
		1882	488	398,034	11,792	
		1883	702	501,963	15,934	
			5,731	3,588,413	115,914	

APPENDIX No. 20.

STATEMENT

SHOWING THE

NUMBER AND TONNAGE OF VESSELS CONSTRUCTED

AT THE PRINCIPAL

SHIP BUILDING PORTS IN CANADA,

FROM 1868 TO 1883 (INCLUSIVE).

STATEMENT showing the Number and Tonnage of Vessels constructed at the principal Ship Building Ports of Canada, from 1868 to 1883—*Concluded.*

Year.	PRINCE EDWARD ISLAND.				QUEBEC.				MONTREAL.				ST. CATHARINES.				TORONTO.				KINGSTON.			
	Charlottetown.				Quebec.				Montreal.				St. Catharines.				Toronto.				Kingston.			
	Steam.		Sailing.		Steam.		Sailing.		Steam.		Sailing.		Steam.		Sailing.		Steam.		Sailing.		Steam.		Sailing.	
	Number.	Tonnage.	Number.	Tonnage.	Number.	Tonnage.	Number.	Tonnage.	Number.	Tonnage.	Number.	Tonnage.	Number.	Tonnage.	Number.	Tonnage.	Number.	Tonnage.	Number.	Tonnage.	Number.	Tonnage.	Number.	Tonnage.
1868
1869
1870
1871
1872
1873
1874
1875
1876
1877
1878
1879
1880
1881
1882
1883
	5	410	457	117,047	8	6,955	61	256,038	68	6,201	208	25,562	37	6,177	38	11,721	34	2,306	35	3,525	46	4,166	81	12,806

N.B.—For number and tonnage of sea-going vessels built in Quebec from 1787 to 1867, see Appendix No. 53 of Report of Commissioners of Public Works, published in 1867.—G.F.B.

APPENDIX No. 21.

NUMBER OF SEA GOING AND COASTING VESSELS WRECKED

ON THE

SEA GOAST;

AND IN THE

GULF, RIVER & LAKES of the ST. LAWRENCE

IN THE

DOMINION OF CANADA,

FROM 1868 TO 1883 (INCLUSIVE).

COMPILED FROM REPORTS OF DEPARTMENT OF MARINE AND
FISHERIES.

APPENDIX No. 21.

Ref. No. 54,415.

PART 1st.—SEA-GOING, AND COASTING VESSELS.

(a) STATEMENT of Wrecks and Casualties which have occurred in Canadian Waters to Foreign and Canadian Sea-going Vessels, from 1868 to 1883.

(Compiled from the *Yearly Reports of the Minister of Marine and Fisheries.*)

Year.	Place where Wreck or Casualty occurred, and No. of Vessels wrecked or damaged at each place.							Description of Vessels wrecked or damaged, or No. of each description.						Nature of Casualty and No. of Vessels.							
	Newfoundland	Anticosti Is-land.	Magdalen Is-lands.	Prince Edward Island Coast.	New Brunswick Coast.	Nova Scotia Coast.	Gulf St. Lawrence.	Quebec to Gulf.	River St. Lawrence to Mon-treal.	Steamers.	Ships.	Barques.	Brigs.	Brigantines.	Schooners.	Stranded.	Sunk or Foundered.	Burnt.	Collision.	Abandoned.	Other causes.
June 1, 1868, to Dec. 31, 1869.	4	4	.....	.....	9	(b) 25	7	38	1	3	9	33	13	7	21	.....	6	.....	.....	.....	.....
1870.....	4	5	3	1	9	51	4	30	8	8	15	23	8	13	47	83	6	.....	15	1	9
1871.....	6	1	1	1	11	55	11	37	2	5	20	25	7	22	46	95	5	.....	13	1	5
1872.....	2	8	4	1	19	40	16	31	1	6	13	43	4	10	46	90	11	.....	8	2	10
1873.....	5	3	37	8	28	116	11	28	3	18	15	39	12	21	132	192	10	3	11	1	20
1874.....	5	7	6	3	23	71	6	62	2	30	21	40	4	18	72	114	5	4	28	1	33
1875.....	8	6	8	7	33	87	14	30	3	19	15	35	4	27	96	146	5	5	26	1	13
1876.....	11	4	9	21	33	109	16	38	10	24	14	49	6	33	125	152	9	3	47	3	37
1877.....	8	3	7	9	29	104	4	58	12	28	13	49	2	25	122	145	8	8	57	.....	21
1878.....	8	7	4	7	33	76	14	31	10	20	8	43	3	18	98	123	5	5	30	.....	17
1879.....	11	2	5	17	25	118	10	32	13	23	13	28	3	23	143	169	4	5	34	1	20
1880.....	7	11	3	11	16	88	24	29	17	27	13	49	8	16	93	113	7	5	39	5	37
1881.....	4	1	5	8	22	58	12	13	5	23	3	30	.....	11	61	76	4	6	54	.....	18
1882.....	9	2	2	8	33	92	13	19	10	29	5	28	3	21	103	125	3	4	28	1	27
1883.....	3	6	5	8	12	96	9	14	7	25	12	27	.....	16	80	108	4	4	12	3	29
Grand Totals.	95	75	98	110	335	1,186	171	486	104	288	189	541	77	281	1,285	1,741	86	59	372	20	296

Notes (a)—For statement of wrecks prior to 1867, see Appendix No. 53 to Public Works Report for 1867, pp. 426 to 428, prepared by G. F. Baillairgé, D.M.P.W.
 (b)—The vessels shown as having been wrecked on the Nova Scotia coast are principally fishing and coasting schooners.

PART 1st.—SEA-GOING AND COASTING VESSELS—Continued.

STATEMENT of Wrecks and Casualties which have occurred in Canadian Waters to Foreign and Canadian Sea-going Vessels from 1868 to 1883.

Year.	Approximate Loss.				Total No. of Wrecks and Casualties.	Remarks.
	When Total.		When Partial.			
	No. of Vessels.	Amount.	No. of Vessels.	Amount.		
June 1, 1868, to Dec. 31, 1869.		\$		\$	86	Nature of casualties not ascertained; amount of losses not recorded.
1870.....	53	266,946	61	49,720	114	
1871.....	58	84,614	67	84,614	125	
1872.....	58	575,544	64	314,595	122	On 1st April, s.s. "Atlantic" was stranded at Marr's Head, N.S.; 515 lives lost; loss \$350,000.
1873.....	94	847,000	143	278,692	237	On 5th July, s.s. "City of Washington" was stranded at Gulf Rock Bar, N.S.; no lives lost; loss \$460,000.
1874.....	65	669,375	120	270,648	185	On 6th Sept., s.s. "Medway" was stranded on Newfoundland coast; 7 lives lost; loss \$200,000.
1875.....	75	1,040,794	121	307,154	196	On 24th Aug., s.s. "Saltwell" foundered off Scatterie, N.S.; 6 lives lost; loss \$160,000.
1876.....	87	497,490	164	197,662	251	On Nov., s.s. "Pictou"; never heard of; all on board lost; loss \$45,000.
1877.....	61	527,950	178	232,073	239	A portion of the partial loss could not be ascertained.
1878.....	72	850,260	118	97,918	190	On 23rd July, s.s. "Lake Megantic" stranded on Anticosti Island; no lives lost; \$200,000.
1879.....	73	675,600	160	169,803	233	
1880.....	71	1,192,100	135	151,288	206	On 8th Oct., s.s. "Corean" stranded on Point St. Michel, River St. Lawrence; no lives lost; partial loss, \$200,000.
1881.....	46	608,810	82	364,155	128	
1882.....	69	917,555	119	215,051	188	
1883.....	69	703,220	95	133,069	164	On 3rd Sept., barque "Britannia," wrecked on Sable Island, and 14 lives lost.
Grand Totals.....	951	10,574,844	1627	2,866,342	2664	

PART 2ND.—VESSELS NAVI

STATEMENT of Wrecks and Casualties to Vessels navigating

Year.	Place where Wreck or Casualty occurred, and No. of Vessels wrecked or damaged at each place.						Description of Vessels wrecked or damaged, and No. of each description.				Nature of Casualty, and No. of Vessels.				
	Lakes.					Lake Ontario to Montreal.	Steamers.	Propellers.	Schooners, &c.	Barges.	Stranded.	Sunk or Foundered.	Burnt.	Collision.	Other Causes.
	Ontario.	Erie.	Huron.	Superior.	Welland Canal.										
July 1, 1868, to Dec. 31, 1869..	2	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Jan. 1 to Dec. 31, 1870.....	26	21	11	.....	.....	5	5	7	48	3	.....	.....	.....	.....	.....
1871.....	16	6	16	.....	.....	3	6	5	30	.....	.....	.....	.....	.....	.....
1872.....	24	12	8	2	3	6	10	7	32	6	39	6	2	4	4
1873.....	9	2	3	2	.....	2	8	.....	8	2	9	2	4	.....	3
1874.....	10	9	4	.....	1	3	7	.....	19	1	15	5	4	.....	3
1875.....	9	5	5	1	.....	1	12	.....	9	.....	12	1	4	4	.....
1876.....	2	4	2	.....	.....	1	3	1	5	.....	6	1	1	1	.....
1877.....	4	12	3	1	.....	2	4	1	14	3	17	2	1	1	1
1878.....	8	7	10	.....	.....	1	16	.....	10	.....	11	5	7	1	2
1879.....	6	4	8	.....	1	4	10	.....	10	3	11	3	3	5	1
1880.....	22	9	9	1	.....	14	18	.....	27	10	28	9	6	4	8
1881.....	12	2	4	1	2	11	14	.....	14	4	10	8	5	4	5
1882.....	10	11	8	.....	.....	6	9	.....	23	3	13	6	6	5	.....
1883.....	4	10	5	2	1	16	19	.....	11	8	20	7	5	3	3
Grand Totals.....	164	120	96	10	8	75	141	21	260	43	196	55	48	32	30

GATING ON INLAND WATERS.

on Inland Waters of Canada, from 1868 to 1883.

Approximate Loss.				Total Number of Wrecks or Casualties.	Remarks.
When Total.		When Partial.			
No. of Vessels.	Amount.	No. of Vessels.	Amount.		
	\$ cts.		\$ cts.		
				63	
				41	
11	150,700	44	70,433	55	{ On 28th Sept. steamer "Rapid" capsized near Pt. Pelée Lake Erie; 7 lives lost; loss on vessel, \$8,000. On 24th Nov. propeller "Mary Ward" foundered off Nottawasaga Lighthouse, Lake Huron; 8 lives lost; \$43,000.
6	108,000	12	23,450	18	{ On 5th Nov. steamer "Bavarian" was burnt off Whitby Lighthouse, Lake Ontario; 20 lives lost; \$50,000.
6	109,300	21	52,175	27	
10	96,000	11	27,550	21	
4	40,000	5	11,000	9	{ On 17th May schooner "T. C. Street" capsized on Lake Erie; 6 lives lost; \$4,000. On 26th Oct. schooner "Maggie Hunter" on Lake Ontario; 7 lives lost; \$10,000.
9	92,000	13	12,400	22	{ On 8th Oct. barge "American" drifted ashore at Point Pelée, Lake Erie; 6 lives lost; \$7,000.
13	97,600	13	25,425	26	{ On 16th June schooner "James Scott" capsized above Port Burwell Lighthouse, Lake Erie; 5 lives lost; \$10,000.
5	20,900	18	27,445	23	
18	133,600	37	29,500	55	{ On 16th April schooner "Northman" foundered off Port Credit, Lake Ontario; 8 lives lost; \$18,000. On 7th Nov. steamer "Zealand" foundered near Long Point, Lake Ontario; 17 lives lost; \$27,000. On 24th Nov. steamer "Simcoe" foundered off Manitoulin Islands, Lake Huron; 12 lives lost; \$24,000. On 24th May steamer "Victoria" upset on Thames River, 1½ miles from London; 182 lives lost.
11	110,800	21	38,775	32	{ On 19th July steamer "City of Winnipeg" burnt at Duluth; 4 lives lost; \$60,000. On 14th Nov. schooner "E. P. Dorr" foundered off Long Point; 7 lives lost; \$9,000.
22	226,450	13	32,968	35	
12	191,600	26	98,189	38	
127	1,376,950	234	449,310	465	

APPENDIX No. 22.

REPORT

ON

GOVERNMENT TELEGRAPH LINES,

FOR THE FISCAL YEAR ENDED 30TH JUNE, 1884.

BY

F. N. GISBORNE, Superintendent.

APPENDIX No. 22.

REPORT ON GOVERNMENT TELEGRAPH LINES.

Ref. No. 49,328.

OTTAWA, 15th July, 1884.

SIR,—I have the honour to submit the following Report upon the Telegraph Service, for the twelve months ended 30th June, 1884.

The report is, as heretofore, divided into several sections, in order that the telegraph lines operated in the different localities may be separately dealt with, and is accompanied by comparative statements of the revenue and expenditure for the two years ended as above indicated.

Appended hereto will be found tabular statements, showing the number and names of offices established, intermediate distances, operators appointed, salaries paid, &c., in the different sections, as revised and corrected in accordance with changes in staff, extension of lines, &c., during the year 1883-84.

NEWFOUNDLAND.

The line between Port aux Basque and Cape Ray has been satisfactorily maintained and operated, under the immediate supervision of the Anglo-American Cable Company, no expense having been incurred beyond that anticipated for maintenance.

ATLANTIC COAST.

A line was put in operation between Barrington and Cape Sable Island, Nova Scotia, during the autumn of 1883. The land line sections, in all 16 miles, were erected, under contract, by Mr. R. T. Clinch, of St. John, N.B., who began work on the 26th September and completed it on the 7th November, the steamer "Newfield" having meanwhile laid the cable sections, $1\frac{1}{2}$ and $\frac{1}{2}$ miles in length, said cables having been ordered from England during 1882-83.

The revenue, since the establishment of this line, has been \$36.25, and the expenditure for maintenance, covering cost of teaching operators, \$241.70.

The line between Halifax and Canso, in Nova Scotia, has been maintained efficiently, without cost to the Government, by the Western Union Telegraph Company, under a contract made with the Dominion Telegraph Company, whose liabilities in this connection they assumed.

The line between Low Point and Lingan, and the line between North Sydney and Meat Cove, Cape Breton, which forms part of the Magdalen Islands system, have also been efficiently maintained by the Western Union Company, but at the expense of the Government; the expenditure upon the Meat Cove section during the year being \$1,579.26, and the revenue derived from it, accruing to the Government, \$724.00. Both expenditure and revenue are included in the figures quoted for the Magdalen Islands system.

GULF OF ST. LAWRENCE.

The cable between Meat Cove and the Magdalen Islands, which was repaired on the 18th July, 1883, as stated in my last Annual Report, became interrupted again during the month of May, 1884. Communication was rendered difficult on the 28th

April, and the cable continued failing until the 24th May, when complete interruption was reported. As soon as possible the steamer "Newfield" was despatched to repair the fault, which was effected on the 16th June. It appears that the unusual pressure of the Gulf ice flattened the heavy shore end in seven places, within a space of 30 fathoms from the beach, and after the damaged portion had been cut out, the cable was found to be in excellent electrical condition.

The gales which prevailed in the Gulf during the early part of the winter of 1883, caused great damage to the land lines between the Magdalen Islands, by washing away the sand bars upon which the intervening stretches are erected. Temporary repairs were made as speedily as circumstances would permit, and communication was not interrupted for an unreasonable period at any one time. In order to obviate this trouble for the future, two knots of cable have been ordered, and will be laid through the gullies and across the most exposed portions of the sand bars during the present season.

The other cables and land lines in the Gulf and upon the islands remained uninterrupted, and the working of the entire system has been satisfactory to the public.

The revenue and expenditure for 1883-84, compared with 1882-83, is as follows:—

	1882-83.	1883-84.
Anticosti Lines, Revenue.....	\$ 618.20	\$ 813.42
“ “ Expenditure	1,612.03	1,648.27
Magdalen Islands, Revenue.....	1,239.67	1,272.33
“ “ Expenditure.....	3,564.31	3,325.84

These expenditures are exclusive of a proportion of the contingent expenses of the Gulf telegraph service generally, and do not include amounts paid by the Department for stationery, line material, &c., out of the amount appropriated for the service.—(Vide Recapitulation at end of report.)

BAY OF FUNDY.

The cables and land lines in the Bay of Fundy have been uninterrupted since the repairs were made in September, 1883, and no expense has been incurred, beyond the anticipated expenditure for maintenance.

	1882-83.	1883-84.
Revenue	\$ 529.46	\$ 804.86
Expenditure	1,072.71	1,194.65

Beginning with the month of July, 1883, up to the close of the fiscal year, the allowance made to the operator at Welchpool, Campo-Bello, was \$20 per month. With this exception, the condition of the tabular statement accompanying last year's report remains unchanged.

NORTH SHORE, ST. LAWRENCE.

During 1882-83 the North Shore line had been completed to Bersimis.

In June, 1883, 40 knots of cable, ordered from London, England, was shipped in the steamer "Newfield" and early in July 38 miles of it was laid, as follows:—

Between Bersimis and Pointe Outardes	12 miles.
“ Pointe Paradis and Godbout River.....	26 “
	—
Cables laid.....	38 miles.

The construction of the land line sections was begun on the 18th July, 1883, and carried on by day's labour, under the supervision of Geo. E. Carter, of Gaspé, as follows:—

Between Pointe Outardes and Pointe Paradis.....	18 miles.
Between Godbout River and Pointe de Monts.....	18½ “
Between Pointe du Monts and Trinity Bay.....	7½ “

From Trinity Bay eastward.....	6 miles.
Work was then stopped 25th October, 1883, but was subsequently resumed under contract with Messrs. Gagnon Bros., Quebec; and, on 31st December 1883, was completed to Pentecost River, a further distance of	25 “
Total extension under Appropriation, 1883-84.....	<u>113 “</u>

The expenditure on account of this extension, including cost of repairer's shelter huts, was \$29,938.92, inclusive of \$16,700 for the cables.

This section of the north shore line, since its completion, has been operated by the Government, directly. The revenue from the five offices which have been established, at the close of the fiscal year, was about \$40, and the expenditure for maintenance, including cost of teaching operators, was \$900.

The other sections of the north shore system, Bay St. Paul to Chicoutimi, 92 miles, and Murray Bay to Bersimis, 147½ miles, were maintained and operated under contract by the Great North-Western Telegraph Company, at a cost of about \$1,000, plus revenue.

NORTH-WEST TERRITORIES.

The sections of line, 433 miles, extending between Prince Arthur's Landing and Winnipeg, which had been, during the previous year, transferred from the Department of Railways and Canals to that of Public Works, was, during the month of July, 1883, assumed by the Canadian Pacific Railway Company, and thus ceased to be included in the Government telegraph service.

During the time elapsing between the 15th September and 20th November, 1883, that portion of the line between Clarke's Crossing, on the South Saskatchewan River and Humboldt, a distance of 47½ miles, was reconstructed and put in good order, under contract, by Mr. Andrew McConnell, of Qu'Appelle. who had also, during the same period erected and completed the new extension from Clarke's Crossing to Prince Albert, a distance of 83 miles—in lieu of 100 miles, as estimated in my supplementary report for 1882-83. The same contractor completed the line between Qu'Appelle and Humboldt, 141 miles, the construction of which had been begun by day's labor in the autumn of 1882, and was then completed to within 72½ miles from Humboldt, the work under contract being performed between the 15th June and 25th July, 1883.

At the close of the fiscal year the Government lines in operation in the North-West were as follows:—

Qu'Appelle Station, <i>vid</i> Humboldt to Edmonton.....	537 Miles
Clarke's Crossing to Prince Albert.....	83 “
Total	<u>620 “</u>

The line between Clarke's Crossing and Battleford requires considerable repair, and between Battleford and Edmonton requires entire renewal, the wire, No. 10½, being so brittle that it is difficult to make joints therewith; the insulators being so exceedingly defective that an excessive amount of battery power is required to work the line; and the poles, for the most part, being decayed poplar, of small growth. As it will be necessary to furnish entirely new material for reconstruction, temporary repairs only have been effected during the past year, and I have recommended the adoption of a new route *vid* Fort Pitt, and south of Victoria to Edmonton, *vid* Fort Saskatchewan, where spruce poles can be obtained at moderate cost.

The revenue and expenditure for maintenance was:—

	1882-83.	1883-84.
Revenue.....	\$659.82	\$2,725.00
Expenditure.....	7,306.85	18,000.00

BRITISH COLUMBIA.

A line between New Westminster and Ladner's Landing, $17\frac{1}{2}$ miles land line, and $\frac{1}{2}$ mile cable, was constructed under contract by Jas. Punch, of Victoria. Work was begun during July, and completed 24th August, 1883.

A line between New Westminster and Port Moody, $7\frac{1}{2}$ miles, was also constructed by the same contractor. Work began 14th December, 1883, and completed 14th January, 1884.

Owing to the extensive forest fires which prevailed during the summer of 1883, considerable portions of the lines between Victoria and Nanaimo and on Gabriola Island, and between Grenville, Matsqui and Yale, had to be reconstructed, the poles, brackets and insulators having been, in many instances, completely destroyed. The line between Lytton and Kamloops, and between Cache Creek and Clinton, was also put in a thorough state of repair.

Despite the extraordinary frequency of interruption of the Government lines in British Columbia, and of the connecting lines in Washington Territory, due to the cause above mentioned, the revenue for the year shows a considerable increase over that for the previous 12 months. The comparative amounts of revenue and expenditure for maintenance (which latter was materially increased by the institution of a night service, that has not as yet proved remunerative; in addition to this, the amount set down includes the payments of some accounts chargeable to the previous year, which were not received until after the books were closed) were as follows:—

	1882-83.	1883-84.
Revenue.....	\$25,093.40	\$27,461.76
Expenditure.....	30,505.69	36,435.72

RECAPITULATION.

(Exclusive of Lines in North-West Territory.)

1883-84.	Expenditure.	Revenue.	Deficit.
	\$ cts	\$ cts.	\$ cts.
Gulf of St. Lawrence, and Maritime Provinces:—			
Anticosti Island.....	1,648 27	813 42	834 85
Magdalen Islands (including Meat Cove line).....	3,325 84	1,272 33	2,053 51
Cape Sable line.....	241 70	36 25	205 45
Bay of Fundy.....	1,194 65	804 86	399 79
North shore St. Lawrence (approximate).....	900 00	40 00	860 00
Subsidies, stationery, repairs, material and contingencies chargeable to Gulf Service generally, out of appropriation.....	5,689 51	.....	5,689 51
British Columbia system.....	36,435 72	27,461 76	8,973 96
Total.....	49,435 72	30,428 62	19,007 10
The figures for 1882-83 were.....	43,505 69	27,480 73	16,024 96

Among the accompanying tabular statements will be found one showing the tariff rates charged in the several localities where the Government lines are in operation.

In conclusion, I may add that a revised map, sheet No. 1, of the series alluded to in the General Report upon Public Works, 1867-82, of the Gulf of St. Lawrence cable system, and Quebec and Maritime Provinces Telegraph and Signal Stations; also sheet No. 2, of Ontario, and sheet No. 3, of Manitoba and the North-West Provinces, have been completed and issued, and that sheet No. 4, of British Columbia, is now in press, and will shortly be ready for distribution.

I have the honor to be, Sir,

Your obedient servant,

F. N. GISBORNE,

Superintendent Telegraph Service.

GOVERNMENT TELEGRAPH SERVICE.
NEWFOUNDLAND TELEGRAPH SYSTEM.

No.	STATIONS.	Intermediate Distances.	Operators.	Salaries' per Annum.	Date of Appointment.	Memo.
		Miles.		\$ cts.		
1	Port au Basque.	0	.....	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 per cent..... \$ 75 00
 Estimated annual maintenance and repairs..... 175 00
 Total..... \$250 00 Required in Estimates, 1884-85.

N. B.—The above short line is constructed in connection with the Signal Service, and connects at Port au Basque with the land line system of the Anglo-American Telegraph Company.

GOVERNMENT TELEGRAPH SERVICE.

CAPE SABLE TELEGRAPH SYSTEM.

No.	STATIONS.	Intermediate Distances.	Operators.	Salaries per Annum.	Date of Appointment.	Memo.
1	Barrington.....	0	Miss A. A. Sponagle.....	\$ cts. 50 00 or com'n.....	Dec. 18, 1883	N.B.—The commission is 25 p.c. upon all business to and from the offices; said commission guaranteed to be not less than at the rate of \$50 per annum.
2	Newelltown (including 1½ miles cable).....	11	Miss S. J. Newell.....	50 00 do ...	do 22, 1883	
3	Cape Sable Island Lighthouse (including ¼ mile cable)....	6½	I. K. Doane.....	50 00 do ...	do 18, 1883	
	Total.....	17½		150 00		

Cost of land line, 16 miles \$2,103 00
 Cost of cables, laid 1¾ mile (about) 1,500 00
 Total..... \$3,603 00

Estimated cost of annual maintenance :—
 Required in Estimates for 1884-85 \$300 00
 Estimated revenue do 100 00

NOVA SCOTIA TELEGRAPH SYSTEM.

LOW POINT, CAPE BRETON, SECTION.

No.	STATIONS.	Intermediate Distances.	Operators.	Salaries per Annum.	Date of Appointment	MEMO.
1	Lingan.....	Miles. 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. Peter's.....	50 00 do	Aug. 1, 1881.....	
	Totals.....	5		100 00		

Cost of land line.....	\$635 00
Estimated annual maintenance and repairs:—	
Land lines—Salaries and repairs	\$150 00 { Required in Estimates, 1884-85.
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.

GOVERNMENT TELEGRAPH SERVICE — Continued.

ANTICOSTI TELEGRAPH SYSTEM.
ANTICOSTI ISLAND SERVICE.

STATIONS.	Intermediate Distances.	Operators.	Salaries per Annum.	Date of Appointment.	MEMO.
1 Fox Bay.....	Miles. 0	Miss E. 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; and commission guaranteed not to be less than at the rate of \$50 per annum.
2 Heath Point Lighthouse.....	23	T. Gagné.....	50 00 do	July 20, 1881	
3 South Point Lighthouse.....	32½	W. Carter.....	50 00 do	July 27, 1881	
4 Shallop Creek.....	17½	B. Bradley.....	50 00 do	July 7, 1881	
5 Salt Lake.....	52½	F. Denault.....	360 00 do	Oct. 19, 1881	General Repairer. Plus \$1 per day when absent on duty.
6 South-West P'nt Lighthouse.	15	Miss G. Denault.....	50 00 do	Sept. 1, 1882	Chief Operator since 1st August, 1882. Previously received \$90 per annum
		Miss G. Pope.....	200 00 do	Oct. 18, 1880	District Superintendent. Plus \$1 per day when absent on duty.
		E. Pope.....	100 00 do	Aug. 1, 1882	
7 Jupiter River.....	7	.....	50 00 do	.....
8 Otter River.....	17½	.....	50 00 do	.....
9 Beesie River.....	22	Miss A. Ascal.....	50 00 do	Oct. 8, 1881	Plus \$1 per day for her father when he is absent on repairing duties.
10 Cape Eagle (Ellis Bay).....	10	.....	50 00 do	.....
11 West Point Lighthouse.....	14	A. Malouin.....	50 00 do	Aug. 1, 1881	
12 English Bay.....	3	F. Cabot.....	50 00 do	July 1, 1882	N.B.—Mr. J. A. Lebourdais was District Superintendent from 17th August, 1880, to 31st July, 1882, at \$450 per annum.
Totals.....	214		1210 00		

Cost of land lines complete at (say) \$165 per mile

CABLE.

S. W. Point Lighthouse to L'Anse à Fougère, Gaspé, 44½ nautical miles at \$1,100 laid down...

Total.....

\$35,300 00
48,700 00
\$84,000 00

GASPÉ.

No.	STATIONS.	Intermediate Distances.	Operators.	Salary per Annum.	Date of Appointment.	Memo.
1	L'Anse à Fougère	Miles. ....	.....	\$ 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 \$60 per annum. Plus his salary as operator for the Montreal Telegraph Company.
2	Gaspé Basin	28	J. J. Annett	150 00	Oct. 16, 1881....	
		28		200 00		

Cost of land line..... \$1,925 00

TOTAL COST OF ANTIGOSTI TELEGRAPH SYSTEM.

Land lines, 242 miles..... \$37,225 00
 Cable, 44³/₈ nautical miles

Total

ESTIMATED COST OF ANNUAL MAINTENANCE AND REVENUE.

Land lines—Salaries and repairs..... \$3,500 00
 Cable—Repairs, say

Total

Less—Revenue, probably..... \$4,000 00
 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.

GOVERNMENT TELEGRAPH SERVICE — Continued.

MAGDALEN ISLANDS TELEGRAPH SYSTEM.
MAGDALEN ISLANDS SECTION.

No.	STATIONS.	Intermediate Distances.	Operators.	Salaries per Annum.	Date of Appointment.	MEMO.
1	Amherst.....	Miles. 0	Miss J. Shea.....	\$ cis. 50 00 or com'n.	Oct. 1, 1882	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.
2	Amherst Lighthouse.....	9	Wm. Cormier.....	50 00 or com'n.	June 11, 1881	Plus \$30 per annum for rent. General line repairer.
3	Etang du Nord Village.....	15	P. Pelletier.....	400 00	Dec. 1, 1881	
4	do Lighthouse.....	1	Miss O'Brien.....	50 00 or com'n.	do 1, 1881	2 wire loop.
5	Cap aux Meules.....	.....	W. Leslie.....	50 00 or com'n.	Aug. 9, 1883	
6	House Harbour.....	8	P. Jocas.....	50 00	Dec. 1, 1881	1 mile loop. Short cable of 750 feet in length.
7	Wolf Island.....	23½	N. Clark.....	50 00	Sept. 25, 1881	
8	Grosse Isle.....	11	A. Lebourdais, D. Supt.....	500 00	Aug. 17, 1880	Plus \$1 per day when absent on duty.
9	Bird Rock.....	Cable.	T. Turbide.....	50 00 or com'n.	do 20, 1881	
10	Grand Entry.....	11	Miss McPhail.....	50 00	Feb. 18, 1882	MEMO.—House Harbour office was worked by Miss O'Brien from 1st January, 1881, to 30th Nov., 1881, and Amherst office by Miss C. Campbell from 1st December, 1881, to 30th September, 1882.
	Total.....	82½		1,300 00		

Cost of above land lines complete, with instruments, at \$130 per mile..... \$10,855 00

CABLES.

Distance, Grosse Isle to Bird Rock, 18^{2/3} nautical miles } At a general average cost of
do Old Harry to Meat Cove, C.B., 54^{1/2} do } about \$1,100 per mile laid
do do } down, 73^{2/3} miles 80,630 00
do Across House Harbour Gut, 100
Total \$91,485 00

MAGDALEN ISLANDS TELEGRAPH SYSTEM.
CAPE BRETON SECTION.

STATIONS.	Intermediate Distances	Operators.	Salaries per Annum.	Date of Appointment.	MEMO.
1 Meat Cove	Miles.	A. B. McDonald	\$ cts.	Nov. 7, 1880	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 Aspie Bay.....	0	R. G. Zwicker.....	420 00	Aug. 1, 1882	
3 O'Neil's Harbour (½ way house)	10½	.....	50 00 or Com'n.	.....
4 Ingonish, North Bay.....	15	J. M. Burke.....	do	April 1, 1882	General Repairer. N.B.—Ingonish office was worked by F. Brown from Jan. 1, 1881, to March 31, 1882.
5 Ingonish Harbour.....	9	D. McLennan.....	360 00	April 1, 1883	
6 Indian Brook.....	10½	Miss C. Morrison.....	50 00	do 1, 1884	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
7 St. Anne's South Bay.....	23	.....	50 00	Jan. 1, 1882
8 Baddeck (Loop Line)	19	Miss Bingham.....	50 00	July 19, 1882	
9 Englishtown	13	.....	50 00	.....
10 Kelly's Cove	6	.....	50 00	.....
11 Big Bras d'Or.....	2	50 00	N.B.—St. Anne's office opened 1st Jan., 1883, R. S. McDonald, operator, until 1st April.
12 North Sydney	6	.....	50 00	.....
Total	126½	.....	1230 00	.....

Cost of above land lines complete, with instruments, at \$110 per mile \$13,915 00

CABLES.

Crossing Big Bras d'Or, ½ nautical mile 550 00
 \$14,465 00

TOTAL COST MAGDALEN ISLAND SYSTEM.

Land lines, 210 miles cost \$24,770 00
 Cables, 73½ nautical miles cost 81,180 00
 \$105,950 00

ESTIMATED COST OF ANNUAL MAINTENANCE OF MAGDALEN ISLAND SYSTEM.

Land lines. Salaries and repairs..... \$4,300 00
 Cable. Repairs, say..... 1,000 00
 Total..... \$5,300 00 Registered in Estimates, 1884-85.
 Less probable revenue..... 1,000 00
 Balance deficit..... \$4,300 00

GOVERNMENT TELEGRAPH SERVICE — Continued.

BAY OF FUNDY, N.B., TELEGRAPH SYSTEM.
GRAND MANAN SECTION.

No.	STATIONS.	Intermediate Distances	Operators.	Salaries per Annum.	Date of Appointment	MEMO.
	<i>Long Eddy Cable Mut, to</i>	Miles.		\$ cis.		
1	Flagg's Cove.....	3	{ H. C. Seely (D. Sept.) ... Miss C. Daggett	420 00 50 00	Nov. 18, 1880 June 1, 1882	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	Woodward's Cove	6	W. A. Fraser.....	50 00 or com'n.	Nov. 26, 1880	
3	Grand Harbour.....	2	Miss Josie Cronk.....	50 00 do	Jan. 18, 1881	
4	Seal Cove	4½	O. McLaughlin.....	50 00 do	do 1, 1883	
5	Southern Head Lighthouse...	5½	Wood McLaughlin	50 00 do	do 18, 1881	
			D. McKay, Repairer.	60 00	May 1, 1881	Seal Cove office was operated by Miss L. Fry, from 1st November, 1882, till 31st December, of same year.
	Totals.....	21		730 00		Before the winter of 1884 there will be completed, between Chatham and Escouminac, N.B., a line 43 miles in length.

Cost of land lines. \$2,000 00

CABLE.

Length of cable, Long Eddy, Grand Manan, to Liberty Cove, Campbell, 7½ nau. miles... 8,000 00
Total..... \$10,000 00

CAMPABELLO SECTION.

STATIONS.	Intermediate Distances.	Operators.	Salaries per annum.	Date of Appointment.	Memo.
<i>Liberty Cross Cable Hut, to</i>	Miles.		\$ cts.		
1 Welchpool.....	7½	G. M. Mabee	50 00 or com'n.	Dec. 1, 1881...	This office was worked by G. M. Mabee, from 1st February to 30th April, 1881, at \$20 per month, and by G. W. Byron, at \$50 per annum, from 1st May to 30th November, 1881. Mr. Mabee was again paid \$20 per month after 1st July, 1883.
2 Eastport, Maine, U.S.A.....	½	J. Cushing	100 00	do 26, 1881	
Total.....	8		150 00		

Cost of land lines..... \$825 00

CABLE.

Cable 1,13½ nautical miles, Welchpool (Campobello) to Eastport, Maine, U.S.A..... 2,100 00
 Total..... \$2,925 00

TOTAL COST GRAND MANAN TELEGRAPH SYSTEM.

Land lines, 29 miles, cost..... \$2,825 00
 Cables, 91½ nautical miles, cost..... 10,100 00
 Total..... \$12,925 00

ESTIMATED COST OF ANNUAL MAINTENANCE AND REVENUE.

Land lines—Salaries and repairs..... \$1,600 00
 Cable—Repairs, probably..... 1,000 00
 Total..... \$2,600 00 Required in Estimates,
 Less probable revenue..... 1,000 00 1884-85.
 Balance deficit..... \$1,600 00

GOVERNMENT TELEGRAPH SERVICE—Continued.
CHICOUTIMI AND NORTH SHORE OF ST. LAWRENCE TELEGRAPH SYSTEM.
CHICOUTIMI SECTION.

No.	STATIONS.	Intermediate Distances.	Operators.	Salaries per annum.	Date of Appointment.	MEMO.
		Miles.				
1	Bay St. Paul	0	} The Operators on this line are appointed and paid by the Company operating the line.			} This line was completed 1st September, 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	31½				
5	St. Alphonse de Bagotville	3				
6	Chicoutimi	11½				
	Total.....	92				

CONSTRUCTION.
 Cost of land line complete, at \$135 per mile \$12,420.00

MAINTENANCE.
 Included in agreement with Montreal Telegraph Company for North Shore Section.
NORTH SHORE SECTION.

No.	STATIONS.	Intermediate Distances.	Operators.	Salaries per annum.	Date of Appointment.	MEMO.
		Miles.				
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. One nautical mile of this distance is sub-marine cable.
2	St. Fidèle	10				
3	St. Simeon	11				
4	Anse du Portage	23				
5	Tadoussac	2				
6	Bergeronnes	15				
7	Escoumains	12				
8	Sault au Mouton	16				
9	Portneuf Village	11½				
10	do Lighthouse (Loop 3 milles)	9				

GOVERNMENT TELEGRAPH SERVICE IN BRITISH COLUMBIA.

Office.	Intermediate Distances.	Miles.	Names.	Positions.	Salaries per month.	Date of Appointment.	Memo.
Victoria			Miss D. A. Maclure	Manager and operator	\$ 90 00	1st Dec, 1871	Repairing allowance, \$3 per day.
do			J. A. Carmichael	Assistant and clerk	65 00	1st Jan, 1881	
do			F. S. Brown	Night operator	75 00	1st Aug, 1883	
do			Max. Leclair	Messenger	20 00	1st do 1882	
Covican		31	C. H. Sherwood	Operator and repairer	50 00	11th Jan, 1884	do \$2 do
Somenos		8	Mrs. Skinner	Operator	60 00	1st May, 1881	Testing station; no salary attached.
Chemainus		9	T. D. Gonyaw	Operator and repairer	60 00	1st Aug, 1883	Repairing allowance, \$2 per day.
Nanaimo		25	J. A. Callaghan	do	60 00		do \$4 do
Departure Bay		34	B. H. Wake	Operator and repairer	20 00	15th Aug, 1881	Telephone station at Colliery wharves.
Valdes		16	Geo. Sinclair	do	20 00		Repairing allowance, \$2 per day.
Granville		35	Jas. Wilson	District superintendent	125 00	1st do 1883	
New Westminster		11 1/2	W. F. Archibald	Manager and operator	100 00	22nd May, 1880	
do			Miss S. E. Maclure	Assistant operator	75 00	1st Jan, 1881	do \$5 do
do			S. T. Mackintosh	Night operator	75 00	1st May, 1881	
do			G. P. Pettendrich	Messenger	20 00	1st Aug, 1883	
Moodyville			John Maclure	Operator and repairer	60 00	25th do 1883	
Mat-quí		36	John McOutcheon	do	60 00	1st Mar, 1885	Private line; operated by Moodyville Saw Mill Co.
Chiliwack		22	Mrs. E. M. Daly	Operator	50 00	15th June, 1885	Plus 36 miles, 2nd land wire; repairing allowance, \$1 per day.
Hope		36	E. Belanger	Operator and repairer	50 00	1st Nov, 1879	Repairing allowance, \$1 per day.
Yale		13	James Fraser	Messenger and assistant	30 00	1st April, 1884	do \$1 do
do			A. C. McArthur	Operator and repairer	60 00	7th July, 1882	do \$3 do
Easton Bar		25	Henry L. Good	Operator	50 00	1st April, 1884	\$15 per month, horse feed.
Keefe's		16	G. W. Birney	Operator and repairer	50 00	1st * pril, 1884	O. P. R. Divisional Engineer's headquarters.
Lytton		17	H. A. Macfreed	Operator	60 00		\$20 per month, horse feed.
Drynock		6	Daniel O'Hara	Operator and repairer	60 00	27th May, 1880	O. P. R. Divisional Engineer's headquarters.
Spence Bridge		30	John Ross	do	60 00	5th do 1884	Repairing allowance, \$3 per day.
Cache Creek		24	G. C. McQuire	Operator	50 00	15th do 1884	do \$3 do
Savona's Ferry		26	A. J. Venn	Operator and repairer	50 00	28th Oct, 1881	do \$2 do
Kamloops		26	J. A. LeBourdais	do	50 00	1st do 1883	do \$2.50 do
Clinton		28	Wm. Walker	do	50 00	1st May, 1880	\$10 per month, horse feed.
Bridge Creek		78	Henry Yeates	do	60 00	June, 1866	\$15 do
Soda Creek		54 1/2	Miss I. Barlow	Operator	47 00	28th April, 1882	\$15 do
Quesnelle		48	W. W. Dodd	do	83 33		Accommodation office; no salary attached.
Stanley		13	James Stone	Operator and repairer		17th Feb, 1873	Repairing allowance, \$3 per day.
Bakerville							

<i>Branches.</i>			
New Westminster to Ladner's Landing, ($\frac{1}{2}$ mile cable)	18	H. J. Edwards	Operator
New Westminster to Port Moody	7 $\frac{1}{2}$	Earle Atkins	do
	702		40 00
			24th Aug., 1883
			14th Jan., 1884
			1,785 33

Length of line, 702 plus 36 miles double line, 738 miles. Total salaries, \$1,785 33 per month; \$21,424 per annum.

TOTAL COST OF BRITISH COLUMBIA TELEGRAPH SYSTEM.

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, about	12,000 00
Value of 248 miles additional new lines erected, say at a cost of \$100 per mile	24,800 00
New cable laid, including cost of "Electron," say 26 knots, at \$1,100 per mile	28,600 00
Total present value	\$89,400 00
Estimated expenditure, 1884-85, salaries, repairs, &c.	\$37,500 00
Less—Revenue, probably	30,000 00
Balance deficit	\$7,500 00

GENERAL RECAPITULATION.

Total length of land lines now in operation (exclusive of lines in Manitoba and North West; on South Shore of St. Lawrence, and between Halifax and Oanoo)	1,506 $\frac{1}{2}$ miles
Total length of cables	192 $\frac{1}{2}$ do
Annual maintenance (including \$2,000 subsidy to Prince Edward Island) about	\$55,000 00
Annual revenue upon Government account, about	33,000 00

F. N. GISBORNE,
Superintendent.

OTTAWA, 15th July, 1884.

TARIFF ON DOMINION GOVERNMENT TELEGRAPH LINES.

Location of Lines.	Extreme Distance in Miles.			Rate for a message of 10 words, and for each extra word. The address and signature not charged for.
	Land Lines.	Cables.	Total.	
Nova Scotia—				
Between North Sydney and Meat Cove, Cape North.....	126	$\frac{1}{2}$	126 $\frac{1}{2}$	25c. and 2c.
do Barrington and Cape Sable Island Light	16	1 $\frac{3}{4}$	19	12c. " 1c.
New Brunswick—				
Between offices on Grand Manan.....	21			15c. " 1c.
do on Grand Manan and Campbellobello.....	8	7 $\frac{1}{4}$		25c. " 2c.
do on Grand Manan and Campbellobello and Eastport.....		1 $\frac{7}{8}$	38 $\frac{1}{8}$	25c. " 2c.
Between Chatham and Escouminac.....	43		43	15c. " 1c.
Quebec—				
Between offices on Magdalen Islands.....	83 $\frac{3}{8}$			25c. " 2c.
do on Magdalen Islands and North Sydney	126 $\frac{1}{2}$	73 $\frac{3}{8}$	283 $\frac{1}{4}$	75c. " 5c.
do on Anticosti Island.....	214			25c. " 2c.
do on Anticosti Island and Gaspé.....	28	44 $\frac{1}{2}$	286 $\frac{1}{4}$	75c. " 5c.
do on north shore St. Lawrence, east of Bersimis.....	75	38		25c. " 1c.
do on north shore St. Lawrence, east and west of Bersimis.....			113	40c. " 2c.
do on Orleans Island.....	(about) 31			15c. " 1c.
do on Orleans Island and Quebec.....	13	$\frac{3}{4}$		15c. " 1c.
do on Orleans Island and Grosse Isle.....	1	5 $\frac{1}{4}$		25c. " 1c.
do on Grosse Isle and Quebec.....			54	25c. " 1c.
North-West Territory—				
Between Qu'Appelle and Edmonton.....	537		537	75c. " 5c.
do Intermediate offices 25c. and 2c. to 75c. and 5c., according to distance.				
EXAMPLE:— Qu'Appelle to Fort Qu'Appelle, 17 miles, 2c. for 10 words and 2c. for each additional word; Qu'Appelle to Battleford, 281 miles, 5c. for 10 words and 3c. for each additional word.				
British Columbia—				
Between Victoria and Barkerville.....	653	23 $\frac{1}{2}$	676 $\frac{1}{2}$	\$1.00 " 5c.
do Intermediate offices 15c. and 1c. to \$1.00 and 5c., according to distance, as explained in example above.				

In proportion to population Canada enjoys greater telegraphic accommodation than any other country in the world; there being within the Dominion one station to every 1,914 persons *vs.* one to 3,700 persons in the United States, and one to every 6,508 persons in Great Britain. The value of such means of accommodation, even in distant places where the population is at present sparse, makes the emigrant feel not far from home no matter where he may be settled in the Dominion, and at the same time enables him to dispose of his crops, &c., to the best possible advantage.

APPENDIX No. 23.

STATEMENTS

SHOWING

1ST.—CONTRACTS LET BY THE DEPARTMENT.

2ND.—PROPERTY PURCHASED BY THE DEPARTMENT.

3RD.—PROPERTY LEASED BY OR TO THE DEPARTMENT,

DURING FISCAL YEAR ENDED 30TH JUNE, 1884.

BY

A. GOBEIL, Law Clerk.

APPENDIX No. 23.

CONTRACTS LET BY THE DEPARTMENT, &c.

Ref. No. 49,952.

**DEPARTMENT OF PUBLIC WORKS,
OTTAWA, 1st August, 1884.**

SIR,—In compliance with your letter of the 14th May last, I have the honor to enclose to you herewith the accompanying statements which are required for publication in the Annual Report for 1883-84, viz :—

1st. Statement of the contracts let by the Department of Public Works from 1st July, 1883, to 30th June, 1884.

2nd. Statement of property purchased by the Department during the fiscal year ended 30th June last.

3rd. Statement of property leased to or by the Department during the same period.

I have the honor to be, Sir, ~~Yours~~
Your obedient servant,

A. GOBEIL.

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

No. 1.—CONTRACTS let by the Department of Public Works of Canada, from the 1st July, 1883, to 30th June, 1884.

Works.	Names of Contractors.	Date of Contract.	Amount.
PUBLIC BUILDINGS.			
<i>Ontario.</i>			
			\$ cts.
Amherstburgh—Construction of Post Office, &c.....	P. Navin	Oct. 3, '83	17,909 00
Barrie do do	W. Toms	Sept. 12, '83	25,000 00
Berlin do do	W. H. Lewis.....	Jan. 10, '84	23,900 00
Chatham—Heating apparatus in Post Office, &c.....	J. & J. Blackmore.....	Nov. 9, '83	1,800 00
Gananoque Customs House—Construction.....	George Wilson.....	July 23, '83	9,000 00
Kingston Penitentiary—Timber for wharf	W. McRossie.....	Oct. 13, '83	4,028 90
Toronto Post Office—Fittings.....	Thos. Pells.....	Nov. 20, '83	4,900 00
do Examining Warehouse—Additions	Brown & Love.....	Oct. 19, '83	72,967 00
Generally—Letter box fronts	E. Chanteloup.....	Aug. 14, '83	p. box 2 40
<i>Quebec.</i>			
Levis—Roof over Fort No 1.....	P. Samson.....	May 10, '83	3,117 50
Montreal—Drill Shed—Iron roof.....	W. Hendrie.....	Aug. 16, '83	32,000 00
do Examining Warehouse—Additions.....	John Black	Nov. 2, '83	6,954 00
do do Floors.....	Cousineau & Valiquette.....	do 27, '83	56,249 00
do Coal for Public Buildings.....	J. O'Brien & Co.....	Sept. 20, '83	1,311 00
Quebec—Drill Hall—Construction.....	Costolow & Lortie	May 26, '84	62,000 00
do Fortifications—Repairs to Diamond Bastion, Citadel	do	Sept. 5, '83	5,722 00
do do Repairs to Richmond Bastion, Citadel	do	do 5, '83	965 64
do do Repairs to Military Stores, Palace Hill.....	do	do 5, '83	900 00
do do Repairs to Rampart Walls....	do	do 5, '83	1,412 21
do do Wall below Citadel Cliff— Construction.....	do	do 27, '83	3,476 00
do do Repairs to St. Valier St. wall	Chs. Jobin.....	do 5, '83	1,500 00
do do Building roof over Dalhousie Bastion, Citadel.....	do	do 5, '83	3,300 00
do do Repairs to d'Auteuil St. wall	do	do 5, '83	650 00
do do do Mt Carmel do	do	do 5, '83	1,900 00
do do Building wall at St. John Bastion.....	E. Larose	do 5, '83	900 00
do do Repairs to Part 9 of Sec. 3....	Thos. Pampalon	Dec. 12, '83	4,780 00
do and Three Rivers—Supply of coal	A. H. Murphy & Co.....	Sept. 14, '83	1,256 25
Sherbrooke—Completion of Public Building	G. G. Bryant	May 28, '84	11,997 00
St. Vincent de Paul Penitentiary—Supply of stone	Louis Paré	Oct. 3, '83	*
Three Rivers—Conversion of Customs House into Post Office	J. Durocher & Fils.....	do 1, '83	1,300 00
<i>New Brunswick.</i>			
Moncton—Construction of a Post Office, &c.	Geo. J. O'Doherty.....	Aug. 29, '83	21,480 00
St. John—Fort Dufferin—Further lengthening of retaining wall	J. T. Kennedy	March 3, '84	3,000 00
do Marine Hospital—Heating apparatus	Campbell & Ellis.....	Sept. 14, '83	4,825 00
do do Completion of building	Bund & Mildon.....	June 28, '84	7,444 00
po Fredericton and Sussex—Coal for Public Buildings	R. P. McGivern.....	Oct. 2, '83	4,424 07

* Rubble, \$12 per toise; dimension, 35c. per cubic foot; flags, 18c. per cubic foot.

No. 1.—CONTRACTS let by the Department of Public Works, &c.—Continued.

Works.	Names of Contractors.	Date of Contract	Amount.
PUBLIC BUILDINGS—Concluded.			
<i>Nova Scotia.</i>			
			\$ cts.
New Glasgow—Construction of a Post Office.....	James Strachan.....	June 23, '84	29,175 00
Truro do do	Townshend & McKay	Sept. 12, '83	21,000 00
Windsor do do	J. McIntosh	Oct. 15, '83	19,800 00
<i>Prince Edward Island.</i>			
Summerside—Construction of a Post Office	Pierce Doyle.....	Oct. 16, '83	21,125 00
<i>Manitoba.</i>			
Winnipeg—Parliament Buildings—Construction of further wing...	J. G. Gelly & Co.	Dec. 3, '83	36,000 00
do do Heating apparatus	The American Plumbing Co.	Feb. 4, '84	12,980 00
do Post Office—Construction	J. G. McDonald.....	Sept. 28, '83	122,900 00
do Powder Magazine—Construction.....	Rourke & Cass.....	do 24, '83	5,600 00
<i>North-West Territories.</i>			
High River—Industrial School—Construction.....	Williams & Murphy.....	July 9, '84	11,720 00
Qu'Appelle do do	M. P. Zindord.....	June 24, '84	8,500 00
do Immigration Shed.....	C. H. Logan.....	July 10, '83	5,839 00
<i>Ottawa.</i>			
Public Buildings—Coal supply	G. W. McCullough.....	Aug. 15, '83	4,534 60
do Snow removal.....	H. G. Lewis	Nov. 30, '83	430 00
New Departmental Buildings—Construction.....	A. Charlebois.....	Sept. 20, '83	295,000 00
Drill Hall—Caretaker's House do	John Black	Nov. 2, '83	1,958 00
Nepean Point—do do	Askwith & Neville.....	do 23, '83	373 50
Rideau Hall—Snow removal.....	H. G. Lewis	do 30, '83	469 00
HARBOURS AND RIVERS.			
<i>Ontario.</i>			
Cobourg—Further extension of Eastern Pier.....	J. W. Dinwoodie.....	Mar. 10, '84	22,750 00
Collingwood do Breakwater.....	Robert Reed.....	Nov. 23, '83	18,613 00
Kingsville—Harbour Works	Geo. J. Wilson.....	July 28, '83	33,500 00
Morpeth—Construction of a Pier, and Dredging.....	J. E. Askwith.....	Mar. 5, '84	17,400 00
Southampton—Extension of Pier.....	D. Porter.....	do 28, '84	9,750 00
<i>Quebec.</i>			
Berthier (<i>en las</i>)—Extension of Pier.....	A. Guerard.....	Feb. 28, '84	9,700 09
Bic—Supply of timber for Pier.....	W. E. Butchart.....	April 2, '84	6,637 54
Ile aux Grues—Connection of isolated Block with shore	Normand & Duclos.....	Jan. 30, '84	8,250 00
Lacolle and Clarenceville—Pier at Bridge between...	R. H. Rogers.....	do 30, '84	3,000 00
Lanoraie—Construction of a Wharf	Normand & Dusablon	April 10, '84	4,500 00
Quebec—Queen's Wharf repairs.....	T. E. Normand.....	Oct. 31, '83	8,048 60
Perce—Supply of timber for Pier.....	C. H. Burman.....	Mar. 21, '84	3,347 25
Rivière du Loup (<i>en bas</i>)—Addition of 130 ft. to Pier.	Aikman & Wardle.....	Dec. 15, '83	21,950 00

No. 1.—CONTRACTS let by the Department of Public Works, &c.—*Concluded.*

Works.	Name of Contractors.	Date.	Amount.
HARBOURS AND RIVERS—<i>Concluded.</i>			
<i>New Brunswick.</i>			
			\$ cts.
Anderson's Hollow—Extension of Breakwater.....	Brewster & Peck	Sept. 12, '83	3,450 00
Boutouche—Construction of a Wharf.....	Venant Bourque.....	Mar. 31, '84	3,290 00
Hopewell Cape—Inward portion of Ballast Wharf....	Dowling, Condom, Curry & Palmer	Sept. 18, '83	2,780 00
Mispec—Construction of Breakwater.....	G. S. Mayes	Mar. 1, '84	9,000 00
Rocher Bay—Extension of Breakwater.....	Anderson & Cannon.....	July 13, '83	3,000 00
Upper Salmon River—Construction of Breakwater at western entrance.....	D. Cleveland	Oct. 16, '83	3,970 00
<i>Nova Scotia.</i>			
Cheverie—Construction of a Breakwater.....	Sanford & Burgess	Mar. 12, '84	8,888 00
Port Hood—Rip-rap slope to Landing Pier.....	J. McKeen	Dec. 12, '83	11,400 00
<i>Prince Edward Island.</i>			
Malpeque—Extension of Breakwater.....	J. A. Beairsto.....	Nov., 15, '83	3,000 00
DREDGING.			
Belleville, Ont.....	C. A. Munson.....	Oct. 26, '83	p. h. 7 00
BRIDGES.			
St. David de Levis, Que.....	H. A. Carrier	Aug. 10, '83	2,200 00
TELEGRAPHS.			
Province of Quebec—Telegraph poles for line between Rivers Pentecost and Moisie.....	T. J. Lamontague.....	Mar. 20, '84	5,000 00
do Telegraph Line between Rivers Pentecost and Moisie—Con- struction.....	Gagnon et Frères.....	June 13, '84	*p.m.60 00
Province of New Brunswick—Telegraph poles for Line between Chatham & Escuminac.....	J. & P. Williston.....	Jan. 22, '84	612 50
do do Telegraph line between Chatham and Escu- minac—Construction	W. Wyse.....		p.m. 35 00
North West Territories—Construction of Telegraph Lines.....	A. McConnell	Sept. 4, '83	6,949 31

*Not more than 150 and not less than 100.

NOTE.—The above list contains only contracts for which a written agreement was entered into.

A. GOBEIL.

DEPARTMENT OF PUBLIC WORKS,
OTTAWA, 1st August, 1884.

No. 2.—STATEMENT of Property Purchased by the Department of Public Works during the Fiscal Year ended 30th June, 1884.

Date of Purchase.	Vendors.	Purchaser.	Description of Property.	For what Purpose used.	Area.	Price.
1882. Dec. 26...	D. O'Connor.....	Her Majesty.....	W. ½ lot 22, south side of Wellington Street, Ottawa.	New Departmental Building.	City lots.	\$ cts. 12,000 00
do 26...	do	do	E. ½ do do	do	do	13,180 00
1883. Dec. 18...	High Court of Justice, Chancery Division.	do	Order vesting in Her Majesty lot No. 23, (Porter Lot) south side Wellington Street, Ottawa.	do	do	15,006 84
1882. Dec. 26...	D. O'Connor.....	do	Lot No. 24 and W. ½ No. 25, south side of Wellington Street, Ottawa.	do	do	24,000 00
1883. May 19...	High Court of Justice, Chancery Division.	do	Order vesting in Her Majesty E. ½ lot No. 25, and lot No. 26 south side Wellington Street, Ottawa. (Baker Lots).	do	do	23,000 00
1882. July 30...	W. Shoolbred.....	do	Release of leasehold interest in lot No. 23 on south side of Wellington Street, Ottawa	do	do	250 00
1882. Sept. 19...	N. S. Tarr.....	do	do do do	do	do	300 00
1882. Dec. 1...	J. G. Butterworth	do	do do do	do	do	100 00
1882. do 14...	Jos. Kavanagh, &c.....	do	do do do	do	do	300 00
1882. June 26...	Vancouver Coal Mining and Land Company.	do	Lot No. 9, block LVI, in Nanaimo, B.C., in addition to lots 7 & 8 already purchased.	Additional for site of Public Building.	do	400 00
1882. Aug. 29...	Mrs. S. Ballam.....	do	Lot of land bounded by Lower Water Street, Maria Street, the Harbour and the land of E. E. Binch, at Arichat, N.S.	Site for Post Office.....	do	1,000 00
1882. Oct. 20...	Oaspar Heller.....	do	Lot No. 3 in the town of Berlin, Ont., corner of Benton and King Streets.	do	13,680 sq. ft.....	3,000 00
1882. do 12...	Bank of Montreal.....	do	Two lots of land in the Town of Newcastle, N.B., fronting on Water Street.	do	do	3,000 00
1882. do 25...	John Symonds.....	do	Water and mill privileges, roadway and feeder, on the River St. Louis, Parish of St. Louis de Gonzague, Co. of Beauharnois, P.Q.	do	do	9,000 00
1882. Nov. 20...	Williams Estate.....	do	Lot of land on Main Street, Portland, N.B., with buildings thereon.....	Post Office purposes.....	71 x 80 ft.....	\$9,000 & \$130.90 ground rent.
1882. do 28...	N. Marks.....	do	Lot of land in the Town of St. Stephens, N.B.	Site for Post Office.....	do	3,000 00
1884. Jan. 6...	A. B. Falinger.....	do	Lot of land on Pinnacle Street, Belleville, Ont.	For examining warehouse	1 1/16 acre.....	3,500 00

No. 2.—STATEMENT of Property Purchased by the Department of Public Works during the Fiscal Year ended 30th June, 1884—
Concluded.

Date of Purchase.	Vendors.	Purchaser.	Description of Property.	For what Purpose used.	Area.	Price.
Jan. 12...	Trustees of Public Property, County of Cumberlandland.	Her Majesty.....	Lot of land corner of Victoria and Lawrence Streets, Amberg, N.S.	Site for Post Office.....	(10 x 105 x 65 x 9) ft.	Gift.
March 13...	Mayor & Council of Sorel	do	Lot of land corner George and Prince Streets, Sorel, P.Q.	do	110 x 104.	do
April 1...	Imperial Hotel Co., Galt	do	Part of lot No. 1 on South Water Street, Galt, Ont.	do	8 perches.	Free grant.
do 8...	Davidson Estate.....	do	do	do	18 do	do
May 9...	Alfred Mondoux.....	do	Part of lot 290, parish of St. Michael d'Yamaska, P.Q.	Yamaska River Works...	0.49 arpents.....	49 00
do 9...	Marxine Leveillé.....	do	do 292	do	1.30 do	130 00
do 29...	Louis Leveillé.....	do	do 293	do	1.46 do	146 00
do 9...	Aimé Leveillé.....	do	do 387	do	0.85 do	85 00
do 9...	Felix Leveillé.....	do	do 388	do	0.97 do	97 00

A. GOBELL.

DEPARTMENT OF PUBLIC WORKS,
OTTAWA, 1st August, 1884.

No. 3.—STATEMENT of Property Leased to or by the Department of Public Works during the Fiscal Year ended 30th June, 1884.

Date of Lease.	Lessor.	Lessee.	Property Leased.	For what Purpose used.	Duration of Lease.	Rent Payable.
1883. April 19...	Miss A. L. Arkland..... Her Majesty.....	Her Majesty..... The Grand Trunk, Georgian Bay and Lake Erie Railway Company.	Dwelling house in city of Winnipeg, Man The Government docks at Warton, Ont	Public Works Office. Railway wharves....	1 year to 1st May, 1884. 99 years.....	\$600 per annum. \$25.00 do

A. GOBELL.

DEPARTMENT OF PUBLIC WORKS,
OTTAWA, 1st August, 1884.

APPENDIX No. 24.

LIST OF SOME OF THE ACTS OF PARLIAMENT

[PASSED AT THE SESSION OF 1884,

AND HAVING REFERENCE TO

THE DEPARTMENT OF PUBLIC WORKS,

OR WORKS UNDER ITS CHARGE.

BY

A. GOBEIL, Law Clerk.

APPENDIX No. 24.

SIR,—I beg to enclose herewith the following Statement, viz.:—The Public Acts of the Parliament of Canada, passed at the Session of 1884, and having reference to the Public Works Department, or works under its charge.

I have the honour to be, Sir,

Your obedient servant,

A. GOBELL.

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

List of some of the Public Acts of the Parliament of Canada, passed at the Session of 1884, and having reference to the Public Works Department, or works under its charge.

Subject.	Full Title of the Statute.	Chapter.	Page in Statute Book.
Civil Service of Canada— Amending Acts of 1882-83...	An Act to amend the Civil Service Acts of 1882 and 1883.	15	87
Esquimalt Graving Dock—Sec. 10.....	An Act respecting the Vancouver Island Railway, the <i>Esquimalt Graving Dock</i> , and certain railway lands of the Province of British Columbia granted to the Dominion	6	55
Public Works Act— <i>Re</i> sale or lease of public property.....	An Act further to amend the Act 31 Vic., cap. 12, intitled: "An Act respecting the Public Works of Canada"	16	90
Public Works Act—Transfer of fortification works, &c., to Militia Department.....	An Act respecting Fortifications and Military Buildings, and their maintenance and repair.....	17	91
Quebec—Harbour Works (\$300,000).....	An Act to make further provision towards the completion of the Tidal Dock in the Harbour of Quebec	9	76
do Graving Dock (\$150,000).....	An Act to authorize the advance of a further sum for completing the Graving Dock in the Harbour of Quebec.. ..	10	77

A. GOBELL.

DEPARTMENT OF PUBLIC WORKS,
OTTAWA, 6th December, 1884.

APPENDIX No. 25.

ESSAY

ON THE

CONTRACTED LIQUID VEIN

AFFECTING THE PRESENT THEORY OF THE

SCIENCE OF HYDRAULICS,

BY

R. STECKEL, Assistant Engineer,

DEPARTMENT OF PUBLIC WORKS, CANADA.

ESSAY

ON THE CONTRACTED LIQUID VEIN

AFFECTING THE PRESENT THEORY OF THE SCIENCE OF HYDRAULICS

BY R. STECKEL, ASSISTANT ENGINEER,
DEPARTMENT OF PUBLIC WORKS, CANADA.

1883-84.

INTRODUCTION.

It has been proved in the most conclusive manner, a full century ago, by the celebrated Italian philosopher, Lorgna, founder of the "Societa Italiana," in the first chapter of his "Phisico Mathematical Theory of the Motion of Liquids issuing from Orifices in Reservoirs,"* and by other scientists, that the contracted fluid vein issuing from an orifice in the side or bottom of a reservoir constantly kept full of water, does not acquire its *vis viva* or living force by reason of the actual descent of the liquid particles, from the surface through the orifice. Yet, for the want of a sound theory, consistent with the results of experiment, respecting the formation of the liquid contracted vein, we are up to this day compelled, in the absence of any other alternative, to consider all liquid jets or veins in the light of bodies falling, in each case, freely through a space equal to the height of the liquid surface above the centre of the orifice, according to the universally accepted law of gravitation. We are also forced, chiefly for this reason, to introduce into all hydraulic computations, empirical coefficients of velocity, coefficients of contraction and coefficients of efflux or discharge, in addition to a variety of coefficients of friction and other resistances.

Some time ago I undertook a series of experiments, for the purpose of becoming practically acquainted with the leading hydraulic phenomena and thoroughly convinced of the truth of the commonly accepted laws by which the intricate and still imperfectly understood science of hydraulics is said to be governed. It is no more than might be expected, that such a prominent phenomenon as the contraction of the liquid vein at its exit from the orifice should attract a good share of attention on my part. I may state, however, that I was also incited to pursue deeply the investigation of this particular part of hydraulics by the perusal of such passages of the literature on the subject as the following, viz.:-

1. "By applying the general laws of motion to the lateral fluid filaments of the stream which issues through A B, it is found that they tend to describe a curve which commences within the reservoir, for example at A, and continues towards C S E. To determine the nature of this curve, it is requisite to know and to combine together by calculation: the mutual convergency of the fluid filaments in A B, the law of the lateral communication of motion between the filaments themselves and their divergent progression from C to E. These combinations and calculations are perhaps beyond the utmost efforts of analysis. While the tube

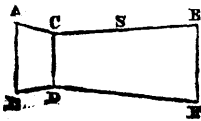


PLATE I.

* Vol. IV., Mem. della Societa Italiana. (See Appendix.)

"A B F E, possesses a different figure from this natural curve, the results of experiment will always differ more or less from the theory (1).

2. "Lorgna pretends that $0.472 a$ (a being the head) is the height which would produce, in any heavy body, the velocity of efflux in the orifice, and that the contracted vein is nothing else than the continuation of the Newtonian Cataract: he supports this proposition by computations deduced from the mutual action of the particles of the fluid contained in the vessel. But after having seen the failures of the greatest geometers on this very subject, we ought to mistrust all these demonstrations founded on mechanical principles very true in themselves, but of which the application to an infinity of bodies, which move and are pressed in every direction, becomes extremely difficult, if not impossible." (2)

3. "So long as we have no more accurate knowledge of the law of contraction of the stream, we can assume that the stream flowing through a circular orifice, forms a solid of rotation whose surface is generated by the revolution of the arc of a circle about the axis of the stream. (3)

4. "It has been latterly asserted in a Blue-Book that theoretically $V_d = \frac{2}{3}\sqrt{2gh}$, V_d denoting the velocity in the plane of an orifice in a thin plate; h , the head of water on this orifice, and g , the acceleration produced by gravity, per second. It is not necessary here to combat this error, which confounds the discharge with its velocity, and a single practical fact, applicable only to a thin plate, with a theoretical principle. The experimental discharge approximates to $\frac{2}{3}\sqrt{2gh}$ multiplied by the area of the orifice; but the theoretical velocity $\sqrt{2gh}$ always approximates to the experimental velocity, or $.974\sqrt{2gh}$, obtained immediately outside the orifice, in the *vena contracta*. It would be unnecessary to allude to this theory here, if it were not supported and put forward by three engineers whose authority in practical questions may mislead others. *Vide* p. 4 of 'Brief Observations of Messrs. Bidder, Hawksley and Bazalgette on the answers of the Government Referees on 'the Metropolitan Main Drainage,' ordered by the House of Commons (London, Eng.), to be printed 13th July, 1858.'"*

The first part of Lorgna's "Phisico Mathematical Theory of the Motion of Liquids issuing from Orifices in Reservoirs," especially, is well worth perusing. As the fourth volume of the memoirs of the "Italian Society," published in 1785, which contains this *savant's* original paper in extenso, is not easy of access for consultation. I have appended hereto a translation of the introduction and the two first chapters.

EXPERIMENTAL ENQUIRIES.

APPARATUS USED—MODE OF CONDUCTING EXPERIMENTS.

In order that the experimental data to which I shall have to refer hereafter, in support of theoretical deductions, may prove acceptable with some degree of confidence, it is indispensable that I should give a brief description of the apparatus made use of, and of the *modus operandi* followed by me for their determination.†

(1) and (2) See Tracts on Hydraulics, edited by Thomas Tredgold, London, 1826. Part II.—Experimental enquiries concerning the principle of lateral communication of motion in fluids applied to the explanation of various hydraulic phenomena, by Citizen Z. B. Venturi; translated from the French by W. Nicholson. Pages 145 and 177.

(3) See Weisbach's Mechanics of Engineering, page 822, vol. I. English translation by Coxe. Von Nostrand, New York.

* See Neville's Hydraulic Tables, coefficients and formulæ, second edition, p. 33.

† The apparatus shown in Fig. 2, including mouth-pieces, orifices, tubes, hook gauges and fittings was constructed for me by Mr. E. Chanteloup of Montreal, who executed the work with his accustomed ingenuity, precision and care.

The reservoir of supply A—a brass cylinder 12 inches in diameter inside and some $3\frac{1}{2}$ inches high in the clear—was mounted on two horizontal, parallel circular plates B, C, respectively 10 and 12 inches in diameter, connected by four ball and socket jointed levelling screws D, by means of two guide rods E, and a feed screw F, about 3 feet in height, along which it could be raised or lowered at pleasure to any desired height above the upper plate B.

The orifice-plates O, mouth-pieces M, or tubes T, were screwed from below into a threaded ring provided in the center of the horizontal circular bottom of the reservoir A, and a brass stand G, carrying a hook-gauge and scale S provided with vernier furnishing readings to within $\frac{1}{500}$ part of an inch, was screwed around the outer face of this interior ring-shaped projection, about $\frac{1}{2}$ inch in height, on the bottom of the said reservoir. A cylindrical, vertical, perforated partition of sheet copper, some 9 inches in diameter, and $3\frac{1}{2}$ inches high, was placed loosely in the centre of the reservoir A, for the purpose of counteracting such disturbances as might be produced by any appreciable centrifugal or other motion which the water might still have had after passing into the reservoir of supply proper, from a square tank situated in the garret of the building, through an inch supply pipe I, connected with a $\frac{3}{4}$ inch circular copper pipe laid on the bottom of the last mentioned reservoir, outside of the guide rods and screw, which was pierced on the outside by a number of small, round holes.*

The water was first received into a light trough K, of sheet copper, held by hand or otherwise secured in position, so as to be easily removable, when an experiment is finished, from underneath the orifice, tube, or cock; from this small trough the water ran into one or more circular brass vessels L, which were weighed when the experiment was over, on a scale Z, reading to half ounces.

The time was furnished by a stop-watch, giving quarter seconds, and the diameters of orifices, tubes, &c., &c., were determined by means of tapering sheet-metal gauges and solid conical brass rods, measured with Brown and Sharp's Vernier calipers, reading to 0.001 inch.

When the discharge took place under water the cylindrical brass reservoir A, was connected with a square brass box H, 3 inches wide by 2 inches high in the clear, and some 16 inches long, resting on the upper parallel plate B, by means of one or more brass tubes W, nearly $2\frac{3}{4}$ inches in diameter and $2\frac{1}{4}$ inches high, screwed together, the connections being rendered perfectly watertight by the interposition of rubber bands between the brass bearing surfaces.

On top of the square brass receiving box H, and near one end thereof, stood a glass graduated tube N, open at both ends, of inch bore, some 50 inches high, hermetically connected with the square box by means of a stuffing box; this tube served the double purpose of indicating approximately the height of the water or intensity of the pressure in the receiving reservoir and preventing any accumulation of air therein.

The water that passed from the upper cylindrical reservoir A, through a submerged orifice or tube fitted into its bottom, was discharged through a $\frac{3}{4}$ -inch gauged cock V, inserted in a stuffing box at the left end of the square receiving reservoir H, into the light conduit or trough of sheet copper K, already referred to, whence it ran finally into the brass vessel L, until the time allotted for each experiment, viz., usually from 100 to 300 seconds, was up, when the trough was quickly removed from under the cock V, and the water allowed to go to waste; everything, in other respects, remaining undisturbed, until it was settled whether or not it was desirable to repeat the experiment.

The square box or receiving reservoir H, was connected at the right end by means of an India rubber tube P, $\frac{3}{4}$ inch diameter inside, provided with brass couplings, with a cylindrical vessel Q of sheet copper, 6 to 8 inches in diameter, and some 3 inches high, supported on a movable bracket pushed tightly into one of the interstices, 1 inch high, left between every two of a tier of shelves let into two uprights,

* The tank had an area of 36 feet, and was supplied from the water works of the City of Ottawa by means of an inch service pipe, provided with a bib and ball cock, and its water surface stood, on an average, say, 16 feet above the water in the reservoir A.

raised on a heavy base, the whole of wood, so as to form a firm stand R; by this means the water surface in the receiving reservoir Q, could be fixed at any elevation below that of the reservoir of supply A, that might be found desirable. A second hook-gauge, with scale S_2 , and vernier, supported on a bracket similar to that just described, which was inserted into a compartment situated at a convenient height above the top of the reservoir Q, served to determine the actual difference of level between the water surface of this reservoir and that of the reservoir of supply A, to within $\frac{1}{500}$ part of an inch.

Prior to commencing a set of experiments, the zero points of the scales S_1 and S_2 , in connection with the respective reservoirs A and Q, were compared with each other, by taking the elevation of the water surface in both of them, while the liquid was in a state of perfect equilibrium in the whole system of vessels and tubes, proper care being taken that no leakage or syphoning should take place anywhere, and sufficient time allowed for the water to come to a perfect stand still in each case.

When it was found requisite to use a greater head of water than that which could be directly furnished by the cylindrical reservoir A, viz., about 3 inches, the orifice plates or tubes experimented with were screwed into the bottom of an auxiliary brass cylinder U, some 3 inches in diameter inside, and 8 inches high. This auxiliary cylinder U, itself, was then screwed into the bottom of the 12-inch reservoir A, in the place of the hook-gauge stand G, and placed in communication with the iron 1 inch supply pipe, from the tank in the garret, by an intermediate $\frac{3}{4}$ -inch rubber hose. The effective pressure on the orifice or tube was regulated by the inlet cock, its intensity being ascertained by observing to what height the water rose in a glass tube connected with the 3-inch closed reservoir, at its highest point, by means of a flexible rubber tube X.

EXPERIMENTS.

COEFFICIENTS OF DISCHARGE THROUGH CIRCULAR ORIFICES, IN THIN PLATES.

It is generally conceded by all authorities in hydraulic matters, such as Michelotti, Bossut, Eytelwein, Venturi, D'Aubuisson, Weisbach, &c., that, for a circular orifice in a thin plate, the coefficient of velocity of efflux, corresponding to the plane of the orifice—that is to say, the ratio between the quantity of water actually discharged and the quantity which would be discharged from the reservoir if the velocity in the plane of this orifice was equal to that acquired by a heavy body falling freely or in vacuo, through a space equal to the height of the water surface, above the centre of the orifice—varies between 0.60, or thereabouts, for large heads and small circular orifices, and 0.66 or 0.68 for small heads and large orifices, when the discharge takes place in the open atmosphere.

I may remark, however, at the outset, that the experiments with small orifices, under large heads, on record, are not very numerous, so far as I have been able to find out, and to say the least, those that are available do not inspire unlimited confidence as to the accuracy of the results arrived at. Thus—while Michelotti found the coefficient of velocity of efflux to be 0.607, for an orifice 2.126 inches in diameter, under a head of 7.218 feet, and 0.597 for a circular orifice, the diameter of which was 3.189 inches, under a head of 22.179 feet—Weisbach says that for an orifice of 1 centimeter, or about 0.394 inch in diameter, this coefficient is: $0.632 \times 0.99 = 0.6256$, under a head of 13.574 meters, or 44.536 feet, and $0.60 \times 0.994 = 0.5964$, under a head of 103.578 meters, or 339,839 feet; these last two co-efficients appear to me to be much too large, or else the two former are too small.

The coefficients of velocity determined by myself for efflux, in air, through circular orifices in a thin plate, do not differ from those obtained by a number of others, before me, under similar circumstances, as may be seen by the following recapitulation of experiments, headed Table 1.

TABLE I.

Letter of reference.	Number of experiments made.	Diameter of orifice in inches.	Mean head in inches.	C (vel. orif.) Average value of coefficient of velocity of efflux, in air, at plane of orifice.	Remarks.
A	3	0.394	51	0.6210	<p>The diameter of each orifice was obtained by measuring, with Brown & Sharpe's vernier calipers, reading to 0.001 inch, a slightly conical brass mandrel introduced into the hole, at the point where it filled the same, the largest dimensions being assumed to be nearest the true one.</p> <p>$\sqrt{2g}$ was taken at 27.78 in inches; 1 ounce was taken equal to 1.7315 cubbic inches.</p>
B	3	"	44	0.6263	
C	2	"	35	0.6259	
D	"	"	29	0.6277	
E	"	"	19	0.6268	
F	"	"	12.10	0.6281	
G	8	"	3.08	0.6544	
H	6	0.400	2.97	0.6702	
I	6	"	2.92	0.6727	
J	5	0.4185	3.03	0.6802	
K	14	0.420	3.07	0.6775	
L	3	0.482	3.00	0.6803	
M	4	0.484	2.81	0.6844	

In order to establish coefficients of efflux for very small heads and large orifices, I made experiments with submerged orifices. A synopsis of the results arrived at is given in—

TABLE II.

Letter of reference.	Number of experiments made.	Diameter of orifice in inches.	Mean head in inches.	C (vel. orif.) Average value of coefficient of velocity of efflux, under water, at plane of orifice.	Remarks.
A	7	0.484	0.12	0.6615	Temperature of water, from 52° to 55° Fahrenheit.
B	7	"	0.13	0.6564	
C	4	"	0.23	0.6540	
D	3	"	0.38	0.6531	
E	7	"	0.50	0.6528	
F	3	"	1.42	0.6532	
G	2	"	2.60	0.6503	
H	10	1.031	0.040	0.6598	
I	"	"	0.053	0.6684	
J	"	"	0.103	0.6676	
K	"	"	0.155	0.6619	
L	"	"	0.206	0.6639	

On comparing the above coefficients for discharge under water, with corresponding ones for efflux in air, given in Table I, it is found that from $4\frac{1}{2}$ to 5 per cent must be subtracted from the coefficients of efflux in air, to convert them into coefficients of efflux under water, instead of only $1\frac{1}{2}$ per cent. obtained by Dr. Weisbach for ordinary heads of water I suppose, * indicating a difference of over 3 per cent., which, although comparatively large, may still properly be considered to be due, in a great measure, to the very small heads which I used exclusively.

The coefficients to be used for efflux under water through circular orifices in thin plates, which are given by Mr. J. B. Francis, in his "Lowell Experiments," differ very materially from those obtained by myself, as recorded above, in Table II., and still more from those established according to Dr. Weisbach's rule, just referred to (1).

Mr. Francis entertains, apparently, no doubt but that the coefficient of efflux, through a circular submerged orifice, 0.1017 foot = 1.2204 inch in diameter, should not exceed 0.57 under small heads of from 1 to 5 inches, for at page 225 of his work (1), he says: "It is the general result of the great number of experiments, on record on the flow of water through orifices in a thin plate, discharging freely into air, that the coefficient of discharge (which in simple orifices is the same thing as the ratio of the velocity at the smallest section of the orifice to the velocity due to the head) is greatest for very small heads. In these results where the discharge takes place

* See Weisbach's Mechanics of Engineering and of the Construction of Machines.—English Translation, by Cox, page 825.

(1). See "Lowell Hydraulic Experiments by J. B. Francis."—Third edition, 1871—D. Van Nostrand, N.Y.—Table XXVII—Experiments 93 to 101.

“under water, the coefficient of discharge is least with the very small heads. This result is so marked and uniform that there can be no doubt of the fact.”

Nevertheless, my fifty experiments, H I, J, K, L, Table II, indicate unmistakably that even under the very small heads, varying between $\frac{1}{10}$ and $\frac{2}{30}$ of an inch, the coefficient in question is at least as high as 0.66, for an orifice of 1.031 inch in diameter.

The only distinctive feature that I can see in Mr. Francis' experiments on submerged circular orifices in a thin plate, as compared to my own, is that his orifice, of 1.22 inch, was in a vertical plane, while my orifice of 1.031 inch in diameter was in a plane parallel to the horizon.

I may be allowed to observe, in regard to the discrepancies found to exist between Mr. Francis' coefficients and those of other experimenters, for efflux under very small heads, that his mode of establishing the quantity of liquid flowing in a given time, through a circular orifice in a thin plate, 1.2204 inch in diameter under small heads, varying from say 1 to 5 inches by means of the measured depths of the contracted stream passing over the sharp crest of a weir 7.8 inches long, placed in the wall at the far end of a rectangular reservoir 11½ feet long and 3.0 feet wide, viz.: 6½ feet beyond the plane of the discharging orifice, does not appear to me to be one calculated to lead to unquestionable results.

I do not see that it is possible to determine, with unerring certainty, the discharging power of an orifice in a reservoir, otherwise than by weighing the quantity of water which actually flows out of it into a receiving vessel in a given time and under a constant head, and I consider this to be more especially the case when the heads used are small and the reservoirs comparatively large. I cannot help thinking that had Mr. Francis bored small holes in the wall wherein the weir was placed, at a depth of 1 foot or so below the level of the crest, and weighed the water that would have flowed in a fixed space of time, out of the openings, taking one after another or as many together as would have been convenient, he would very probably have arrived at a different conclusion respecting the value of the coefficients of efflux which are applicable when submerged circular orifices, in thin plates, are used.

On the whole, I think we can admit with confidence that the coefficient of efflux, in air, through my orifice of 1.031 inch in diameter, would be, under the very small head of about $\frac{1}{20}$ inch—if such a vein could be produced in its complete state—in air, no less than 0.668 + 0.032 additional for discharge in air, instead of water, viz.: 0.70; even this value is perhaps yet slightly smaller than it would be if ordinary river water was a perfect fluid in every respect.

The Chevalier Lorgna contends that the reduced velocity of the liquid in the plane of the orifice, as compared with the ordinary theoretical velocity $V = \sqrt{2gH}$ due to the head, H , of water in the reservoir, is due to the simultaneous pressure of the whole liquid mass around the orifice, which, he says, prevents the free efflux from the reservoir; and he computes the theoretical velocity in the plane of the orifice to be:

$$V_{\text{orif.}} = \left(\sqrt{2} \left(\frac{\sqrt{5}-1}{2} \right)^3 \right) \sqrt{2gH} = \sqrt{.472127 \times 2gH} = 0.687115 \cdot \sqrt{2gH}.$$

Mr. H. Résal proves (see article 268, page 288, second volume of his “*Traité de Mécanique Générale*”—Paris—Gauthier Villars, 1874) that the coefficient of discharge through an orifice, in a thin plate, can never be less than $\frac{1}{2}$ or 0.5.

COEFFICIENTS OF CONTRACTION.

It has been usual to take for granted that the coefficient of contraction of the circular vein projected from an orifice in a thin plate, becomes a minimum at a distance from the orifice, equal, on an average, to once or twice its radius. At or near this point, the diameter of the vein has been measured repeatedly by means of four pointed set screws, mounted on a circular diaphragm, these screws being directed, by the eye, as nearly as possible, towards the centre of the vein, until the points touched

its surface. The mean of the two distances, between opposite points, has been invariably held to be the true diameter of the vein at its greatest contraction; this diameter was found to be, on an average, 0.8 of that of the orifice.

From the manner just described, in which these coefficients of contraction are commonly obtained, it is manifest that although they are, as a general thing, sufficiently accurate for practical purposes, for the objects of theoretical research they are not equally serviceable.

In order to arrive at something more reliable, in my opinion, I measured two vertically descending veins, projected through circular orifices, in thin plates of 0.4 inch and 0.482 inch in diameter, respectively, under a constant pressure of some 3 inches.

For this purpose, the position of the cylindrical reservoir of supply A (See fig. 2), into the bottom of which the orifice plates were screwed, was adjusted by means of the four levelling screws D, so as to render the plane of the orifice truly horizontal in every case. The diameter of the vein was measured at various points by means of pointed screws, mounted opposite each other on a circular diaphragm *d*, secured with a screw *c*, to a vertical cylindrical brass standard *r*, along which it could be moved up or down, by sliding. The foot of this upright brass rod *r*, was ground to fit closely into each of three long vertical tapering sockets *s*, united by three radiating bars to a central ring, so as to form a kind of tripod, which was placed concentrically under the falling liquid vein.

The rod *r*, together with the diaphragm *d*, was turned round in one of these sockets, until I succeeded in adjusting the positions of the screws, so that their points would describe, about the centre or axis of the rod or socket, circular arcs tangent to the liquid vein at both sides. The distance between the points of the screws was then ascertained, by measuring, at the proper place, with the vernier callipers, already described, the diameter of a conical mandrel introduced between them.

The dimensions and coefficients of contraction found are given in Tables III and IV, which here follow :—

TABLE III.

Liquid Contracted Vein, falling vertically under a head of 2.99 inches, through a circular orifice, in a thin horizontal plate, 0.4 inch in diameter.

Letter for reference.	x , Abcissa, or distance from the plane of the orifice, down to the measured section.	$2y = d$. Diameter of the vein.	h . Depth of the measured section below the water surface.	$C_{cont.} = \left\{ \frac{\sqrt[4]{h}}{\sqrt[4]{2.99}} \right\} \frac{d}{4}$ Coefficient of contraction, abstraction being made of the acceleration produced by gravity, outside of the reservoir.* See foot note next page.
	Inches.	Inches.	Inches.	
A	0.000	0.400	2.990	1.0000
B	0.800	0.309	3.790	0.8197
C	1.000	0.303	3.990	0.8143
D	1.535	0.296	4.525	0.8207
E	2.535	0.282	5.525	0.8200
F	3.535	0.270	6.525	0.8203
G	4.535	0.258	7.525	0.8063
H	5.535	0.248	8.525	0.8056
I	6.535	0.242	9.525	0.8083
J	7.535	0.238	10.525	0.8116
K	8.035	0.234	11.025	0.8082
L	8.535	0.231	11.525	0.8089
M	8.800	0.229	11.790	0.8070
N	9.535	0.227	12.525	0.8118
O	10.535	0.224	13.525	0.8165
P	11.535	0.220	14.525	0.8165
Q	12.535	0.216	15.525	0.8150
R	13.535	0.212	16.525	0.8127
S	14.535	0.209	17.525	0.8129
T	15.535	0.207	18.525	0.8165
U	16.930	0.205	19.920	0.8086

Mean value of C_{cont} = say 0.813, whence $C_{cont}^2 = 0.813^2 = 0.661$.

Coefficient of velocity of efflux, $C_{(vel. orif.)} = 0.6662$, whence $C_{(vel. orif.)}^2 = 0.44382$.

Coefficient of velocity at section of greatest contraction = $\frac{0.6662}{0.6610} = 1.0078$.

TABLE IV.

Liquid Contracted Vein, falling vertically under a head of 3.00 inches, through a circular orifice, in a thin horizontal plate, 0.482 inches in diameter.

Letter for reference.	x , Abcissa, or distance from the plane of the orifice, down to the measured section.	$2y = d$. Diameter of the vein.	h . Depth of the measured section below the water surface.	$C_{\text{cont.}} = \left\{ \frac{\sqrt[4]{h}}{\sqrt[4]{3.00}} \right\} \frac{d}{.482}$ Coefficient of contraction, abstraction being made of the acceleration, produced by gravity outside of the reservoir.*
	Inches.	Inches.	Inches.	
A	0.000	0.482	3.000	1.0000
B	0.925	0.380	3.925	0.8431
C	1.925	0.358	4.925	0.8407
D	2.925	0.341	5.925	0.8387
E	3.925	0.327	6.925	0.8366
F	4.925	0.316	7.925	0.8353
G	5.925	0.306	8.925	0.8337
H	7.535	0.289	10.535	0.8205
I	10.535	0.279	13.535	0.8436
J	13.535	0.260	16.535	0.8263

* At a distance of one to two diameters below the plane of the orifice, the vein-form is here supposed to be governed only by the ordinary laws of the descent of heavy bodies subjected to the force of gravity.

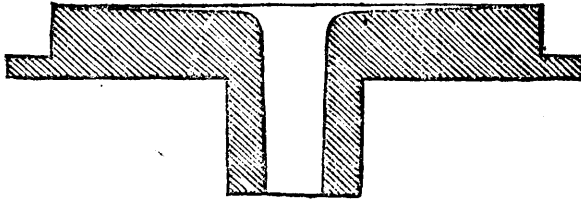
Mean value of $C_{\text{cont.}}$ = say 0.835, whence $C_{\text{cont.}}^2 = 0.835^2 = 0.6972$.

Coefficient of velocity of efflux $C_{\text{(vel. orif.)}} = 0.6803$, whence $C_{\text{(vel. orif.)}}^2 = 0.46281$.

Coefficient of velocity at section of greatest contraction = $\frac{0.6803}{0.6972} = 0.9753$.

In order to gain, at least, an approximate knowledge of the rate of variation of the coefficients of contraction applicable to liquid veins in general, I made the experiments under various heads, which are recapitulated in Table V, with a polished brass mouth-piece, having nearly the form of the contracted vein projected through a circular orifice in a thin plate, of 0.4 inch diameter, under a head of say between 1 and 2 feet.

Fig. 2 $\frac{1}{2}$



This mouth-piece or artificial contracted vein, shown full size in Fig 2 $\frac{1}{2}$, is 1 inch long, the diameter of the bore at the small end being 0.313 inch, while at the junction with the reservoir its cross-section may be considered to be infinitely great as compared to that of the small end.

The coefficients of contraction, C_{cont} , given below in Table V, were computed on the supposition that inasmuch as the form of the mouth-piece coincided nearly with the true conoidal form which the naturally contracted vein would assume, in each case, the fluctuations of the coefficients of discharge, C_{disch} , were entirely due to deficiency of the waterway afforded by the mouth-piece in comparison to the areas of the respective corresponding cross-sections of the natural contracted veins projected under equal heads through an orifice of 0.4 inch in diameter.

As the actual amount of acceleration produced by gravity during the passage of the liquid downward, from the large to the small base of the mouth-piece, in addition to that due to the hydrostatic pressure in the reservoir, cannot be computed with unerring certainty, when the efflux takes place in air, I preferred to have the discharge take place under water, running the risk of having to apply, for efflux in air, approximate corrections to the coefficients as found for discharge under water.

TABLE

1	2	3	4	5	6	7	8	9	10	11
No. of Experiments.	Elevation of water in reservoir of supply A, above 0 of hook-gauge scale, or 0 of glass tube.	Elevation of water in receiving reservoir above 0 of hook-gauge scale, or 0 of glass tube.	Difference of level between the surfaces of the two reservoirs, or effective head.	h Mean effective head.	T Duration of experiments.	Designation of vessels.	Total weight of the vessels, with the water contained therein, at the end of each experiment.	Total mean net discharge.	Discharge per second = $\frac{1.7315D}{T}$	Velocity per second at small base of mouthpiece, = $\frac{d}{a}$, a representing the area of this base.
	inches.	inches.	inches.	inches.	sec.		lbs. oz.	ounces.	cub. in.	inches.
1	66.000	8.000	58.000		50	V _o	34 5			
2	66.000	8.000	58.000	58.000	50	V _o	34 5	459	15.8951	206.4308
3	58.600	8.000	50.600		50	V _o	32 5			
4	58.600	8.000	50.600	50.600	50	V _o	32 5	427	14.7870	192.0390
5	51.600	8.000	43.600		50	V _o	30 5			
6	51.600	8.000	43.600	43.600	50	V _o	30 5	395	13.8788	177.6474
7	43.800	8.000	35.800		50	V _o	27 14			
8	43.800	8.000	35.800	35.800	50	V _o	27 14	356	12.3283	160.1076
9	38.000	8.000	30.000		50	V _o	26 0			
10	38.000	8.000	30.000	30.000	50	V _o	26 1	326½	11.3067	146.8402
11	32.400	8.000	24.400		100	V _o	42 4			
12	32.400	8.000	24.400	24.400	100	V _o	42 5	586½	10.1553	131.8863
13	24.200	8.000	16.200		100	V _o	35 4½			
14	24.200	8.000	16.200	16.200	100	V _o	35 5½	475	8.2246	106.8126
15	19.700	8.000	11.700		100	V _o	30 9			
16	19.700	8.000	11.700	11.700	100	V _o	30 9	390	6.9087	89.7232
17	+	—	5.800		200	V _o	40 10½	560½	4.8525	63.0198
18	3.078	2.154	5.232		200	V _o	38 14½			
19	3.078	2.156	5.234	5.233	200	V _o	38 14	532½	4.6079	59.8436
20	3.080	1.230	4.310		200	V _o	35 10½	480½	4.1600	54.0250
21	3.082	0.732	3.814	3.814	200	V _o	33 13	451	3.9045	50.7082
22	3.074	0.540	3.614		300	V _o	46 4			
23	3.072	0.536	3.608	3.611	300	V _o	46 6	651	3.7573	48.7968
24	3.110	0.100	3.010		300	V _o	42 8			
25	3.104	0.100	3.004	3.007	300	V _o	42 7	589½	3.4024	44.1870
26	3.066	0.620	2.446		300	V _o	38 14			
27	3.084	0.652	2.432	2,439	300	V _o	38 14	532	3.0705	39.8770
28	3.088	1.220	1.868		300	V _o	33 13½			
29	3.092	1.210	1.882	1.875	300	V _o	33 14	451½	2.60735	33.8617
30	3.090	1.964	1.126		300	V _o	26 13			
31	3.088	1.990	1.098	1.112	300	V _o	26 13	339	1.9566	25.4103
32	3.068	2.500	0.568		300	V _o	19 6			
33	3.082	2.496	0.586	0.573	300	V _o	19 6	220	1.2697	16.4905
34	3.080	2.516	0.564		300	V _o	19 6			
35	3.072	2.874	0.198		300	V _o	10 5			
36	3.072	2.900	0.172	0.186	300	V _o	10 5	109.5	0.6320	8.2078
37	3.064	2.878	0.186		300	V _o	10 4½			
				0.000			0 0	0	0	0

V.

<p>12</p> <p>Theoretical velocity due to the mean effective head h.</p> <p>$\sqrt{2gh} = 27.78 \sqrt{h}$</p>	<p>13</p> <p>Coefficient of discharge under water</p> <p>$C_{disch} = \frac{v}{\sqrt{2gh}}$</p>	<p>14</p> <p>Correction to be added to the coefficient of discharge, C_{disch} for efflux under water, to reduce it to the co-efficient of discharge for efflux in open air, viz., $t_0 C_{disch}$</p> <p>$m = .06 \cdot \frac{\sqrt{3.13}}{\sqrt{3.13} + h}$</p>	<p>15</p> <p>Coefficient of discharge in the open air</p> <p>$C'_{disch} = C_{disch} + m$</p>	<p>16</p> <p>Coefficient of contraction, based on the coefficient of contraction obtained by direct measurement of the descending veins, projected through an orifice, in a thin plate 0.4 in. diam., viz., .813 in experiment 25.</p> <p>$C_{cont} = .813 \frac{\sqrt{0.9556}}{C'_{disch}}$</p>	<p>17</p> <p>$C^4_{cont} = \frac{r^4_{cont}}{r^4_{orif}}$</p>
inches.					
211.6386	0.9751	0.0132	0.9883	0.79944	0.40845
197.5991	0.9718	0.0137	0.9855	0.80057	0.41077
183.4321	0.9684	0.0147	0.9831	0.80155	0.41278
166.2163	0.9632	0.0160	0.9792	0.80314	0.41607
152.1511	0.9651	0.0174	0.9825	0.80180	0.41328
137.2230	0.9611	0.0189	0.9800	0.80281	0.41540
111.8145	0.9552	0.0225	0.9777	0.80376	0.41735
95.0222	0.9442	0.0254	0.9696	0.80711	0.42435
66.9031	0.9441	0.0327	0.9768	0.80418	0.41812
63.5488	0.9417	0.0337	0.9754	0.80470	0.41932
57.6727	0.9368	0.0355	0.9723	0.80599	0.42200
54.2543	0.9346	0.0367	0.9713	0.80640	0.42287
52.7895	0.9244	0.0368	0.9612	0.81063	0.43180
48.1723	0.9173	0.0383	0.9556	0.81300	0.43688
43.2851	0.9191	0.0403	0.9594	0.81139	0.43343
38.0393	0.8902	0.0412	0.9314	0.82349	0.45988
29.2945	0.86741	0.0436	0.9110	0.83266	0.48070
21.0285	0.78419	0.0422	0.8264	0.87424	0.58416
11.9815	0.6850	0.0389	0.7239	0.93409	0.76130
0	0.6647 supposed limiting value.	0.0424 supposed limiting value.	0.7071 supposed limiting value.	1.0000 supposed limiting value.	1.0000 supposed limiting value.

Remarks.

It is probable that, owing to the very small heads used in experiments No. 28 to 87, the coefficients of discharge and contraction are sensibly affected by friction.

The following are the results obtained by Michelotti, the younger, with large jets, under great heads. He refers the curve assumed by the longitudinal profile of the contracted vein to a cycloid, and in one of his experiments with a cycloidal tube, he found the coefficient of velocity at the section of maximum contraction to be 0.984:

TABLE VI.

h Head above the orifice in feet.	Diameter in inches.		C_{cont} Coefficient of contraction or ratio between the diameters.	Distance from orifice to contraction, in inches.	Ratio of the distance to the contracted diameter.	C^2_{cont}
	At the orifice.	At the contraction.				
6.890	6.394	5.047	0.790	2.520	0.501	0.3895
12.008	6.394	5.039	0.788	2.520	0.500	0.3856
7.349	3.197	2.511	0.786	1.260	0.500	0.3817
12.502	3.197	2.504	0.783	1.210	0.492	0.3759
22.179	3.197	2.413	0.755	1.181	0.497	0.3249

Mr. H. Résal says, at page 290, vol. ii., of his "Traité de mécanique générale" (Paris, Gauthier Villars, 1874), that the results of experiment respecting the contraction of a liquid vein through a circular orifice in a thin plate, show that for any head less than 6.80 met. = 22.3088 feet = 267.7038 inches, the coefficient of contraction is equal to $\sqrt{.62}$, or .7874—for all orifices the diameter of which is less than 0.^m16 = 6.299 inches, and greater than 0.^m02 = .78737 inches.

**EXPERIMENTS ON THE FLOW OF LIQUID THROUGH ANNULAR
SPACES FORMED BY INTRODUCING A CYLINDRICAL ROD
OR DISK, INTO A CIRCULAR ORIFICE, PIERCED
IN A THIN PLATE.**

EXPERIMENTS ON THE FLOW OF LIQUID THROUGH ANNULAR SPACES FORMED BY INTRO-

L. The discharge took place, in air, under a uniform head, an orifice in a thin plate, 0.4 inch diameter, and the surface axis, J K L, through the centre of the orifice, to points at Area, a , of the annular opening, A B C I G H, = 0.09980

$$\frac{\text{Area A B C G H I}}{\text{Area A B C}} = \frac{0.098800}{0.125664} = 0.78622.$$

Ratio of breadth, A G, of ring-shaped opening to its mean



Fig. 3.



TABLE

1	2	3	4	5	6	7	8		9	10			
Series and Nos. of experiments.	Elevation of water surface, in reservoir of supply, A, above 0 of hook-gauge scale.	Mean elevation of water-surface in reservoir of supply.	Elevation of plane of orifice in a thin plate, A B C, referred to 0 of hook-gauge scale.	Mean head of water on the horizontal orifice A B C.	Duration of experiments.	Designation of vessels.	Total weight of the vessels with the water contained therein, at the end of each experiment.		Total mean net discharge.	Discharge per second in cubic inches			
	inches.	inches.	inches.	inches.	seconds.		lbs.	oz.	ounces.	cub. inches.			
a	1 3.980	3.982	1.016	2.966	100	V _i	15	13	197.5	3.4197			
	2 3.986		1.016		"	V _i	13	13					
	3 3.980		"		"	V _i	13	5					
b	4 3.960	3.958	"	2.942	"	V _i	"	5 1/2	189.5	3.2812			
	5 3.958		"		"	V _i	5	5					
	6 3.956		"		"	V _i	5	3					
c	7 3.956	3.996	"	2.980	"	V _i	"	3	187.5	3.2466			
	8 3.956		3.980		"	2.964	"	V _i			2 1/2	187.0	3.2379
	9 3.970		3.970		"	2.954	"	V _i			2 1/2	186.75	3.2335
d	10 3.932	3.932	"	2.916	"	V _i	"	1 1/2	186.0	3.2206			
	11 3.904		3.904		"	2.888	"	V _i			1 1/2	185.0	3.2033
	12 3.982		3.982		"	2.966	"	V _i			"	1	185.5	3.2119
e	13 3.982	3.982	"	2.966	"	V _i	"	1	185.5	3.2119			
	14 3.950		3.950		"	2.934	"	V _i			1 1/2	185.0	3.2032
	15 3.980		3.980		"	2.964	"	V _i			"	14 1/2	199.0	3.4457
f	16 3.980	3.980	"	2.964	"	V _i	"	14 1/2	199.0	3.4457			
	17 3.980		3.980		"	2.964	"	V _i			14 1/2	199.0	3.4457
	18 3.982		"		"	"	"	V _i			16	3 1/2
g	19 3.980	3.980	"	2.964	"	V _i	"	3 1/2	204.0	.....		
	20 3.980		"		"	"	"	V _i			3
	21 3.970		"		"	"	"	V _i			"	11 1/2
h	22 3.970	3.970	"	2.954	"	V _i	"	12	212.5	.....		
	23 3.970		"		"	"	"	V _i			12
	24 3.966		"		"	"	"	V _i			17	6 1/2
i	25 3.966	3.966	"	2.950	"	V _i	"	6	222.5	.....		
	26 3.964		"		"	"	"	V _i			6
	27 3.954		"		"	"	"	V _i			"	14 1/2
j	28 3.954	3.954	"	2.938	"	V _i	"	14	230.5	.....		
	29 3.954		"		"	"	"	V _i			14
	30 3.954		"		"	"	"	V _i			18	0
k	31 3.956	3.956	"	2.940	"	V _i	"	0	232.5	4.0257			
	32 3.956		"		"	"	"	V _i			1/4
	33 3.956		"		"	2.940	"	V _i			"	0	232.5	4.0257

DUCTING A CYLINDRICAL ROD OR DISK, INTO A CIRCULAR ORIFICE, PIERCED IN A THIN PLATE. through the horizontal annular space left between the the circumference, A B C, of G H I of a cylindrical rod, M N O P, 0.185 inch in diameter, let down along the various distances, K L, above and below the plane of the said orifice. square inch. Area of orifice A B C = 0.125664 square inch. Hence

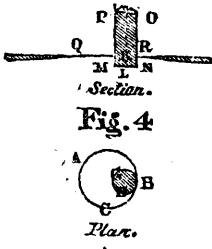
$$\text{length (D E F, measured in the centre)} = \frac{0.918918}{0.107500} = 8.55.$$

VII.

11	12	13	14	REMARKS.
Velocity per second. $\frac{v}{a}$	$\sqrt{2gh} = 27.78 \sqrt{h}$	Coefficient of velocity in orifice or discharge $C = \frac{v}{a \sqrt{2gh}}$	Distance, K L, between the base M N, of the cylindrical rod and the plane of the orifice, + above it, - below it.	
inches.	inches.		inches.	
34.6125	47.8371	0.7256	0.000	The brass vessel, Vt, weighed 55.5 ounces.
			0.000	The vein appeared troubled by air carried along with the water and at a short distance below the cylinder, the space in the centre of the ring disappeared, the cross section changing invariably from an annular to a circular one.
33.2105	47.6490	0.6970	- 0.050	Vein appeared still troubled by the presence of air within it.
32.8600	47.9557	0.6852	- 0.100	
32.7723	47.8268	0.6852	- 0.100	The vein continues troubled by air.
32.8040	47.7460	0.6855	- 0.100	
32.5971	47.4380	0.6871	- 0.100	
32.4213	47.2098	0.6868	- 0.100	
32.5094	47.8429	0.6795	- 0.200	The vein always a little troubled by air, but not so much as in preceding experiments.
32.5094	47.8429	0.6795	- 0.200	
32.4213	47.5842	0.6814	- 0.200	
34.8753	47.8269	0.7292	+ 0.005	Air mixed with water, apparently.
34.8753	47.8269	0.7292	+ 0.005	The base of the cylinder 0.005 inch above the plane of the orifice.
34.8753	47.8269	0.7292	+ 0.005	
.....	.....	.....	+ 0.020	
.....	.....	.....	+ 0.020	
.....	.....	.....	+ 0.020	
.....	.....	.....	+ 0.050	
.....	.....	.....	+ 0.050	
.....	.....	.....	+ 0.050	
.....	.....	.....	+ 0.100	The vein yet slightly troubled by air.
.....	.....	.....	+ 0.100	
.....	.....	.....	+ 0.100	
.....	.....	.....	+ 0.200	Vein appears perfectly clear and transparent; no air present in it.
.....	.....	.....	+ 0.200	
.....	.....	.....	+ 0.300	The plane where the presence of the cylinder ceases to effect the discharge, is apparently from 0.25 inch to 0.30 inch above the plane of the orifice.
32.0356	47.6328	0.6726	+ 0.300	
32.0356	47.6328	0.6726	+ 0.300	
.....	.....	.....	+ ∞	The cylinder was altogether removed, the vein being perfectly transparent.

EXPERIMENTS ON THE FLOW OF LIQUID, THROUGH ANNULAR SPACES FORMED BY INTRO

II.—The discharge took place freely in air, under a uniform an orifice in a thin plate, 0.4 inch diameter and the surface orifice tangent to its circumference, to points various distances



Area A B C H G B
Area A B C

TABLE

1	2	3	4	5	6	7	8		9	10
Series, and Nos. of experiments.	Elevation of water surface in reservoir of supply, A, above 0 of hook-gauge scale.	Mean elevation of water surface in reservoir of supply.	Elevation of plane of orifice, in a thin plate, A B C referred to 0 of hook-gauge scale.	h —Mean head of water on the horizontal orifice A B C.	T Duration of experiments.	Designation of vessels.	Total weight of the vessels with the water contained therein, at the end of each experiment.		D Total mean net discharge.	Discharge per second in cubic inches $\frac{d}{1.7316 D} = \frac{d}{T}$
	inches.	inches.	inches.	inches.	seconds		lbs.	ozs.	ounces.	cub. ins.
a {	1	3.960	3.958	1.016	100	V_1	15	6 $\frac{1}{2}$	190.75	3.3028
	2	3.958					15	6 $\frac{1}{2}$		
b {	3	3.956	3.970	2.942	"	V_1	15	6 $\frac{1}{2}$	184.0	3.1859
	4	3.960					14	15		
c {	5	3.980	3.964	2.954	"	V_1	15	0	182.0	3.1513
	6	3.960					14	15 $\frac{3}{4}$		
d {	7	3.964	3.988	2.948	"	V_1	14	13 $\frac{3}{4}$	181.5	3.1427
	8	3.966					14	13 $\frac{3}{4}$		
e {	9	3.964	4.010	2.982	"	V_1	14	13	181.5	3.1427
	10	3.998					14	12 $\frac{1}{2}$		
f {	11	3.970	3.970	2.994	"	V_1	14	12 $\frac{1}{2}$	181.0	3.1341
	12	3.980					14	12 $\frac{1}{2}$		
g {	13	3.980	3.980	2.964	"	V_1	16	3	203.5	.....
	14	3.982					16	3		
h {	15	3.966	3.964	2.948	"	V_1	16	3	200.25	.....
	16	3.964					17	0		
i {	17	3.964	3.960	2.944	"	V_1	16	15 $\frac{1}{2}$	226.66	.....
	18	3.960					16	15 $\frac{1}{2}$		
j {	19	3.960	3.948	2.932	"	V_1	17	10	231.0	.....
	20	3.960					17	14 $\frac{1}{2}$		
k {	21	3.960	3.956	2.940	"	V_1	17	9	232.5	4.0275
	22	3.950					17	14 $\frac{1}{2}$		
l {	23	3.948	3.956	2.940	"	V_1	17	14 $\frac{1}{2}$	232.5	4.0275
	24	3.946					17	14 $\frac{1}{2}$		
m {	25	3.954	3.956	2.940	"	V_1	18	0	232.5	4.0275
	26	3.960					18	0		
n {	27	3.956	3.956	2.940	"	V_1	18	0	232.5	4.0275
	28	3.956					18	0		

DUCTING A CYLINDRICAL ROD OR DISK INTO A CIRCULAR ORIFICE PIERCED IN A THIN PLATE-head, through a horizontal lunular space left between the circumference A B C, of G H B, of a cylindrical rod M N O P, 0.185 inch diameter, let down through this K L, above and below its plane Q R. Fig. 4.

0.098860

$$0.125664 = 0.78622$$

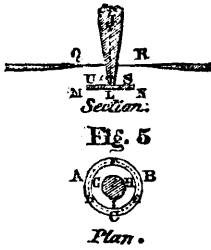
VIII.

11 Velocity per second $\frac{v}{d} = \frac{v}{a}$	12 $\sqrt{2gh} = 27.787h$	13 Coefficient of velocity in orifice or discharge $C_{disch} = \frac{v}{\sqrt{2gh}}$	14 Distance K L, between the base M N, of the cylindrical rod and the plane of the orifice—above it,—below it.	REMARKS.
inches.	inches.	.	inches.	
33.4295	47.6490	0.7016	0.000	The vein is twisted and troubled by air mixed with water.
.....	.....	.....	0.000	
.....	.....	.....	0.000	
33.2466	47.7137	0.6758	-0.050	
.....	.....	.....	-0.050	
.....	.....	.....	-0.050	
31.8961	47.6975	0.6687	-0.100	Vein twisted and still apparently slightly troubled by air.
.....	.....	.....	-0.100	
.....	.....	.....	-0.100	
31.8084	47.9718	0.6631	-0.200	Vein twisted but almost perfectly transparent.
31.8084	48.0682	0.6617	-0.200	
31.7208	47.7460	0.6643	-0.200	
.....	.....	.....	+0.020	Vein twisted and troubled by air.
.....	.....	.....	+0.020	
.....	.....	.....	+0.020	
.....	.....	.....	+0.050	
.....	.....	.....	+0.050	
.....	.....	.....	+0.050	
.....	.....	.....	+0.100	
.....	.....	.....	+0.100	
.....	.....	.....	+0.100	
.....	.....	.....	+0.200	Vein appears to be perfectly transparent.
.....	.....	.....	+0.200	
.....	.....	.....	+0.200	
.....	.....	.....	+0.300	
32.0356	47.6328	0.6726	+0.300	
.....	.....	.....	+0.300	
32.0356	47.6328	0.6726	+∞	The cylinder removed altogether.

EXPERIMENTS ON THE FLOW OF LIQUID THROUGH ANNULAR SPACES, FORMED BY INTRO-

III. The discharge took place freely, in air, under a A B C, of an orifice in a thin plate, 0.482 inch in diameter, thick, fastened to the point of a conical needle, as shown Fig. this orifice to points at various distances K L, above or below

Area of the annular opening A B C I G H = 0.083487
 $\frac{\text{Area A B C I G H}}{\text{Area A B C}} = \frac{0.083487}{0.182467} = 0.4575$
 Ratio of breadth A G, of ring-shaped opening to its



TABLE

1	2	3	4	5	6	7	8		9	10
Series and Nos. of experiments.	Elevation of water surface in reservoir of supply A, above 0 of hook-gauge scale.	Mean elevation of water surface in reservoir of supply.	Elevation of plane of orifice, in thin plate A B C, referred to 0 of hook gauge scale.	Mean head of water on the horizontal orifice A B C.	Duration of experiments.	Designation of vessels.	Total weight of the vessels, with the water contained therein, at the end of each experiment.		Total mean net discharge.	Discharge per second in cubic inches = $\frac{1.7315D}{T}$
	inches.	inches.	inches.	inches.	seconds.		lbs.	ozs.	ounces.	cubic in.
a 1	4.036	4.036	1.016	3.020	100	V ₁	15	4	188.5	3.2639
2	"					V ₁	15	4		
b 3	"	"	"	"	"	V ₁	15	1	185.5	3.2119
4	"					V ₁	15	1		
5	4.032	"	"	"	"	V ₁	14	13½	182.5	3.1600
6	4.040					V ₁	14	14½		
7	4.036	"	"	"	"	V ₁	14	15	183.5	3.1773
8	4.036					V ₁	14	15		
9	4.036	"	"	"	"	V ₁	15	½	185.0	5.2033
10	4.038					V ₁	15	½		
11	4.038	"	"	"	"	V ₁	15	3½	187.5	3.2466
12	4.034					V ₁	15	2½		
13	4.036	"	"	"	"	V ₁	17	11½	228.0	3.9478
14	"					V ₀	24	0		
15	"	"	"	"	"	V ₀	24	8½	302.5	5.2378
16	"	"	"	"	"	V ₀	27	2	344.0	5.9563
17	"					V ₀	27	2		
18	"	"	"	"	"	V ₁	15	11½	196.0	.....
19	"					V ₁	16	3½		
20	"	"	"	"	"	V ₁	16	13	212.5	.....
21	"					V ₁	17	11		
22	"	"	"	"	"	V ₀	22	13	275.0	.....
23	"					V ₀	24	12		
24	"	"	"	"	"	V ₀	26	9	338.0	.....
25	"					V ₀	27	2		
26	"	"	"	"	"	V ₀	27	3	345.0	.....

REDUCING A CYLINDRICAL ROD OR DISK INTO A CIRCULAR ORIFICE, PIERCED IN A THIN PLATE. uniform head, through the horizontal annular space left between the circumference and the surface G H I, of a cylindrical disk, 0.355 inch in diameter, and 0.048 inch thick, and let down in the water along the vertical axis J K L, through the centre of its plane Q R. Area of orifice A B C = 0.182467 square inch. Hence

$$\text{mean length (D E F, measured in the centre)} = \frac{1.3147}{0.0635} = 20.70$$

IX.

11	12	13	14	15	Remarks.
v , Velocity per second = $\frac{d}{a}$	$\sqrt{2gh} = 27.78 \sqrt{h}$	Coefficient of velocity in orifice or discharge $C_{disch} = \frac{v}{\sqrt{2gh}}$	Distance K T, between the upper base U S, of the disk and the plane Q R, of the orifice (+ above and - below it).	Distance K L, between the lower base M N, of the disk and the plane Q R, of the orifice (+ above and - below it).	
inches.	inches.		inches.	inches.	
39.0944	48.2765	0.8098	+0.048	0.000	Air apparently mixed with flowing water. The lower base M N, in plane Q R, of the orifice.
38.4722	"	0.7969	+0.048	0.000	
			+0.036	-0.012	
37.8501	"	0.7840	+0.036	-0.012	
			+0.024	-0.024	
38.0575	"	0.7883	+0.024	-0.024	
			+0.012	-0.036	
38.3686	"	0.7948	+0.012	-0.036	The upper base U S, of the disk, is in the plane Q R, of the orifice.
			0.000	-0.048	
			0.000	-0.048	
17.9786	"	0.37241	-0.012	.....
			-0.012	.....
22.7356	"	0.47095	-0.120	.....
31.3539	"	0.6495	-0.240	.....	The axis of the vein continues to coincide with the vertical through the centre of the orifice. Vein quite transparent; no air present; area of annular space in plane Q R = $a = 7854 - (.482^2 - .178^2) = 2005 \times 7854 = 0.1575$ square inch.
33.2558	"	0.6888	-0.340	.....
32.6435	"	0.6762	.....	.....	The disk removed altogether.
			
			.....	+0.012	
			.....	+0.024	
			.....	+0.036	
			.....	+0.048	
			.....	+0.096	
			.....	+0.144	
			.....	+0.244	
			.....	+0.312	
			.....	.....	At this elevation the presence of the disk ceases apparently to influence the discharge sensibly. The disk removed altogether.

EXPERIMENTS ON THE FLOW OF LIQUID, THROUGH ANNULAR SPACES FORMED BY INTRO

IV. The discharge took place freely, in air, under a uniform head, through the 0.384 inch in diameter, and the surface of a cylindrical disk, 0.355 inch in diameter, ceding page, in case III, and let down along the vertical passing through the centre Area *a*, of the annular passage = 0.016832 square inch—Area *o*, of the complete

$$\frac{a}{o} = \frac{0.016832}{0.115812} = 0.1453.$$

Ratio of breadth of ring to its mean length measured in the centre = $\frac{1.1650}{0.0145}$

TABLE

1	2	3	4	5	6	7		8	9
Nos. of experiments.	Elevation of water surface in reservoirs of supply A, above 0 of hook gauge scale.	Elevation of plane of orifice in thin plate A B C, referred to 0 of hook gauge scale.	Mean head of water on the horizontal orifice, A B C.	Duration of experiments.	Designation of vessels.	Total weight of the vessels with the water contained therein, at the end of each experiment.		Total mean net discharge.	$d = \frac{\text{discharge, per second, in cubic inches}}{T}$
	inches.	inches.	inches.	seconds.		lbs.	os.	ounces.	cubic in.
1	3.942	0.832	3.110	300	VII	10	14	127.25	0.73444
2	3.942	"	"	"	VII	10	14	127.25	0.73444
3	3.942	"	"	"	VII	9	11	108.25	0.62478
4	3.942	"	"	"	VII	9	10	107.25	0.61901
5	3.922	"	3.090	"	VII	9	9	106.25	0.61324
6	3.942	"	3.110	"	VII	9	11	108.25	0.62478
7	3.942	"	"	"	VII	10	8	121.25	0.69981
8	3.942	"	"	"	VII	10	12½	125.75	0.72579
9	3.932	"	3.100	"	VII	11	2	129.75	0.74887
10	3.932	"	3.100	"	VII	11	½	129.75	0.74887
11	3.942	"	3.110	"	VII	11	2	131.25	0.75753
12	3.942	"	"	100	VI	12	14	150.50	2.60591
13	3.942	"	"	100	VI	14	10½	179.00	3.0994
14	3.942	"	"	300	VII	10	15	128.25	.....
15	3.942	"	"	300	VI	19	15	263.50	.....
16	3.952	"	3.120	100	VI	14	3	171.50	.....
17	3.952	"	"	"	VI	16	6	206.50	.....
18	3.952	"	"	"	VI	17	0	216.50	3.7487
19	3.952	"	"	"	VI	17	0	216.50	3.7487
20	3.952	"	"	"	VI	17	0	216.50	3.7487

DUCING A CYLINDRICAL ROD OR DISK INTO A CIRCULAR ORIFICE PIERCED IN A THIN PLATE.

horizontal annular space left between the circumference of an orifice in a thin plate, and 0.048 inch thick, stuck on the point of a conical needle, as shown on the pre- of this orifice to points at various distances above and below its plane.

circular orifice = 0.115812 square inch—whence the ratio between the two areas =

= 80.35.

X.

10	11	12	13	14	Remarks.
v , velocity per second = $\frac{d}{a}$	$\sqrt{2gh} = 27.78 \sqrt{h}$	Coefficient of velocity in orifice or discharge $C_{disch} = \frac{v}{\sqrt{2gh}}$	Distance K T, between the upper base U S, of the disk, and the plane Q R, of the orifice (+ above, and - below it.)	Distance, K L, between the lower base M N, of the disk, and the plane Q R of the orifice (+ above, -below it.)	
inches.	inches.		inches.	inches.	
43-6338	48-9906	0.8907	+ 0.048	0.000	} The under side of the disk is in the plane of the orifice. Vein troubled by air mixed with flowing water.
43-6338	"	0.8907	+ 0.048	0.000	
37-1187	"	0.7577	+ 0.036	- 0.012	} Vein apparently still somewhat troubled by air in experiments Nos. 3, 4, 5, 6, but not so much as in experiments Nos. 1 and 2.
36-7759	"	0.7507	+ 0.032	- 0.016	
36-4330	48-8327	0.7461	+ 0.032	- 0.016	} In all the experiments from No. 1 to No. 12, the liquid fillets meet, in the axis passing through the centre of the orifice approximately at a distance of from $\frac{1}{4}$ to $\frac{1}{2}$ inch below the orifice. Vein rendered somewhat opaque by air carried along by water, in experiments Nos. 8, 9, 10, 11, about to the same extent as in experiments Nos. 1 and 2.
37-1187	48-9906	0.7577	+ 0.028	- 0.020	
41-5764	"	0.8487	+ 0.008	- 0.040	
43-1195	"	0.8802	+ 0.002	- 0.046	
44-4911	48-9117	0.9096	0.	- 0.048	
44-4911	"	0.9096	0.	- 0.048	
45-0054	48-9906	0.9187	0.	- 0.048	
24-0353	"	0.4906	- 0.096	.....
31-2123	"	0.6371	- 0.184	.....
.....	+ 0.008		} Vein much clearer, apparently, than in any experiment between Nos. 1 and 12.
.....	.....	.....	.....	+ 0.028
.....	.....	.....	.....	+ 0.096
.....	+ 0.192	} Vein perfectly clear. Vein perfectly transparent. The disk removed altogether.
32-2688	49-0693	0.6596	.....	+ 0.244
32-2688	"	"	.....	+ 3.198
32-2688	"	"	.....	.....

EXPERIMENTS ON THE STEMMING POWER OF THE NATURALLY CONTRACTED VERTI

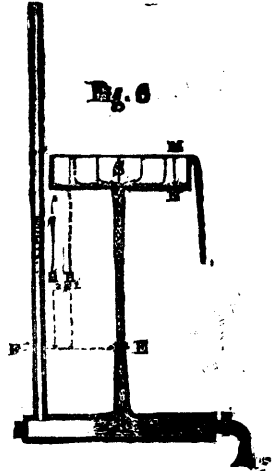
from the reservoir of supply S into a receiving vessel R, under a pressure of Fig. 6 $\frac{1}{2}$, between 19 and 20 minimum diameters of 0.305 inch, or 5-8 to 6 inches long,

TABLE

1	2	3	4	5	6	7	8	9
No. 1—Vertically descending vein V, issuing from horizontal orifice O, 0.482 inch diameter in thin plate, for which coefficient of velocity of efflux = 0.680 under a pressure of about 3 inches.							No. 2—Vein V, projected through orifice O, 0.420 inch diam., for which coefficient of velocity of efflux = 0.677.	
Letter for reference.	H ₁	H ₂	$\frac{H_2}{H_1}$	d	a	$\frac{a}{0.07360}$	H ₁	$\frac{H_2}{H_1}$
	Total fall from water surface of reservoir of supply S to orifice and minimum cross section E of divergent receiving tube T.	Total rise of water in receiving reservoir R above the plane EF of the inlet orifice, and minimum cross section E of divergent tube T, before any lateral spilling commenced.		Diameter of vein V at plane EF of inlet orifice of divergent tube T, according to direct measurements made with points mounted on a diaphragm.	Area of cross section of naturally contracted descending vein V at plane EF of inlet orifice of the divergent tube T.	Ratio of area a of naturally contracted descending vein V to area 0.07360 sq. inch of orifice or minimum cross section of divergent tube T.		
	Inches.	Inches.		Inches.	Sq. inches.		Inches.	
A	3.65							
B	4.15							
C	5.15							
D	6.15							
E	7.15							
F	7.65							
G	8.15							
H	8.65	4.15	0.509	0.314	0.07744	1.0600	5.15	0.632
I	9.15						6.15	0.672
J	9.65						6.65	0.689
K	10.15	7.00	0.689	0.293	0.06743	0.9229	7.05	0.695
L	10.65						7.30	0.686
M	11.15							
N	12.15	8.55	0.703	0.286	0.06424	0.8728	8.20	0.675
O	13.15	9.15	0.696	0.280	0.06158	0.8366		
P	14.15	9.95	0.703	0.275	0.05940	0.8070		
Q	15.15	10.75	0.709	0.269	0.05683	0.7721		
R	16.15	11.45	0.709	0.264	0.05474	0.7437		
S	17.15	12.15	0.703	0.259	0.05269	0.7169		
T	20.15	14.15	0.702				13.00	0.645

CALLY DESCENDING VEIN V, PASSING THROUGH A SIMPLE ORIFICE O IN A THIN PLATE, 3 inches = M N, through a trumpet-mouth shaped divergent tube, shown full size, and provided with a short conoidal convergent entrance E. (See Fig 6.)
 XI.

No. 3—Vein V, projected through orifice 0.400 in. diam., for which coefficient of velocity of efflux = 0.670.					No. 4—Vein V, projected through orifice 0.348 in. diam., for which coeff. velocity of efflux = 0.654.		17	Letter of reference.	Remarks.
10	11	12	13	14	15	16			
H_2	$\frac{H_2}{H_1}$	d	a	$\frac{a}{0.07360}$	H_2	$\frac{H_2}{H_1}$			
Inches		Inches	Sq. in.		Inches.				
1.35	0.370	0.317	0.07892	1.0802	1.80	0.493	A		
1.80	0.433	0.301	0.07116	0.9739	2.50	0.602	B		
3.25	0.631	0.287	0.08469	0.8854	3.15	0.611	C		
.....	.....	.....	.....	.....	3.90	0.634	D		
4.80	0.671	0.262	0.05391	0.7379	4.60	0.643	E		
5.30	0.693	0.258	0.05228	0.7155	5.00	0.654	F		
5.65	0.693	0.252	0.04987	0.6826	5.45	0.669	G		
5.90	0.682	0.248	0.04830	0.6612	.....	.....	H		
6.15	0.672	0.244	0.04876	0.6400	6.10	0.667	I		
.....	.....	.....	.....	.....	.....	.....	J		
6.85	0.675	0.239	0.04486	0.6140	6.60	0.650	K		
.....	.....	.....	.....	.....	.....	.....	L		
7.50	0.672	0.234	0.04300	0.5886	7.30	0.654	M		
.....	.....	.....	.....	.....	.....	.....	N		
.....	.....	.....	.....	.....	.....	.....	O		
9.25	0.653	0.222	0.03871	0.5298	8.65	0.611	P		
.....	.....	.....	.....	.....	.....	.....	Q		
.....	.....	.....	.....	.....	.....	.....	R		
10.85	0.632	0.210	0.03464	0.4741	10.00	0.583	S		
12.15	0.603	0.204	0.03268	0.4474	11.20	0.556	T		



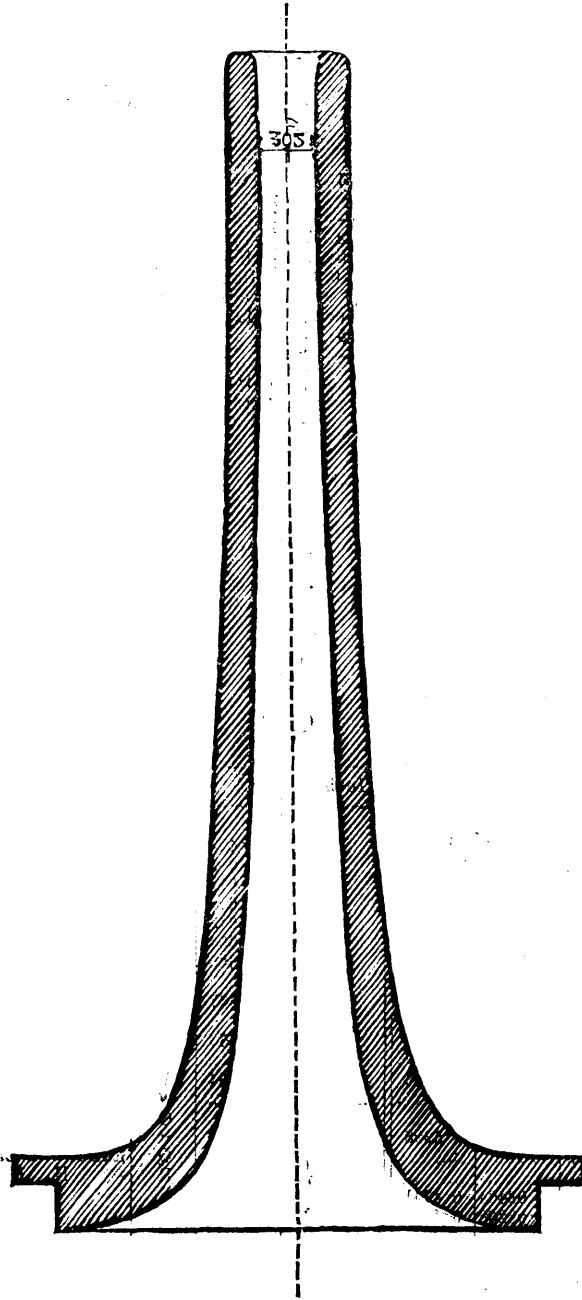


Fig 6½.

EXPERIMENTS on the efflux of water in the open atmosphere through circular orifices, A B, in thin walls, whose sides, E A, F B, form with the axis I X, passing through the centre of the orifice perpendicularly to its plane, angles, E O I, F O I, greater than a right angle, on the inside of the reservoir. (See fig. 7.)

TABLE XI.

1	2	3	4	5	6	7	8	9	10	11	12	13	14
No. of Experiment.	Diameter A B of orifice.	Angle E O I or F O I.	Elevation of water surface, G H, in reservoir of supply, A, above 0 of hook gauge scale.	Elevation of the plane of the orifice A B, above 0 of hook gauge scale.	A—Mean head of water on the horizontal orifice A B.	<i>T</i> , Duration of experiments.	Designation of vessels.	Total weight of the vessels with the water contained in them at the end of each experiment.	<i>D</i> , Total mean net discharge.	$\frac{d}{1.7316 D} = \frac{v}{a}$	v , Velocity per second = $\frac{a}{d}$	$\sqrt{2gh} = 27.78 \sqrt{h}$	Coefficient of velocity or discharge: $C = \frac{d_{\text{disch}}}{a} = \frac{1}{\sqrt{2gh}}$
1	0.406	135°	3.180	0.560	2.62	100	V ₁	17 ½	217	3.7573	29.6309	44.9480	0.6570
2	0.405	135°	3.210	0.560	2.65	100	V ₁	17 ¼	221	3.8266	30.0752	45.2225	0.6650
3	0.416	157½°	4.620	2.090	2.530	200	V ₀	31 ¾	413½	3.5759	26.2934	41.1869	0.5950
4	0.416	157½°	4.564	2.090	2.474	200	V ₀	31 ¼	410½	3.5539	26.1316	43.6970	0.5980
5	0.416	157½°	4.568	2.090	2.478	200	V ₀	31 5	411	3.5582	26.1682	43.7340	0.5980

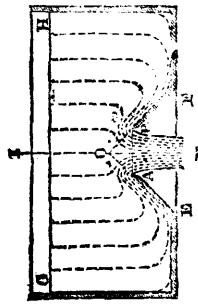


Fig. 7

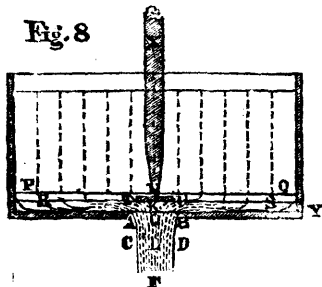
REMARKS.

Area of orifice A B (fig. 7), = 0.127235 square inch. This orifice was not strictly one with a sharp edge; the thickness of the metallic rim around it, measured in the plane A B, was = 0.015 inch; it is no doubt for this reason that the coefficient of efflux, or velocity in the orifice, turned out as high as 0.6570.

This orifice, whose area was 0.136 square inch, had a very sharp edge; its plane, A B, stood 0.47 inch above the bottom E F of the reservoir, whose interior diameter, as already stated, was 12 inches; temperature of the air = 70° Fahrenheit, Water 52°.

THEORY.

Fig. 8



Let H represent the head of water, $O X$, on the orifice $A B$, in a thin plate;
 r , the radius, $A O = O B$ of the orifice $A B$;
 y , the radius, $C E = E D$, of the cross-section $C E D$, taken at any point, E ;
 x , the distance $E O$ of the point E , from the centre O , of the orifice;
 $d x$, an increment of length of the vein;
 V_{orif} , the velocity of the liquid, in the plane of the orifice, $A B$;
 v , the velocity of the water, at any point, E , on the axis of the vein;
 g , the acceleration of gravity, per second;
 γ , the heaviness of water, or weight of one unit of volume.

We know, from experiments with liquid jets, from, say $\frac{1}{2}$ inch in diameter upwards, produced under various heads, up to, say 10 feet, as a matter of fact, that if a jet or vein of water is interrupted at any point whatsoever, the last particles of liquid immediately in front of the interrupting body rise as high, vertically, and reach as far, horizontally, in vacuo or even in the open air, as if the continuity of the vein had not been broken.

We may therefore take for granted, that the whole energy e , which the hydrostatic pressure exerted on the top covering or sides of a reservoir, is capable of developing, through a given orifice $A B$, in the unit of time, is invariably imparted to the spurting water within the reservoir, before the liquid particles pass the plane of that orifice, and the assumption that this is also the case for vertically descending veins, projected through orifices in the horizontal bottom of a reservoir is not unreasonable. Hence, if gravity be abstracted outside of the reservoir of supply, the measure of an element, de of this energy, must be the same for all sections of one and the same vein.

But, in general, the amount of energy e , stored in any moving mass is represented by the product of the square of the velocity v , the volume of the body, and its heaviness γ , divided by twice the acceleration of gravity, viz., $2g$; we must, therefore have, in any theoretically perfect liquid circular jet, uninfluenced by gravity after leaving the orifice, the relation.

$$de = \frac{v^2}{2g} \pi r^2 dx \gamma = \left\{ \begin{array}{l} \text{Constant quantity for every elementary slice or} \\ \text{sheet of liquid contained in the vein.} \end{array} \right.$$

Whence it follows, that in general:

$$de = \frac{v^2}{2g} \pi r^2 dx \gamma = \frac{V_{\text{orif}}^2}{2g} \pi r^2 dx \gamma$$

by considering $\pi r^2 dx$ to be the increment of the volume of liquid discharged or ejected from the reservoir of supply, during the unit of the time t , which corresponds to dt .

Now I found, by direct measurement (See Table III):

1. That the area of the section of greatest contraction of a liquid circular vein projected vertically downward, through an orifice 0.4 inch in diameter, under a constant head of about 3 inches is:

$$\pi r_{\text{cont.}}^2 = 0.6610 \pi r^2;$$

$r_{\text{cont.}}$ standing for the radius of the circular perimeter at the section of maximum contraction.

2. That the square of the velocity, (V_{orif}) in the plane of the orifice is:

$$V_{\text{orif}}^2 = (0.6662)^2 2gH = (0.4438) 2gH.$$

Whence, admitting that in a perfectly liquid stream, or in a continuous stream of infinitely small sensibly equidistant bodies, the velocity must vary inversely as the

area of the vein; we obtain at the section of maximum contraction, for the square of the velocity, $v_{cont.}$:

$$v^2_{cont.} = 2gH (.4438) \left(\frac{\pi r^2}{.6610\pi r^2} \right)^2 = 2gH \left(\frac{0.4438}{0.4376} \right) = 1.0157 (2gH).$$

We must therefore necessarily have, for the energy of every element of volume of the liquid vein, under consideration:

$$de = 1.0157 H \pi r^2 dx \gamma = 4438 H \pi r^2 dx \gamma.$$

Now this result is clearly impossible or absurd of itself, and cannot obtain unless we admit:

That in the plane of the orifice A B, the intensity $i_{orif.}$ of the moving force is less than that $i_{cont.}$ at the section of maximum contraction, in the ratio of 0.4438 to 1.0157 and increases gradually from the former to the latter place, whether or not the vein be interrupted at any point, whence we are led to the conclusion that: $i_{orif.} = .4369 i_{cont.}$, or $i_{cont.} = 2.2885 i_{orif.}$ must obtain either on account of the mutual interference of the jammed up liquid particles, or in consequence of some other corresponding molecular action or owing to a combination of some such actions.

Again, Table IV shows that for a vertically descending vein projected through a circular orifice 0.482 inch in diameter, under a head of 3 inches:

$$\pi r^2_{cont.} = 0.6972 \pi r^2 \quad \text{and}$$

$$V^2_{orif.} = 2gH (.6803)^2 = .4628 (2gH) \quad \text{hence:}$$

$$v^2_{cont.} = .4628 (2gH) \left(\frac{\pi r^2}{.697 \pi r^2} \right)^2 = 2gH \left(\frac{.4628}{.4861} \right) = 0.9521 (2gH)$$

whence:

$$de = 0.9521 H \pi r^2 dx \gamma = 0.4628 H (\pi r^2) dx \gamma, \quad \text{and}$$

$$i_{cont.} = \left(\frac{0.9521}{0.4628} \right) i_{orif.} = 2.0573 i_{orif.} \quad \text{or,}$$

$$i_{orif.} = 0.4860 i_{cont.}$$

Finally, by adding, in the table of experimental results, recorded by Michelotti, the younger, which is given in Spon's Dictionary of Engineering, p. 1891, a column of coefficients of velocity in the orifice C and one of ratios $\left(\frac{i_{orif.}}{i_{cont.}} \right)$, based on the measurements made by the author just named, we obtain:

TABLE XII.

Letter of reference.	Head on the orifice in english feet.	Diameter of the vein in inches.		Ratio between the diameter or radius at the orifice, and that at the section of maximum contraction. $\frac{r_{cont.}}{r_{orif.}}$	Coefficient of velocity in the orifice. $C = \frac{v_{orif.}}{\sqrt{2gh}}$	Approximate ratio between the respective intensities, $i_{orif.}$ and $i_{cont.}$ of the moving force in the plane of the orifice and at section of maximum contraction. $\frac{i_{orif.}}{i_{cont.}}$
		At the orifice.	At the section of greatest contraction.			
A	6.890	6.394	5.047	0.790	0.691	0.3981
B	12.008	6.394	5.039	0.788	0.691	0.3861
C	7.349	3.197	2.511	0.786	0.613	0.3817
D	12.502	3.197	2.504	0.783	0.612	0.3751
E	22.179	3.197	2.413	0.755	0.597	0.3247

It is plain, judging by the results arrived at, that the ratio $\frac{i_{orif.}}{i_{cont.}}$ is not constant for all veins, but that it increases simultaneously with the area of the orifice and

diminishes as the head increases, or else, that the complete vein, R A C D B S, protrudes more through the orifice A O B, in some cases than in others. Possibly the variations of this ratio, as exhibited in Table XII., are governed conjointly by the intensity of the pressure, the area of the orifice and the position of the entire vein, in reference to the plane of this orifice.

There is nothing to show however, as yet, why in one and the same perfectly fluid vein, the variations in the intensity of the force, by virtue of which the liquid acquires motion and the final energy is generated, should be different during the time of describing the last increment of the portion of the trajectory outside of the reservoir between the orifice and the section of maximum contraction, viz: that nearest to the section just named,—wherever that may be situated,—from what it is, while an increment of trajectory is described by the liquid, close to the orifice A O B, or even at any point of the vein within the reservoir back of this orifice. Neither is there any thing to indicate why one or the other of the respective intensities, $i_{\text{cont.}}$, $i_{\text{orif.}}$, should prevail at one time rather than at any other time, during the progress or formation of one and the same vein.

Hence, there is good reason for concluding that $i_{\text{orif.}}$ and $i_{\text{cont.}}$ truly represent the alternating intensities of two forces, $f_{\text{orif.}}$ and $f_{\text{cont.}}$, which govern the motion of every contracted fluid vein, both within and without the reservoir, and that $i_{\text{orif.}}$ is the ratio of two sensibly uniform accelerations generated alternately, each

during an increment of time, dt in every one of the elementary fluid sheets of which any vein may be considered to consist.

From a theoretical point of view, all extraneous resistances and forces being abstracted, gravity included, any unopposed liquid vein, once generated, must evidently continue its course over an infinite distance beyond the orifice, outside of the reservoir, whence it draws its supply; and the time consumed in describing this portion of its path must be infinitely great in all cases. On the inside, however, of this reservoir, the vein can extend only up to the point where, on account of the moving force acting with the alternate intensities, $i_{\text{cont.}}$, $i_{\text{orif.}}$, upon a very great or say infinite number of liquid molecules embraced in its field of action—motion becomes impossible or infinitely small, comparatively speaking. The position of the plane where the vein ceases to exist as such, or rather properly commences within the reservoir, viz., the position of the plane of rest, may be considered to be affected by the volume of liquid discharged through a given orifice, in the unit of time, only in so far as the hydraulic pressure modifies the conditions of the molecular structure of the liquid.

Again, although it is quite true that in every complete and permanently established vein the liquid is continually passing from a less to a greater velocity, both in and outside of the reservoir, nevertheless the velocity $v_{\text{orif.}}$ proper to the plane of the orifice, cannot, for one reason or for another, be attributed to the action of the force $f_{\text{orif.}}$ in preference to that of the force $f_{\text{cont.}}$.

Keeping therefore in view, that in every perfectly fluid vein the areas of the cross-sections must, of necessity, vary inversely as the total velocities generated from a state of rest in the corresponding elementary sheets of liquid moved forward simultaneously, the volume of each of which may be represented by $\pi r^2 dx$, it becomes apparent that in order that the stream may embrace a circular section of the requisite area, to fill or cover the entire orifice in the thin plate, equally well when we consider the total acceleration, viz.: that which corresponds to the actual permanent velocity acquired by the fluid—to be generated by the moving force while its intensity is $i_{\text{cont.}}$, as when the same total acceleration or velocity is considered to be generated by the said moving force while its intensity is but $i_{\text{orif.}}$ (taking now for granted that $f_{\text{orif.}}$ and $f_{\text{cont.}}$ are constant,) an indispensable condition is, that the time during which the force $f_{\text{orif.}}$ acts should bear to the time during which the force $f_{\text{cont.}}$ is acting on each elementary volume of liquid ejected—while the stream passes from a state of rest within the reservoir to the orifice A O B, the ratio of $i_{\text{orif.}}$ to $i_{\text{cont.}}$, that is to say: the ratio of 1 to 2.2, or thereabouts. For, it is only in such case, that the rates of motion corresponding to the total numbers or sums of increments of acceleration generated from a state of rest by each one of the

forces f_{cont} and f_{crit} , or the sums of the increments of the gradual retardations due to the lateral extension of the vein under the government of the said forces, are precisely equivalent at the plane of the orifice after the liquid stream has assumed its definitely permanent state.

Let us now devote some attention to the consideration of the molecular structure of fluid matter in connection with the subject under discussion.

In a paper entitled: "On a Fourth State of Matter,"* which was read by Prof. J. W. Crookes, F.R.S., before the Royal Society of Great Britain, on the 10th of June, 1880, this *savant* explained what seemed to him to be the constitution of matter in its three states, of solid, liquid and gas. In the views which he expressed there appears to be embodied all that is at the present time generally known and admitted in this connection.

The structure of all solid and liquid matter appears to be as follows (using Mr. Crook's own words):

"Solids as well as liquids are composed of discontinuous molecules, separated from each other by a space which is relatively large—possibly enormous—in comparison with the diameter of the central nucleus we call *molecule*. The molecules themselves built up of *atoms*, are governed by certain forces. Two of these forces are attraction and motion. Attraction, when exerted at sensible distances, is known as gravitation, but when the distances are molecular it is called *adhesion* and *cohesion*. Attraction appears to be independent of absolute temperature; it increases as the distance between the molecules diminishes; and were there no counteracting force, the result would be a mass of molecules in actual contact, with no molecular movement whatever—a state of things beyond our conception—a state, too, which would probably result in the creation of something that, according to our present views, would not be matter."

"This force of cohesion is counterbalanced by the movements of individual molecules themselves, movements varying directly with the temperature, increasing and diminishing in amplitude as the temperature rises and falls.

"The molecules in solids do not travel from one part to another, but possess adhesion and retain fixity of position about their centres of oscillation. Matter, as we know it, has so high an absolute temperature that the movements of the molecules are large in comparison with their diameter, for mass must be able to bear a reduction of temperature of nearly 300° C. before the amplitude of the molecular excursions would vanish.

"The state of solidity, therefore—the state which we are in the habit of considering *par excellence* as that of *matter*—is merely the effect on our senses of the motion of discrete molecules among themselves.

"Solids exist of all consistencies, from the hardest metal, the most elastic crystal, down to the thinnest jelly. A perfect solid would have no viscosity, *i.e.*, when rendered discontinuous or divided by the forcible passage of a harder solid, it would not close up behind and again become continuous.

"In solid bodies the cohesion varies according to some unknown factor, which we call chemical constitution; hence, each kind of solid matter requires raising to a different temperature before the oscillating molecules loose their fixed position with reference to one another, at this point, varying in different bodies, the solid becomes liquid.

"In liquids the force of cohesion is very much reduced, and the adhesion or fixity of position of the centers of oscillation of the molecules is destroyed. When artificially heated the inter-molecular movements increase in proportion as the temperature rises until, at last, cohesion is broken down and the molecules fly off into space with enormous velocities.

"Liquids possess the property of viscosity—that is to say, they offer a certain opposition to the passage of solid bodies: at the same time they cannot permanently resist such opposition, however slight, if continuously applied. Liquids vary in consistency from the hard, brittle and apparently solid pitch, to the lightest and most ethereal liquid capable of existing at any particular temperature.

*See page 3798, No. 238, Vol. X., *Scientific American* Supplement, July 24, 1880.

"The state of liquidity is therefore due to inter-molecular motions of a larger and more tumultuous character than those which characterize the solid state."

From the constitution, or molecular structure, of liquids, as just described, it follows that any effort at separating and moving away in any direction, one elementary layer or sheet of molecules from the next succeeding one and the general body of a liquid stored in a reservoir, must necessarily overcome during an infinitesimal space of time, in addition to the inertia of the fluid matter, also a part of its cohesion—within the limits of the sphere of molecular oscillations,—viz.: this effort must undergo the influence of attraction and repulsion before the total increase of motion or acceleration which it is capable of imparting to the fluid particles, viewed as independent solid bodies can be fully developed. This condition of liquid motion I take to be corroborative of the reality of the alternating intensities $i_{\text{orif.}}$ and $i_{\text{cont.}}$ of the moving force, the existence of which was previously deduced directly from the indications afforded by the experimental enquiries.

When, owing to lateral communication among the liquid molecules, proceeding from the orifice A O B in the thin plate towards the interior of the reservoir, the field of action embraced by the pressure on the area of this orifice has become enlarged to such an extent that the rate of separation of liquid sheets from the main body has become infinitely slow, it is clear that the origin K, of the ultimate motion existing at the section of maximum contraction, is reached; but the plane of rest P Q, as regards solicitation of the liquid particles by the force $f_{\text{orif.}}$ in the direction O E within the sphere of mutual attraction, must lie yet some distance further back of the plane of this orifice, viz., at a point N, where all disturbance in the oscillations of the molecules of the fluid which correspond to its temperature ceases, or where the said force, $f_{\text{orif.}}$ must commence to act in order that the requisite separation of a sheet of liquid from the main body may be completely effected at the plane R S.

We have just seen, judging from indications furnished by the experiments made, that in every liquid vein the permanent motion is apparently the result of two alternating forces $f_{\text{orif.}}$ and $f_{\text{cont.}}$ acting upon an invariable elementary volume of water corresponding to the area of the orifice or of one constant force applied against the varying resistances offered alternately by the said elementary volume of water, during a space of time such as to allow of the same velocity being generated by each force, during the passage of the liquid from the plane where the forward movement originates within the reservoir to the orifice A O B. Up to this stage the two forces $f_{\text{orif.}}$ and $f_{\text{cont.}}$ were assumed to be absolutely constant, according to the constitution of liquids, as above quoted, however, attraction and cohesion decrease as the distance between the molecules increases; furthermore, it does not seem improbable that the degree of separation of every two consecutive elementary layers or sheets of molecules of a liquid stream is, in some measure, directly proportional to its velocity—whence it follows: that $f_{\text{orif.}}$ and $f_{\text{cont.}}$ may vary simultaneously with the velocity of the vein.

Notwithstanding the possible variable character of $f_{\text{orif.}}$ and $f_{\text{cont.}}$, there is nothing preventing us—with a view of rendering the artifices of computation less complex, and the mental processes involved easier to follow—to consider $f_{\text{orif.}}$ and $f_{\text{cont.}}$, as denoting the mean values of these forces between any two limiting planes we may choose, as say for instance, between the planes R S and A O B, within the reservoir, or A O B and C E D, outside of it.

Let us now suppose, that by introducing into the water, back of the orifice A O B, a disk or other solid body T U, the area of whose cross-section is small in comparison to that of the reservoir, we determine approximately, or else that we succeed in establishing theoretically or experimentally by some other means—with greater accuracy, if possible—the distance O N=s, at which the conditions of molecular equilibrium would cease to be affected by the flow of liquid through the orifice A O B, if the area of the cross-section of the reservoir, taken in a direction P Q, parallel to the plane of this orifice, was very great—and where, therefore, the presence of a solid body would not diminish the volume of liquid discharged in a given time under a given head. Then, no matter what may be the absolute length of time during which the moving force may have to act, from the instant of opening the orifice A O B, to the establishment of permanent motion and the definite forma-

tion of the vein—leaving friction and all secondary resistances out of consideration for the moment—this distance $s=ON$, may be considered to be the actual space described during the time just mentioned, by an elementary sheet of liquid solicited exclusively by the mean, lesser or reduced variable force f_{orif} , regarded as being constant—and $\frac{i_o}{i_c} s=OK$, the space described by a sheet of liquid subjected to the greater force f_{cont} . with the mean velocity proper, as regards this force, to the portion of vein lying between the orifice AOB , and a plane RKS , where the separation of liquid particles from the main body within the reservoir and from one another, ceases as we proceed from the orifice inwards, or commences, going in a contrary direction, and takes place at an infinitely slow rate. That is to say, the distance OK , between the plane AOB , and a plane RKS , whence a body solicited uniformly by the force f_{cont} , regarded as constant—with a mean acceleration—would have to start in order to pass the plane AOB , with a velocity equal to that which the same body would have after passing over the distance NO , under the influence of the force f_{cont} , is equal to $\frac{i_o}{i_c} s$,—for $\sqrt{i_o}$ correctly represents the mean velocity generated in any body by the lesser force f_{orif} , while the greater force f_{cont} generates in the same body, the equivalent mean velocity corresponding to $\sqrt{\frac{i_o \times i_c}{i}}$. Or, if it be

thought preferable to assume that the motions due to the two forces f_{orif} and f_{cont} , have simultaneous initial or final instants, and begin or cease at the same plane, within the reservoir—then, in order that equal velocities may be generated by both these forces in the elementary volume of liquid ejected, from the plane of rest and origin of motion up to the orifice AOB , it is necessary that the larger force f_{cont} , should act during a shorter space of time than the smaller one f_{orif} , viz: so as to cause the virtual space $\frac{i_o}{i_c} s$, to be described, while under the influence of the latter, the space s , is gone

cv In either case the result is the same

Furthermore, following the same line of argument, it is plain that at any distance $O E=x$ from the centre O , whether measured within or without the reservoir along the axis $EOKX$ of the vein, the final velocity generated by the force f_{orif} , during the interval of time which elapses, after the establishment of permanent motion, between the passage of an elementary volume of liquid at the plane RS and the passage of the same elementary slice at any other section CE may properly be represented by $\sqrt{i_o s + i_o x}$ and also that the total amount of acceleration generated by the force f_{cont} , while the space $KE=KO+OE$ is described by the vein in its permanent condition may be represented by the expres-

$$\text{sion } \sqrt{i_c \left(\frac{i_o}{i_c}\right) s + i_c x} = \sqrt{i_o s + i_o x}.$$

Now the increment of volume moved forward successively at every instant remains clearly invariable so long as the pressure in the reservoir is kept at a uniform intensity; the vein having to lengthen out sufficiently at every step to provide room for each new accession to its fold. Therefore, since the sum total of the increments of acceleration generated by the moving force while overcoming both the inertia and unimpaired cohesion of the liquid particles, must also bear to the sum of the increments of acceleration accumulated while this force has to contend merely against the inertia of matter as reduced by repulsion, the unceasingly varying mean ratio of $\sqrt{i_o s + i_o x}$ to $\sqrt{i_o s + i_c x}$, in order that both these conditions may be fulfilled simultaneously, there remains no alternative but for the areas of the cross-sections of the vein to vary inversely as this ratio, viz., we must have always:

$$\pi y^2 = \pi r^2 \times \frac{\sqrt{i_o s + i_o x}}{\sqrt{i_o s + i_c x}}$$

As nothing definite is known concerning the laws which govern the variations of the ratio of i_0 to i_c , in order to simplify this formula and all others based thereon, let us divide both the numerator and denominator of the fraction in the second member of this equation by i_c and also by π and further substitute i for $\frac{i_0}{i_c}$ —when we obtain:

$$y^2 = r^2 \frac{\sqrt{is+ix}}{\sqrt{is+x}} \tag{a}$$

whence we deduce, for the fundamental equation of the curve whose revolution about the axis $E X$ generates a conoid similar to the theoretical naturally contracted fluid vein $A O B D E C$, abstracted from gravity:

$$y = r \frac{\sqrt[3]{is+ix}}{\sqrt[3]{is+x}} \tag{b}$$

Now granting—as many experiments made with jets of medium sizes, produced under heads or pressures, neither very small nor very great, tend to prove—that the energy generated per unit of volume of the liquid issuing from an aperture in a reservoir under ordinary conditions of flow, is in general pro-

portional to these heads, and denoting by $\left(\frac{\text{coeff. vel. head}}{\text{AOB}}\right)$ the ratio $\frac{\left(\frac{\text{orif.}}{\text{AOB}}\right)}{H}$ between the head due to the actual or experimental velocity of efflux $V_{\left(\frac{\text{orif.}}{\text{AOB}}\right)}$ and the head $H=O X$ the total height of the liquid pressing on the orifice $A O B$, we have for the velocity at this orifice:

$$V_{\left(\frac{\text{orif.}}{\text{AOB}}\right)} = \sqrt{2g \left(\frac{\text{coeff. vel. head}}{\text{AOB}}\right) H}$$

whence we deduce for the velocity v_{CED} at any section $C E D$:

$$v_{CED} = \frac{\sqrt{2g \left(\frac{\text{coeff. vel. head}}{\text{AOB}}\right) H(x+is)}}{\sqrt[3]{is+ix}}$$

But in general, when t represents the time,
 p the acceleration,
 x the space described,
 v the velocity acquired,

the following fundamental relations hold good for all variable motions, viz.:

$$dt = \frac{dx}{v}, p = \frac{dv}{dt} = \frac{dv \cdot v}{dx}, p dx = dv \cdot v.$$

Consequently, if in order to allow of distinguishing the theoretical, vertically descending and ascending veins from each other, we substitute successively, in the last series of fundamental relations:

$$\text{for } t, -t, t, t,$$

$$\text{for } p, -p, p, p,$$

$$\text{for } v, -v, v, v,$$

$$\text{for } y, -y, y, y,$$

we will obtain:

1. For horizontal jets abstracted from the action of gravity outside of the reservoir (which for swift jets is very nearly the case for a length of trajectory equal to a couple of diameters or so):

$$y_t = \frac{r \sqrt[4]{\frac{i' s + i}{(a)} \frac{x}{(a)}}}{\sqrt[4]{\frac{i}{(a)} \frac{s + x}{(a)}}} \tag{1}$$

$$v_t = \frac{\sqrt{2g \left(\frac{\text{coeff vel head}}{\text{orif}}\right) H \left(\frac{i'}{(a)} s + \frac{i}{(a)} x\right)}}{\sqrt{\frac{i'}{(a)} s + \frac{i}{(a)} x}} \tag{2}$$

$$p_t = \frac{dv_t}{dx} v_t = g \left(\frac{\text{coeff vel head}}{\text{orif}}\right) H \left\{ \frac{1}{\frac{i'}{(a)} s + \frac{i}{(a)} x} - \frac{\frac{i}{(a)} \left(\frac{i'}{(a)} s + x\right)}{\left(\frac{i'}{(a)} s + \frac{i}{(a)} x\right)^2} \right\} \tag{3}$$

$$t_t = \int \frac{dx}{v_t} = \int \frac{dx \sqrt{\frac{i'}{(a)} s + \frac{i}{(a)} x}}{\sqrt{2g \left(\frac{\text{coeff vel head}}{\text{orif}}\right) H \left(\frac{i'}{(a)} s + x\right)}} \tag{4}$$

As all available experiments bearing on the subject, notably those recapitulated in Table X, seem to point to the fact that the mean value of the ratio $\frac{i_o}{i_c}$ of the respective alternating intensities of the moving force varies, with the absolute velocity of the water or the pressure in the reservoir and the area or radius of the cross-section of the vein, i was introduced in the above equations to denote generally

this mean ratio inside or outside of the reservoir between any two sections A O B and C E D and i' to indicate the same mean ratio proper to the portion of vein lying within the reservoir between the plane of the orifice A O B and the plane of rest R S. (See Fig. 8.)

y_t is a minimum for $x = \infty$, when it becomes equal to $r \sqrt[4]{\frac{i}{(a)}}$.

y_t is a maximum for $x = -i' s$, when it becomes equal to ∞ ; v_t is a minimum for $x = -i' s$, when it becomes equal to 0; v_t is a maximum for $x = \infty$, when

the velocity becomes equal to:

$$\sqrt{\left\{ 2g \left(\frac{\text{coeff vel head}}{\text{orif}}\right) H \right\} \frac{1}{i}} \tag{5}$$

p_t is a minimum for $x = \infty$ when it becomes equal to 0.

p is a maximum for $x = -\frac{i' s}{i}$ when it becomes equal to ∞ .

$t_t = \infty$, both for $x = \infty$ and for $x = -i' s$.

2° In vertically descending circular veins projected through simple horizontal orifices, where the acceleration p_a is always equal to the acceleration p_n of the theoretical horizontal vein, plus the acceleration g , produced by the never-ceasing force of gravity, in addition to that due to the hydraulic pressure stored in the reservoir, we have:

$$p_a = p_t + g = \left\{ \left(\frac{1}{\binom{i' s + i x}{(v_a)}} - \frac{i \binom{i' s + x}{(v_a)}}{\left(\binom{i' s + i x}{(v_a)} \right)^2} \right) \binom{\text{coeff vel head orif}}{(v_a)} H + 1 \right\} g \quad (1_a)$$

$$\int p_a dx = \int (p_t + g) dx = \int (dv_t v_t + g) dx = \frac{1}{2} v_t^2 + gx = \int dv_a v_a = \frac{1}{2} v_a^2$$

whence—

$$v_a = \sqrt{v_t^2 + 2gx} = \sqrt{\frac{2g \binom{\text{coeff vel head orif}}{(v_a)} H \binom{i' s + x}{(v_a)}}{\binom{i' s + i x}{(v_a)}} + 2gx} \quad (2_a)$$

$$y_a = \frac{r \sqrt{\binom{\text{coeff vel head orif}}{(v_a)} H}}{\sqrt{\frac{\binom{\text{coeff vel head orif}}{(v_a)} H \binom{i' s + x}{(v_a)}}{\binom{i' s + i x}{(v_a)}} + x}} \quad (3_a)$$

$$t_a = \int \frac{dx}{v_a} = \int \frac{dx}{\sqrt{\frac{2g \binom{\text{coeff vel head orif}}{(v_a)} H \binom{i' s + x}{(v_a)}}{\binom{i' s + i x}{(v_a)}} + gx}} \quad (4_a)$$

y_a is a minimum for $x = \infty$, where the radius of the vein becomes infinitely small, theoretically speaking.

y_a is a maximum for:

$$\frac{g \binom{\text{coeff vel head orif}}{(v_a)} \binom{i' s + x}{(v_a)}}{\binom{i' s + i x}{(v_a)}} + 2gx = 0 \quad (5_a)$$

viz: for—

$$x = \pm \sqrt{-H \binom{\text{coeff vel head orif}}{(v_a)} \left(\frac{\binom{i'}{(v_a)}}{\binom{i}{(v_a)}} \right) s + \frac{1}{4i} \left(\frac{H \binom{\text{coeff vel head orif}}{(v_a)} + i' s}{\binom{i}{(v_a)}} \right)^2 - \frac{1}{2} \left(\frac{H \binom{\text{coeff vel head orif}}{(v_a)} + i' s}{\binom{i}{(v_a)}} \right)} \quad (6_a)$$

when the ordinate y_a , becomes infinitely great, the velocity v_a , being a minimum and equal to 0.

v_a is a maximum for $x = \infty$, being then also infinitely great, theoretically speaking.

3° In the vertically ascending vein, where the retarding effect constantly produced by the force of gravitation is on the contrary inflecting, the liquid filaments outward and diminishing their previous inward inflection towards the axis—

$$p_a = p_t - g = \left\{ \left(\frac{1}{\binom{i' s + i x}{(v_a)}} - \frac{i \binom{i' s + x}{(v_a)}}{\left(\binom{i' s + i x}{(v_a)} \right)^2} \right) \binom{\text{coeff vel head orif}}{(v_a)} H - 1 \right\} g \quad (1_a)$$

$$\int p_a dx = \int (p_t - g) dx = \int (dv_t v_t - g) dx = \frac{1}{2} v_t^2 - gx = \int dv_a v_a = \frac{1}{2} v_a^2$$

whence—

$$v_a = \sqrt{v_t^2 - 2gx} = \sqrt{2g \frac{\left(\frac{\text{coeff vel head}}{\text{orif}}\right) H \left(\frac{i' s + x}{(v_a)}\right) - 2gx}{i' s + i x}} \quad (2.)$$

$$y_a = \frac{\sqrt[4]{\left(\frac{\text{coeff vel head}}{\text{orif}}\right) H}}{\sqrt{\frac{\left(\frac{\text{coeff vel head}}{\text{orif}}\right) H \left(\frac{i' s + x}{(v_a)}\right) - x}{i' s + i x}}} \quad (3.)$$

$$t_a = \int \frac{dx}{v_a} = \int \frac{dx}{\sqrt{2g \frac{\left(\frac{\text{coeff vel head}}{\text{orif}}\right) H \left(\frac{i' s + x}{(v_a)}\right) - 2gx}{i' s + i x}}} \quad (4.)$$

y_a is a maximum, when—

$$v_a^2 = 2g \left\{ \frac{\left(\frac{\text{coeff vel head}}{\text{orif}}\right) H \left(\frac{i' s + x}{(v_a)}\right)}{i' s + i x} - x \right\} = 0, \quad (5.)$$

viz: when—

$$x = \sqrt{\left(\frac{\text{coeff vel head}}{\text{orif}}\right) H \left(\frac{i'}{(v_a)}\right) s + \frac{1}{4} \left(\frac{i' s - \left(\frac{\text{coeff vel head}}{\text{orif}}\right) H}{i (v_a)}\right)^2} - \frac{1}{2} \left\{ \frac{i' s - \left(\frac{\text{coeff vel head}}{\text{orif}}\right) H}{i (v_a)} \right\} \quad (6.)$$

Again, y_a is a maximum and at the same time v_a a minimum, when—

$$d \left\{ \frac{i' s + i x}{(v_a)} \frac{(v_a)}{i' s + x} - \frac{i' s x - i x^2}{(v_a)} \right\} = 0 \quad (7.)$$

whence—

$$x = \pm \sqrt{\frac{i'}{(v_a)} H s + \frac{i'}{(v_a)} \frac{(v_a)}{i^2} \left(\frac{\text{coeff vel head}}{\text{orif}}\right) H s} - \frac{i'}{(v_a)} s = \pm \sqrt{H s \left\{ \frac{\left(\frac{\text{coeff vel head}}{\text{orif}}\right) i'}{(v_a)} - \frac{i'}{(v_a)} \right\}} - \frac{i' s}{i (v_a)} \quad (8.)$$

All the experiments made bearing on the question of viscosity and mutual interference combined, seem to point to the conclusion that the loss of velocity head, caused by this complex resistance increases, in some measure, with the head, and diminishes as the area of the orifice or cross-section of the vein increases, but in obedience to what precise laws the variations of the coefficients c and i take

place, is not easy to establish from the experimental data on record.

Outside of the reservoir, the fluid molecules are not directly subjected to pressure, comparatively to what takes place inside; but the resistance of the air has also to be taken into account. Horizontal jets produced under heads varying from 1 foot upwards, with circular orifices, varying, say, from 1 to 7 inches in diameter, are said to reach, according to all authorities on the subject, which have come into my hands, to the end of the same distance measured from the orifice, as if the greatest

velocity of the jet at or near this orifice was the same as that acquired by a heavy body after falling freely through a space equal to the mean height of the water surface in the reservoir above the opening in its side. It does not yet appear to be absolutely established, however that the horizontal projections of jets formed in circular orifices, which are pierced in thin plates, invariably coincide with those of a solid body having a velocity equal to $\sqrt{2gH}$.

According to Weisbach, the coefficients of velocity increase with the heads and Michelotti's experiments on horizontal jets go to show, on the contrary, that they diminish as the heads increase; thus, while for a head of $7\frac{1}{2}$ feet the coefficient of velocity was found by the latter to be .993, for a head of $23\frac{1}{2}$ feet, it was only .983 with the same orifice.

This matter is still involved in much uncertainty and must remain so until some philanthropically disposed Government, wealthy corporation, rich nobleman or merchant prince may choose to take sufficient interest in the advancement of hydraulic science, to set apart the funds required for making conscientious and systematic collections of all reliable experimental data having a bearing on this subject, which are to be found in existing works and archives, and to organize a proper hydraulic service, amply provided with all the necessary apparatuses and appliances, for the purpose of filling, with the results of fresh experiments, the numerous gaps which must inevitably be found to declare themselves after the work of compilation is completed and for verifying such results of old experiments as might appear to be of a doubtful character.

The following table (XIII.) shows the values of $\left(\begin{smallmatrix} \text{coeff.} \\ \text{vel.} \\ \text{orif.} \end{smallmatrix}\right)$ for efflux in air, which were arrived at by different experimenters, with various orifices and heads, and also the corresponding values of $\left(\begin{smallmatrix} \text{coeff.} \\ \text{vel.} \\ \text{heads.} \\ \text{orif.} \end{smallmatrix}\right)$ in the plane of a circular orifice in a thin plate.

TABLE XIII.

1	2	3	4	5	6	REMARKS.
No.	Diameter of orifice in inches.	H Head of water in reservoir above centre of orifice.	$\left(\frac{\text{coeff. of vein}}{\text{coeff. of orifice}}\right)$ Coefficient of velocity of efflux in plane of orifice.	$\left(\frac{\text{coeff. of head orif.}}{\text{coeff. of orif.}}\right)^2$ Coefficient of velocity head of efflux in plane of orifice.	Authority.	
1	0.15945	0.3817 inches.	0.6628	0.4393	Weisbach	
2	0.2000	14 "	0.623	0.3881	Dr. Matthew Young..	Orifice in bottom of reservoir—Jet vertically descending.
3	0.384	51 "	0.6210	0.3856	Steckel	" "
4	"	44 "	0.6263	0.3922	"	" "
5	"	35 "	0.6259	0.3917	"	" "
6	"	29 "	0.6277	0.3940	"	" "
7	"	19 "	0.6268	0.3929	"	" "
8	"	12.10 "	0.6281	0.3945	"	" "
9	"	3.08 "	0.6544	0.4282	"	" "
10	0.394	339.839 feet.	0.5964	0.3557	Weisbach	
11	"	44.536 "	0.6257	0.3915	"	
12	"	35.786 inches.	0.6218	0.3866	"	
13	"	2.133 feet.	0.6730	0.4529	Castel.....	
14	"	23.621 inches.	0.6092	0.3711	Weisbach.....	
15	"	1.017 feet.	0.6540	0.4277	Castel.....	
16	"	9.842 inches.	0.6179	0.3818	Weisbach	
17	"	3.937 "	0.6368	0.4055	"	
18	"	0.787 "	0.6400	0.4096	Venturi	Orifice in top of closed reservoir—Ascending jet a little declined from the vertical.
19	0.3996	33.7849 "	0.6416	0.4117	"	"
20	"	0.8525 "	0.6556	0.4298	Weisbach	"
21	0.3996	59.683 "	0.6319	0.3993	Venturi	"
22	0.400	3.100 "	0.6662	0.4438	Steckel.....	Orifice in bottom of reservoir—Stream or vein vertically descending.
23	"	2.970 "	0.6726	0.4524	"	"
24	"	2.920 "	0.6727	0.4525	"	"
25	"	2.850 "	0.6743	0.4547	"	"
26	0.4185	3.030 "	0.6802	0.4627	"	"
27	0.420	3.070 "	0.6775	0.4590	"	"
28	0.482	3.000 "	0.6803	0.4628	"	"
29	0.484	2.810 "	0.6844	0.4684	"	"

TABLE XIII—Concluded.

1	2	3	4	5	6	REMARKS.
No.	Diameter of orifice in inches.	H Head of water in reservoir above centre of orifice.	$\left(\frac{\text{coeff. vel. str.}}{\text{coeff. vel. orif.}}\right)^2$ Coefficient of velocity of efflux in plane of orifice.	$\left(\frac{\text{coeff. vel. orif.}}{\text{coeff. head orif.}}\right)^2$ Coefficient of velocity head of efflux in plane of orifice.	Authority.	
30	0.533	4.263 feet.	0.616	0.3795	Bossut	Orifice in side of reservoir.
31	0.533	9.600 "	0.613	0.3758	"	"
32	0.580	0.483 "	0.632	0.3994	"	"
33	0.580	0.984 "	0.617	0.3807	"	"
34	1.027	2.372 "	0.618	0.3819	Eytelwein	
35	1.066	9.600 "	0.617	0.3807	Bossut	Orifice in side of reservoir.
36	1.066	7.327 "	0.619	0.3832	Michelotti	"
37	"	4.263 "	0.616	0.3795	"	"
38	"	0.6217 inches.	0.649	0.4212	"	"
39	1.181	2.676 "	0.629	0.3956	Castel	
40	1.614	2.887 feet.	0.622	0.3869	Venturi	Orifice in side of reservoir.
41	1.599	3.553 "	0.605	0.3660	"	"
42	2.126	7.218 "	0.607	0.3684	"	"
43	2.132	23.344 "	0.605	0.3660	Michelotti	"
44	2.132	12.493 "	0.605	0.3660	"	"
45	3.189	22.179 "	0.597	0.3564	"	"
46	3.189	12.600 "	0.612	0.3745	"	"
47	3.189	7.349 "	0.613	0.3758	"	"
48	6.378	12.008 "	0.619	0.3832	"	"
49	6.378	6.923 "	0.619	0.3832	"	"

The following series of coefficients for circular orifices from Rennie's experiments with orifices from $\frac{1}{4}$ inch to 1 inch diameter under heads from 1 foot to 4 feet extracted from Mr. Neville's work, I have purposely given separately from those entered in Table XIII. as it tends to prove, apparently contrary to the experience of other experimenters, including myself, that the coefficients of efflux or velocity in the orifice increase not only as the depths decrease but also simultaneously as the areas of the orifices are diminished:—

TABLE XIV.

No.	Diameter of orifice in inches.	H. Head of water in reservoir above centre of orifice.	$\left(\frac{\text{coeff. vel.}}{\text{head orif.}}\right)$ Coefficient of velocity of efflux in plane of orifice.	$\left(\frac{\text{coeff. vel.}}{\text{head orif.}}\right) = \left(\frac{\text{coeff. orif.}}{\text{orif.}}\right)^2$ Coefficient of velocity head of efflux in plane of orifice.	Authority.	Remarks.
1	0.25	1 foot.	0.671	0.4502	Rennie.	Orifice in side of reservoir.
2	"	2 feet.	0.663	0.4384	"	"
3	"	3 "	0.660	0.4356	"	"
4	"	4 "	0.662	0.4382	"	"
5	0.50	1 foot.	0.634	0.4020	"	"
6	"	2 feet.	0.621	0.3856	"	"
7	"	3 "	0.636	0.4045	"	"
8	"	4 "	0.626	0.3919	"	"
9	0.75	1 foot.	0.644	0.4147	"	"
10	"	2 feet.	0.652	0.4251	"	"
11	"	3 "	0.632	0.3994	"	"
12	"	4 "	0.614	0.3770	"	"
13	1.00	1 foot.	0.633	0.4007	"	"
14	"	2 feet.	0.619	0.3832	"	"
15	"	3 "	0.628	0.3944	"	"
16	"	4 "	0.584	0.3411	"	"

Mr. John Neville says, at page 55 of the 3rd edition of his work :

"It may be remarked, in passing, how universal the coefficients $\cdot 613$ to $\cdot 628$ are for all forms of orifices in thin plates; or with the outside arrises chamfered. Indeed, the coefficient $\cdot 62$ may always be used with certainty for practical purposes, for every orifice of this kind (round or square), whether at the surface, in the form of a notch, or at the sides or bottom of a vessel, if the section of the approaching water be large in proportion to the area of the discharging orifice or notch. By coefficient, of course, is here meant that decimal which, multiplied by the theoretical value, gives the practical result; and this is substantially the same for notches and orifices sunk below the surface."

It is evident, judging by the coefficients given in Tables XIII. and XIV., that the case is quite different as regards theoretical computations.

All the arguments advanced thus far in support of the theoretical formation of the *vena contracta*, as above, are based on the teachings of phenomena pertaining to veins generated through circular orifices in thin, perfectly flat plates. Notwithstanding this, it is readily perceived, upon reflection, that no reason exists why the principles deduced from the enquiries instituted should not also hold good for veins projected through all kinds of circular orifices, viz., whether efflux takes place through a plane at right angles to the direction of motion or through an interior, cylindrical, divergent or convergent tube, without touching the sides.

That there is something abnormal in connection with this feature of the theory proposed, which requires to be looked into and cleared up, appears from the following considerations :

Fig. 9

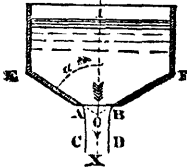
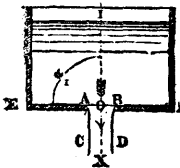
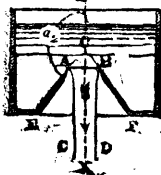


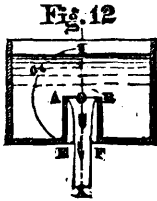
Fig. 10



It is well known that when the axis $I X$ of a stream $A B C D$ makes an acute angle $E O I$ or a with the wall $E A O B F$, as in Fig. 9, the contraction is smaller, and when the said axis makes an obtuse angle $E O I$ or a_2 with the wall $E A O B F$, as in Fig. 11, it is greater than in the case of a vein projected through an orifice $A O B$ pierced in a flat plate $E A O B F$, where the angle $E O I = a'$ is a right angle, as shown in Fig. 10.

Fig. 11





Borda, Bidone and Weisbach have found that when the angle $E O I = \alpha_3$ in fig. 12, reaches 180° , the coefficient of contraction is reduced to a mean value of 0.53—and in two of his experiments Bidone obtained coefficients as low as 0.50 nearly.

Dr. Weisbach made a series of experiments with a great number of mouth-pieces, 2 centimeters or 0.787 inch wide, and under pressures varying from 1 to 10 feet; the results of his experiments with respect to efflux, were as follows :

Angle E O I.	180°	$157\frac{1}{2}^\circ$	135°	$112\frac{1}{2}^\circ$	90°	$67\frac{1}{2}^\circ$	45°	$22\frac{1}{2}^\circ$	$11\frac{1}{2}^\circ$	$5\frac{1}{2}^\circ$	0°
Coefficient of efflux.	0.541	0.546	0.577	0.606	0.632	0.684	0.753	0.882	0.924	0.949	0.966

As a small loss of velocity always takes place during efflux, he estimates that the coefficients of contraction are from 1 to 2 per cent. greater than the coefficients of efflux. Under a head of about 2.475 inches I found that the coefficient of efflux through an orifice of 0.416 inch in diameter, with a sharp edge in a wall whose sides were inclined at an angle of $157\frac{1}{2}^\circ$ to the axis of the vein, was as high as 0.598 instead of only 0.546. Furthermore, under a head of 2.65 inches, the coefficient of efflux obtained by me for a jet formed in an orifice 0.405 inch diameter, pierced in a wall inclined to the axis of the stream at an angle of 135° was as high as .657 when the aperture, instead of having a sharp edge, was surrounded by a flat rim about $\frac{1}{8}$ of an inch wide in the plane of this orifice. (See Table XI $\frac{1}{2}$, page 261).

For the present, however, it is not necessary to attach much importance to these comparatively small variations in the coefficients of efflux and contraction; the broad fact remains, that both the coefficients of efflux in the orifice and coefficients of contraction are variable with the degree of inclination of the sides of the truncated cone A B F E, whose small base A B, constitutes the orifice, to the direction followed by the current or axis of the stream.

The fluctuations of these coefficients are due, as several experimenters have remarked, to the fact of the molecules which flow towards the orifices having to suffer various deviations from the initial directions followed by them while finding their way through the orifice, to form the corresponding vein in each case.

In this respect, viz.: as regards deviation from the directions to be followed in order that the maximum amount of *vis viva* may be produced which may be designated as the normal directions—the molecules flowing through a circular orifice in a thin flat plate—are clearly not an exception to the general rule. That is to say, some of the molecules which are between the plane of rest R K S, and the plane of the aperture A O B (Fig 8) and particularly those lying nearest to this latter plane, must necessarily be deviated to a small extent from the normal direction just described, and it is evident also that, in its passage from the reservoir outward, through an orifice in a thin plate, the liquid stream is not strictly confined, inside of the reservoir, within a truncated conoid resembling that which is generated by the revolution of the curve determined by equation (1), on its longitudinal axis X F, Fig 8.

It will be observed that even in this, the simplest kind of orifice, the free efflux of the liquid is somewhat interfered with, and friction against the metallic envelope being abstracted, the velocity in the plane of the orifice must be slightly smaller and contraction out-side of the reservoir correspondingly greater than if the flow had taken place through a conoidal mouthpiece, so proportioned that within it motion would diminish gradually—proceeding from the plane of the orifice to the plane of rest—solely by virtue of the continuous increase of the field of action, in accordance with some fixed law, toward the interior of the reservoir perpendicularly.

to the plane of the orifice, as compared to the motion imparted by the original impulse to the first elementary layer or sheet of liquid which leaves this plane on the aperture being opened.

It is therefore evident that even if water was devoid of viscosity and if absolutely no resistance was encountered in the passage through the atmosphere, nor friction of any kind generated, a vein projected through a circular orifice in a thin plate with a sharp edge, under a constant head or pressure, could yet not be called a theoretically perfect fluid jet, to wit: a jet composed of a succession of elementary fluid sheets, detached from the body of liquid contained in a state of rest within the reservoir, with gradually increasing velocities and free from all lateral disturbance by extraneous contiguous molecules.

The head KX (Fig. 8), the cross-section CD , and its distance KE , from the origin of motion or plane of rest RS within reservoir, being given, the corresponding perfect fluid circular vein may be defined to be the stream possessing the greatest possible amount of energy to be obtained under the conditions imposed, at the given cross-section as well as at the section of maximum contraction.

Now, a stream or vein flowing through an orifice in a thin plate, under a comparatively small head of say, 5 or 6 diameters or thereabouts, cannot differ sensibly from the theoretically perfect conoidal stream just defined—more especially the portion outside of the reservoir—hence the coefficients of velocity of efflux and contraction corresponding to such an orifice, viz., the ratio between the actual velocity of the liquid in the orifice and that due to the head must coincide very nearly with the theoretical coefficients of velocity of efflux and contraction corresponding to a maximum production of living force and may, therefore, be taken as the measure of these latter, very little error being made.

Again, we have already seen that the largest coefficient of velocity of efflux, in air obtained with an orifice in a thin plate, is about 0.70; this figure (or say $V\frac{1}{2}$ with Newton) may, therefore, be considered to be the true value (nearly) of the coefficient of velocity of efflux of the corresponding perfect theoretical vein, viz.: it may be considered that one-half of the head of water in any reservoir is essentially consumed or utilized in ejecting liquid through a simple orifice, and the other half in generating additional velocity or *vis-viva*.

Finally, by adhering to the principle verified by experiment, within certain limits at least, that the energy developed is proportional to the head or pressure in the reservoir, the probable theoretical coefficient of maximum contraction of a naturally contracted vein composed of perfectly fluid matter, in which case no loss whatever of force could take place, is thus found to be equal to $\sqrt{\frac{1}{2}} = 0.8408$, not at a distance equal to the radius of the orifice, or so, from the reservoir; but at an infinite distance from the same.

APPLICATIONS OF THE NEW THEORY.

COMPARISON OF THEORETICAL COMPUTATIONS WITH EXPERIMENTAL RESULTS.

After constructing the fundamental formulæ required to determine theoretically the motions, forms, &c. of the most elementary kinds of circular contracted liquid veins that are formed through an orifice in a thin plate. I will now attempt to employ some of these equations in the numerical computation of quantities and dimensions, previously established by means of actual measurements of veins of water produced in nature, and of the corresponding discharges in a fixed length of time.

In this manner, I may perhaps succeed in removing some of the ground for hesitation, respecting the acceptance of the hydraulic theory presented above, which the want of concordance of theoretical with experimental results has not, without good cause, proved to be in many similar instances.

Distrust as regards the soundness of the hydraulic theory here presented, would be the more natural, as I found the use of complex and comparatively obscure phraseology unavoidable when endeavoring to describe the effects produced on an infinite number of molecules of matter, liable to change their relative positions at every instant—by an agent, whose action is not directly perceptible to the

touch nor measurable, such as proves to be the force which holds together the constituent elementary particles of every mass of liquid, the reality of whose influence is apparently incapable of being rendered manifest to our senses in any other manner than through the variations of form and pressure brought about by it in various kinds of liquid veins and moving fluid bodies.

On account of the limited number of reliable experimental data of the proper kind that are available at present, it is not to be expected that I should be able to furnish numerous examples of successful applications of the fundamental equations above laid down, to the determination of the forms and other properties of all the different kinds of fluid veins to be met with in nature, as well as of the discharges from tubes, pipes, &c. Indeed, I was forced, in nearly all the cases exemplified, to content myself with computing mere rough approximations to the quantities and dimensions sought; but although rough, the results will be found to be indicative of the soundness of the principles of the theory put forth herein.

HORIZONTAL JETS.

The first experiment which I have chosen in this connection, for comparison with theory, is one of a truly original and scientific character. We owe it to the initiative of Mr. T. Trudeau, the present Deputy Minister of the Department of Railways and Canals, of Canada, so justly distinguished for his learning and scientific attainments, who is for ever taking the greatest interest in the advancement of those branches of the natural sciences, which are more especially connected with the duties of the important office which he so ably fills.

In order to obtain an infallibly correct representation of the form assumed by the contracted vein at its exit from the reservoir, Mr. Trudeau conceived the happy idea of having a photographic view taken of a liquid vein projected horizontally through a circular orifice A B, (See Plate II), 0.530 inch in diameter, under a constant head or pressure of about 14 inches.

This orifice was pierced, on the lathe, in a polished brass plate C D $\frac{1}{16}$ inch thick, being flaired out from 0.530 inch in diameter at A B, on the outer face, to about 4 inches in diameter at C D, on the face within the reservoir, so as to form a conoidal cavity resembling, as near as could be judged by a close inspection of the outflowing fillets, to the inner portion of a contracted liquid vein projected, under an equal head of water, through a circular orifice in a thin plate, having about the same diameter. By this arrangement it was possible to photograph a far greater length of the more important portion of the vein, than if the orifice had been pierced in a thin plate reduced to a feather edge, from the outer towards the inner face, viz., that in contact with the water.

It will also be noticed that, formed in these conditions, the vein outside of the reservoir must have presented a profile differing less from that of the true theoretical fluid vein referred to on the preceding page, than under any other circumstances, and the contraction must undoubtedly have proved smaller than in the case of a corresponding vein projected under the same head through an orifice in a thin flat plate.

On the other hand, this mode of proceeding gave rise to some uncertainty as to the precise location of the origin of the nearly theoretically perfect fluid vein thus obtained, and therefore, also, with respect to the exact diameter of the cavity in the plate corresponding to this origin or, more properly, the plane where the velocities due to the forces f_{orif} and f_{orif} are equivalent. This difficulty was got over, however, by fixing the value of the coefficient of contraction, viz.: $c_c = 0.83$, approximately at 0.83—at a distance of about one diameter from the orifice—this number being the mean value, nearly, of the coefficient of maximum contraction of a vein projected through an orifice 0.482 inch diameter, under a head of 3 inches, found by direct measurement, (See Table IV)—on the ground that the contraction of a vein produced under a head so small in comparison to its diameter, must also have proved nearly the same as the corresponding contraction in a theoretically perfect fluid vein, viz.: one unaffected by either friction, or resistance of the atmosphere, and otherwise undisturbed in its natural forward movement.

From the negative obtained, which was much smaller than the natural size of the vein, enlarged views were made in a solar camera, the actual diameter of the vein being in this manner augmented from 0.53 inch to 8.36 inches. These pictures were skilfully executed by Mr. S. McLaughlin, the experienced photographer of the above named Department, so that an outline of figure, sufficiently clear and sharp, was obtained, to allow of accurately measuring, by scale, the coordinates of the curve forming the longitudinal profile of the vein under consideration, for a distance of about $\frac{2}{3}$ of an inch or $1\frac{1}{2}$ diameters from the plane of the orifice. A *fac simile* of this profile, together with an approximate enlarged section, of the brass plate, is given in Plate II; and Table XV, which here follows, shows the lengths of the ordinates computed by means of equation (1.) side by side with those measured on the photographic record.

TABLE XV.

Inches.	Designation on plate II.	Inches.	Inches.	Notes.
-0.9893			0	<p>For $i_{(v)}^x = .80$ on an average between the points <i>O</i> and <i>E</i> or <i>S</i>, Plate II, $i_{(v)}^x = .4096$. Also for $c_{cont.} = .83$, $r_{orif.} = 4.4578$ inches whence $0.53 \times 4.4578 = 0.55$ in. = natural size</p> <p>of $r_{orif.}$ Hence, substituting the numerical values for the symbols, we have, at the distance of 8 inches from the plane of the orifice where the diameter was found to be a minimum, and equal to 3.70 inches by measurement:</p> $r_{orif.} \sqrt{\frac{i_{(v)}^x s_0 + i_{(v)}^x x}{(v.)}} = 3.70 \text{ inches,}$ $\sqrt{\frac{i_{(v)}^x s_0 + x}{(v.)}}$ <p>whence we deduce $s_0 = 2.4154$ inches in the enlarged vein and $s_0 = \frac{2.4154}{4.4578} r_{orif.} = 0.5419$</p> <p>$r_{orif.} = 0.1495$ inch in the natural vein of water; also $i_{(v)}^x s_0 = .4096 = .5419 r_{orif.} = .22196 r_{orif.} = .06104$ inch in this last vein, viz.: natural size. Thus s_0 stands for an auxiliary space over which a body solicited with a uniform acceleration equivalent to the mean acceleration generated by the force $f_{orif.}$ outside of the reservoir, would have to travel within the reservoir, in order to attain at <i>O</i> a velocity equal to that generated by the variable force corresponding to $f_{orif.}$ within the reservoir during the passage of the liquid from <i>N</i> to <i>O</i> (Fig. 8.)</p>
-0.7500			5.7921	
-0.5000			5.0163	
0.0000	OA		4.4578	
+0.3380	338a	4.2800	4.2799	
+0.5000	5b	4.2100	4.2183	
+1.0000	1c	4.0600	4.0822	
+1.5000	1.5d	3.9700	3.9938	
+2.0000	2e	3.9000	3.9315	
+3.0000	3f	3.8200	3.8494	
+4.0000	4g	3.7650	3.7976	
+5.0000	5h	3.7450	3.7618	
+6.0000	6i	3.7250	3.7357	
+7.0000	7j	3.7100	3.7157	
+7.5000	7.5K	3.7050	3.7080	
+8.0000	8l	3.7050	3.7000	
+9.0000	9m	3.7100	3.6872	
+10.0000	10n	3.7150	3.6767	
+11.0000	11o	3.7170	.....
+12.0000	12p	3.7220	.....
+13.0000	13q	3.7250	.....
8			3.5662	

As $i_{(x)}$ appears to increase simultaneously with the velocity of the water in the vein, and nearly as the square root of this velocity, judging by the values of $i_{(x)}$ computed in the case of a vertically descending vein projected through an orifice 0.4 inch in diameter, which are given hereafter at page 52; $(.80)^2 = .4096$ was assumed to be the approximate mean value of this ratio, $i_{(x)}$ along the portion O E Fig. 8, or $\overline{18}$ Plate II of the natural vein under consideration, instead of $c_c^2 = (.83)^2 = .4747$, which is more properly the particular value corresponding to the section C E D.

The distance O N = s (Fig. 8) of the plane of rest P Q, from the plane of the orifice A O B not having been ascertained by direct measurement, as was done by me for the vertically descending vein (See experiments j , Tables VII and VIII), for the very good reason that when the experiment under consideration was made, there was no apparent object in establishing the position of this plane with accuracy, the length of an appropriate auxiliary space $s_o = 0.14956$ inch, equivalent, as regards generation of motion (when $i_{(x)}$ is constant) to the actual length of O N = s in the reservoir, was established, as shown in the last table, No. XV, in the column headed "Notes," on the supposition that the value of $i_{(x)}$, instead of diminishing, as we proceed from any point E towards the plane RS within the reservoir, and increasing when we travel in the opposite direction along the path of the vein—remains constantly equal, on an average, to 0.4096, along the portion A O B S K R of the vein which lies within the reservoir, the same as for the portion on the outside.

Along this inner portion of the naturally contracted vein the actual mean value of $i_{(x)}$ is probably, as just pointed out, less than 0.4096, decreasing possibly from, say 0.41, on an average, within the space of one diameter or so outside the reservoir in front of the plane of the orifice A O B to 0 at the plane P Q, corresponding to $x = s$, consequently the actual length of s must evidently exceed 0.14956 inch, say, in the ratio of 0.41 to 0.20, whence $s = 0.30$ inch nearly; but the introduction of an auxiliary space s_o , while facilitating the work of computation, evidently, in no way invalidates the final results.

It is, of course, not pretended that the values of c_c , $i_{(x)}$, s_o , r_{orif} determined in the manner just described, are correct, in a theoretical sense, more especially, as apart from other shortcomings, the action of gravity on the vein outside of the reservoir was neglected, the cavity in the brass plate undoubtedly different in a greater or less degree from the true form, and the resistance of the air had also necessarily to be left out of consideration. I think, however, that the close coincidence of the enlarged photographic record of the natural vein with the curve traced out on paper, by means of ordinates, computed with the aid of the formulas established, can reasonably be accepted as a fair indication of the soundness of the theory on which they are based.

The indications are that the mean values of $i_{(x)}$ vary approximately, in horizontal veins abstracted from gravity, as shown hereunder, viz.:

When $x=0$. (in the plane of the orifice), $i=0.87$ of the maximum value proper to the vein.

"	$x=0.1r$ orif.	$i=0.90$	"	"	"
"	$x=0.2r$ orif.	$i=0.925$	"	"	"
"	$x=0.4r$ orif.	$i=0.955$	"	"	"
"	$x=0.6r$ orif.	$i=0.97$	"	"	"
"	$x=0.8r$ orif.	$i=0.98$	"	"	"
"	$x=1.0r$ orif.	$i=0.99$	"	"	"
"	$x=1.5r$ orif.	$i=0.995$	"	"	"
"	$x=2.0r$ orif.	$i=1.000$	"	"	"

With regard to the precise form which the conoidal cavity turned in the brass plate should have had, I do not see, on account of the interference with free

efflux, of the fluid particles drawn into the theoretically perfect conoidal stream, between the orifice in a thin plate and the plane of rest $R S$, being a factor of disturbance of which it is impossible to form an estimate, that it can well be arrived at otherwise than by making repeated trials with mouth-pieces variously proportioned. There can be no doubt, however, but that the distance $O K=0.9893$ as determined in Table $X V$ is slightly shorter than it should be.

If we took for granted that the law, according to which i apparently varies, is general, the conditions of such variation might possibly be directly combined with the other relations already established, and new equations more generally applicable to the class of veins under consideration could then be constructed.

Such a course would, however, tend to bury effectually out of sight, under what Mr. Trautwine has chosen to call mathematical rubbish, perhaps not altogether without some reason, fundamental principles which are, of their own nature, far from being easily discerned and understood, even when exposed and described in the fullest and clearest manner possible. I have, therefore preferred, not to attempt such algebraical combinations at present, contenting myself with introducing in the applications of these formulæ which here follow such values of $i_{(a)}$ as would be required by the particular circumstances of the cases considered, keeping constantly in view that in general: the larger the head or pressure in comparison to the orifice, (1) the greater the value of $i_{(a)}$ in accordance with the law just enunciated, (2) the greater the protrusion of the vein from the orifice $A O B$, whence (3) the less the distance $s=O N$ from the plane of the orifice to the plane $P Q$, where perfect equilibrium between the liquid particles ceases to be disturbed, whence also (4) the smaller the coefficient of the velocity head of efflux $\left(\frac{\text{coeff. vel. head.}}{\text{orif.}}\right)$ through an orifice in a thin plate in comparison to unity, which is that of the velocity due to the fall of a heavy body through a space equal to the total head of water in the reservoir above the orifice.

VERTICALLY DESCENDING VEINS.

The new theory was applied as follows to the determination of the value of $i_{(k)}$ at several points of the vertically descending circular vein projected under a head $H=2.99$ inches through an orifice in a thin plate 0.4 inch diameter, which I measured with points mounted on a diaphragm, as already described, the dimensions used being those given in Table III.

The numerical value given to $i_{(a)}$ s , which represents the distance between the plane of the orifice and the plane of rest within the reservoir, is that which was determined experimentally, as explained, by introducing a cylindrical pin or rod 0.185 inch diameter into the reservoir, from above, opposite the orifice, approaching its base by means of screw motion, towards the plane of that orifice and establishing the lowest or limiting position of the base of the rod for which the volume of water discharged in the unit of time remained a maximum with a constant head—the cylinder being raised a small distance at a time and the corresponding discharge measured in every position. As this limit was reached approximately when the base of the cylindrical rod stood 0.24 to 0.25 inch above and back of the plane of the 0.4-inch circular opening in the thin plate, I put, accordingly: $i_{(a)} s=0.25$ inch.

Substituting, therefore, in the following expression for $i_{(k)}$ in terms of y, x, H, r i 's and $\left(\frac{\text{coeff. vel. head.}}{\text{orif.}}\right)$, which is deduced directly from equation (3_a) viz:

$$i_{(k)} = \frac{r^4 \left(\frac{\text{coeff. vel. head.}}{\text{orif.}}\right) H i'_{(a)} s - y^4 \left(\frac{\text{coeff. vel. head.}}{\text{orif.}}\right) H i'_{(v)} s + \left(\frac{\text{coeff. vel. head.}}{\text{orif.}}\right) H x + x i'_{(v)} s}{x^2 y^4 - x r^4 \left(\frac{\text{coeff. vel. head.}}{\text{orif.}}\right) H} \tag{9}$$

2.99 inches for H , 0.25 inch for $i'_{(a)} s$, 0.2 inch for r , 6.44382 for $\left(\begin{smallmatrix} \text{coeff.} \\ \text{v.cl.} \\ \text{head,} \\ \text{orif.} \end{smallmatrix}\right)$ as found in Table XIII, and for the coördinates y and x , successively, the dimensions obtained by direct measurement, as given in Table III, we obtain the results given in:

TABLE XVI.

x_d Abcissa measured from plane of orifice in thin plate downward.	y_d Ordinate.	$i_{(a)}^{(v)}$ —	Remarks.
1.000	0.1515	0.29737	These two values of $i_{(a)}^{(v)}$ do not seem to be in harmony with the others. It may be remarked, however, that a very slight error in the measurement of the diameter affects the value of $i_{(a)}^{(v)}$ considerably.
1.535	0.1480	0.37099	
2.535	0.1415	0.42937	
5.535	0.1240	0.35735	
10.535	0.1120	0.43550	
15.535	0.1035	0.43807	

These results seem to indicate that $i_{(a)}^{(v)}$ increases simultaneously with the velocity, and nearly as the square root of this velocity. Moreover, that for a mean diameter of about $\frac{1}{2}$ -inch and a velocity of say 120 inches or 10 feet per second $i_{(a)}^{(v)} = 0.44$ nearly, in a vein projected through an orifice in a thin plate. A portion of the differences obtaining between the values of $i_{(a)}^{(v)}$ at various depths is, however, due to the fact of the plane of the theoretical orifice not being coincident with that of the orifice in the thin plate.

It is not usual to find that restrictions are made by authors on hydraulics respecting the uniformity of the discharging power of an orifice pierced in a thin plate; taking into account the position of its plane in relation to the horizon and the direction of the stream. No doubt, practically speaking, under the same head, the discharge through an orifice in a thin plate remains constant, whether this orifice lies in a horizontal, vertical, or any plane inclined to the horizon or vertical. From a theoretical standpoint, however, I am inclined to believe that the discharge through such an orifice, the head being constant, must be slightly greater for a vertically descending vein, especially under small heads, than it would be if the liquid stream followed a horizontal direction at its exit from the reservoir, notwithstanding the increased convergence and consequent mutual interference of the fillets in the immediate vicinity of the plane of the orifice outside of the reservoir, which are due to the additional acceleration suddenly imparted to the fluid particles by the action of gravity.

VERTICALLY ASCENDING JETS.

Dr. Weisbach gives, in his admirable treatise of Mechanics*, the following table where the heights reached by vertically ascending jets projected through orifices in

*Page 830, Vol. 1, English translation, Weisbach's Mechanics, by Cox. Van Nostrand, New York. 283

thin plates of 1 and 1.41 centimeters, viz. : .394-inch and .591-inch in diameter, under heads varying from 10 to 70 feet, are indicated.

TABLE XVII.

Height <i>h</i> , due to velocity, in feet.	Feet 10.	Feet 20.	Feet 30.	Feet 40.	Feet 50.	Feet 60.	Feet 70.
Height of jet projected through circular orifice in a thin plate 0.384 inch=1 centimetre in diameter.....	9.61	18.31	25.98	32.58	38.12	42.66	46.30
Height of jet projected through circular orifice in a thin plate 0.5655 inch=1.41 centimetres in diameter.....	9.715	18.69	26.75	33.77	39.72	44.63	48.59

The reduced elevation of 46.30 feet above the plane of the orifice, to which a jet of 1 centimetre is said to reach, when the head of water in the reservoir is 70 feet, is, of itself, very remarkable and cannot well be accounted for solely by the resistance offered by the air, and the so-called resistance encountered during the passage through the orifice, while admitting, in accordance with the theory based on Toricelli's theorem, that the vein should rise to the level of the water surface in the reservoir.

Let us suppose the coefficient of resistance ζ produced by the passage of the vein through the atmosphere to be equal to that of a plane surface moving through air, the area of which is equal to that of the cross-section of the vein at every point of its path, viz., to 1.25, according to Du Buat and Thibault.* As air, at the ordinary atmosphere pressure, weighs about $\frac{1}{800}$ of water or, say twice as much, viz., $\frac{1}{400}$, to make ample allowance for any air that may be carried along with the vein, the diminution of the effective pressure of the water due to the passage of the jet through the atmosphere is thus roughly, for 70 feet head of water, $70 \times 1.25 \times \frac{1}{400} = 0.2187$ feet. Hence, the jet should rise to 69.78 feet, or thereabouts, instead of only 46.30 feet, if the atmosphere was the only resistance to be overcome.

Another proof of the fallacy of attributing to the resistance of the air, the greater part of the difference between the head due to the velocity actually generated in a fluid projected through a simple orifice, and the total fall from the surface in the supplying reservoir to the centre of this orifice, is obtained by comparing Michelotti's experiments on horizontal jets, with those of Dr. Weisbach, on vertical jets.

According to Michelotti, jets issuing from an orifice in a thin vertical plate, 0.889 foot=9.668 inches in diameter, under heads varying from 7.51 to 23.59 feet, and passing therefore, roughly, from 33 to 23 feet through the air, are said to be projected horizontally in each case to a distance equal, within 1 per cent., or less to the corresponding ordinate of the parabola which would be described by the jet if its horizontal velocity near the plane of the orifice was equal to that due to the head.

Weisbach's experiments on vertical jets formed in an orifice 1.41 centimetres or, say $\frac{3}{8}$ -inch diameter, under heads of 30 to 40 feet and passing 26.75 to 33.77 feet through the air, go to show that the heights reached by the jets will fall short, in each case, of the height of the water surface in the reservoir above the orifice, from 11 to 16 per cent.

I am aware, of course, that a vein formed through an orifice of 9.688 inches is very much larger than one through an opening whose diameter is only $\frac{3}{8}$ -inch or so; but I cannot see how even this large difference of area could render the proportional resistance of air ten to fifteen times greater in one case than in the other.

As for "the resistance during the passage through the orifice" to which frequent allusion is made in works of hydraulics, I confess that I fail to conceive how it can be possible for any round hole pierced through a plate so thin that it may be

*See English translation Weisbach's Mechanics, page 1031.

considered to be devoid of thickness, to offer resistance to bodies passing through it when ejected from a vessel, no matter what may be the rate of the motion imparted to them.

But then it may be, of course, that after having assumed that theoretically the liquid particles must of necessity acquire, at the short distance of, say one radius of the orifice, in front of the said orifice, a velocity equal to that due to the fall from the surface of the water to the centre of this orifice, the authors, when saying "during the passage through the orifice," mean to refer to the time occupied by the water in passing from within the reservoir to the section of maximum contraction and velocity, or to some other point.

If some such broader meaning is attributed to the expression "during the passage through the orifice," I must acknowledge that it is well suited for smoothing over the difficulty of reconciling the shortcomings of a defective theory with the arguments supplied by properly substantiated experimental truths.

Although I have not found it practicable, up to the present time, in directly employing equation (6_a) for the computation of the height h , to which a jet will rise vertically in the air under a given head, I am satisfied that the great differences between the heights to which the jets experimented on by Dr. Weisbach rose and the corresponding elevations of the water surface in the reservoir of supply, must be attributed chiefly to the decrease in the velocity head of efflux, $\left(\frac{v_{\text{head}}}{v_{\text{orif}}}\right)$, due to the mutual interference of particles, and to the simultaneous increase of $i_{(y)}$, when we pass from small to great velocities and from large to small orifices.

The following attempts at applications of equation (6_a) for the purposes of discovering what values have to be assumed for $i_{(y)}$ for arriving at the heights to which Dr. Weisbach's jets projected through an orifice 0.394 inch diameter, rose under heads of 10 and 70 feet respectively, go to show that this formula does not lead to absurd results.

In the case of a jet formed in an orifice of 0.394 inch diameter, under a head of 10 feet, we may, judging by what we have seen, put $i_{(y)} = r = .3\frac{3}{4} = 0.197$ inch = 0.016 foot, also $\left(\frac{\text{coeff}}{v_{\text{head}}}\right) = 0.612 = 0.372$, without much risk of material error. These numbers being substituted for the symbols in equation (6_a), it is found that in order that x may be 9.61 feet, $i_{(y)}$ must be equal to 0.40 nearly.

When the diameter of the circular orifice is 0.394 inch and the head 70 feet, we can put $i_{(y)}$ the distance from the plane of the orifice to the plane of rest, equal to $0.6r$, or say 0.01 feet; also $\left(\frac{\text{coeff}}{v_{\text{head}}}\right) = 0.582 = 0.3364$. Upon the respective symbols being replaced by the corresponding numbers in equation (6_a), we find that in order that x may be 46.30 feet, $i_{(y)}$ must be equal to about 0.50.

The mean values of $i_{(y)}$ thus established roughly, viz., 0.40 and 0.50 are not absurd or unreasonably low or high, when compared with the mean value of this quantity (0.4096) in the horizontal vein projected through an orifice 0.53 inch in diameter under a head of 14 inches which was photographed, and with that (0.44) in the vertically descending vein projected through an orifice 0.4 inch in diameter under a head of 2.99 inches, which I measured directly with the pointed screws mounted on a diaphragm &c., &c., as explained.

It is not improbable that vertical jets produced under great pressures through orifices in thin plates, rise in the air, to elevations much below those which jets issuing under the same pressure from properly proportioned conoidal-mouth pieces would attain, on account of the interference with free efflux from the reservoir, arising in each case from the fact of the body of liquid intervening within the vessel between the surface of the conoidal form that would be assumed by a theoretically perfect vein and the inner surface of the orifice plate, being drawn up in the jet spurting through the orifice in the thin plate.

As stated before, for practical purposes, the coefficient of discharge proper to an orifice in a thin plate may be considered to be invariable, whatever direction the stream flowing through this orifice may follow; in point of fact, however, the discharge through such an orifice must be less, especially under small heads, when the water flows vertically upwards than when it follows a horizontal direction at its exit from the reservoir, notwithstanding the gradual spreading of the fillets, which takes place necessarily in such case from the plane of the orifice to the upper end of the vein, being the result of the action of gravity in a direction contrary to that of the motion of the liquid.

Lorgna says, in article L of his "Phisico Mathematical Theory," etc.:—"It is observed that the quantity of water supplied by a vertical jet, in a fixed time, through a given orifice, and under a permanent head, is much smaller than that which would issue from a reservoir in the same time, through the same orifice, pierced in a thin plate in the side of this reservoir, under the same head." (See the comparison of these discharges in the tables given by M. Bossut, in his Hydrodynamics, Part II, Chap. IV.

DISCHARGE THROUGH CYLINDRICAL AJUTAGES OR TUBES.

Poleni has made known the singular effects of cylindrical tubes two centuries ago; and the determination of the cause has been a serious study with scientists ever since.

If we prevent or destroy, artificially, the inflection of the fillets of a naturally contracted horizontal vein projected through a vertical orifice in a thin plate O R (Fig. 13), by causing this vein to flow through a cylindrical tube O R S T, added to the reservoir at the orifice, so as to completely fill the tube, the velocity acquired by the liquid, and consequently the discharge, in a given time, under a constant head, can be arrived at—if the effects of gravity outside the reservoir are abstracted or neglected—in the manner hereafter described, by supposing the natural fluid fillets to

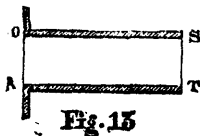


Fig. 15

be spread over the full cross-section of the tube in a uniform and continuous manner, by virtue of their attraction towards its sides, in every part of the cylindrical space from O to S—which is not strictly the case in reality, however, as we will see presently. In these conditions the ever-varying ratio between the two velocities which are due to the forces f_{orif} and f_{cont} in the naturally contracted vein, is continually transformed into the constant ratio of unity or 1, through the intervention of the capillary attraction of the metal, wood, glass, etc., of which the tubular envelope is made, the acceleration due to the force f_{orif} being increased, and that due to the force f_{cont} simultaneously diminished in a corresponding manner.

Thus, if the acceleration due to the force f_{orif} is continually increased, along the trajectory of the naturally contracted vein abstracted from gravity, in the ratio of 1 to j , the total amounts of momentum due to two sensibly constant mean forces f_{cont} and f_{orif} being necessarily the same under all circumstances, at the end of equal times, independently of any transformation whatever, which the constituent factors of mass and velocity may be subjected to within the tube, by virtue of the attraction of its walls—while the momentum is being generated—it follows, that the relation :

$$\left(\begin{matrix} \text{vel} \\ \text{ratio} \\ \text{nat-} \\ \text{vein} \end{matrix} \right) = \frac{\sqrt{i_{(a)}^{(v)} s_0 + x}}{\sqrt{i_{(a)}^{(v)} s_0 + i_{(a)}^{(v)} x}}$$

which holds good for any point P of the naturally contracted vein, situated at a distance x from the orifice, measured in a direction parallel to the longitudinal axis, (See page 267), will become transformed or converted into the relation :

$$\left(\frac{\text{vel. ratio}}{\text{cyl. stream}}\right) = \frac{\sqrt{i_{(a)}^{(v)} s_o + x} + (\sqrt{i_{(a)}^{(v)} s_o + i_{(a)}^{(v)} x} - \sqrt{i_{(a)}^{(v)} s_o + i_{(a)}^{(v)} jx})}{\sqrt{i_{(a)}^{(v)} s_o + i_{(a)}^{(v)} jx}} = 1 \tag{11}$$

whence we deduce the equation :

$$\sqrt{i_{(a)}^{(v)} s_o + i_{(a)}^{(v)} jx} = \sqrt{i_{(a)}^{(v)} s_o + x} + \sqrt{i_{(a)}^{(v)} s_o + i_{(a)}^{(v)} x} - \sqrt{i_{(a)}^{(v)} s_o + i_{(a)}^{(v)} jx}$$

and the value of j in terms of s_o , i and x , viz. :

$$j = \frac{-s_o}{2x} + \frac{1}{4i_{(a)}^{(v)}} + \frac{1}{4} + \frac{1}{2} \sqrt{\frac{s_o^2}{x^2} + \frac{s_o}{x} + \frac{s_o}{i_{(a)}^{(v)} x} + \frac{1}{i_{(a)}^{(v)}}} \tag{12}$$

Now, if we leave the acceleration due to the force f_{cont} entirely out of consideration for the present, it will be seen that the total velocity which is due to the force f_{orif} in the natural contracted vein projected through an orifice in a thin plate, at the instant when the water reaches the point P, bears to the total velocity due to the force $j f_{\text{orif}}$ as increased by the lateral capillary attraction at the inner surface of the cylindrical envelope, the ratio of $\sqrt{i_{(a)}^{(v)} s_o + i_{(a)}^{(v)} x}$ to $\sqrt{i_{(a)}^{(v)} s_o + i_{(a)}^{(v)} jx}$. Therefore, also, the quantity of liquid particles, considered for the moment as being independent solid bodies or molecules, that would pass in the unit of time at the point P, on the axis of the contracted stream, by virtue of the velocity generated by the force f_{orif} from o while a space equal to $i_{(a)}^{(v)} s_o + i_{(a)}^{(v)} x$ is described and corresponding therefore to $\sqrt{i_{(a)}^{(v)} s_o + i_{(a)}^{(v)} x}$ must bear to the volume of molecules that pass in the same time at the same point P, on the axis of the stream rendered artificially cylindrical by means of a tube, by virtue of a velocity corresponding to $\sqrt{i_{(a)}^{(v)} s_o + i_{(a)}^{(v)} jx}$, the same ratio of $\sqrt{i_{(a)}^{(v)} s_o + i_{(a)}^{(v)} x}$ to $\sqrt{i_{(a)}^{(v)} s_o + i_{(a)}^{(v)} jx}$.

Consequently, abstracting all variations in the resistances of viscosity, friction, etc. due to the altered conditions of the disturbed and partly broken fluid filaments flowing within the tube, as compared to those of the transparent crystal-like naturally contracted vein, the mean velocity in the plane of the orifice in a thin plate is to that in the cross section of a cylindrical tube x inches long, or which is the same thing, the discharge through the circular orifice is to the discharge through the cylinder, as $\sqrt{i_{(a)}^{(v)} s_o + i_{(a)}^{(v)} x}$ is to $\sqrt{i_{(a)}^{(v)} s_o + i_{(a)}^{(v)} jx}$.

Hence, in a cylindrical tube l inches long running full, the mean velocity of the stream corresponding to any cross section of the tube is :

$$V_{\text{cyl}} = \frac{\sqrt{2g \left(\frac{\text{coeff. vel. head}}{\text{orif.}}\right) H \left(i_{(a)}^{(v)} s_o + i_{(a)}^{(v)} jl\right)}}{\sqrt{i_{(a)}^{(v)} s_o + i_{(a)}^{(v)} l}}$$

replacing j by its value in terms of $x = l$ as per equation (12), we have :

$$V_{\text{cyl}} = \frac{\sqrt{2g \left(\frac{\text{coeff. vel. head}}{\text{orif.}}\right) H \left\{s_o + l \left(-\frac{s_o}{2l} + \frac{1}{4i_{(a)}^{(v)}} + \frac{1}{4} + \frac{1}{2} \sqrt{\frac{s_o^2}{l^2} + \frac{s_o}{l} + \frac{s_o}{i_{(a)}^{(v)} l} + \frac{1}{i_{(a)}^{(v)}}}\right\}}}{\sqrt{s_o + l}} \tag{13}$$

where $\left(\frac{\text{coeff. vel. head}}{\text{orif.}}\right)$ represents the coefficient (see column 5, table XIII), by which the theoretical head H must be multiplied to obtain the head due to the actual velocity in an orifice in a thin plate having the same diameter as the cylindrical tube.

Wherefore, we have finally for the coefficient of discharge $c_{\text{cyl.}}^{\text{(disch.)}}$ of the cylin-

dricl tube as compared to a coefficient of discharge equal to unity, or 1 for the simple orifice in a thin plate :

$$c_{(disc. \text{ cylin.})} = \frac{v_{cyl.}}{v_{(simple \text{ orifice})}} = \frac{\sqrt{s_0 + l \left(-\frac{s_0}{2l} + \frac{1}{4i_{(a)}^2} + \frac{1}{4} + \frac{1}{2} \sqrt{\frac{s_0^2}{l^2} + \frac{s_0}{l} + \frac{s_0}{i_{(a)}^2 l} + \frac{1}{i_{(a)}^2} \right)}}{\sqrt{s_0 + l}} \tag{14}$$

EXAMPLE 1.

By using a cylindrical tube, such as that represented in (Fig. 15), 18 old french lines = 1.5985 inches in diameter, but only 54 lines = 4.7955 inches long, Venturi obtained under a constant head of 32.5 french inches = 34.6476 english inches, a discharge from the reservoir, bearing to that passing under the same head, through a circular orifice in a thin plate having the same diameter as the tube, the ratio of 41 to 31*. The delivery of 4 cubic feet took the same time, viz., 31 seconds, when the tube was 57, instead of only 54 lines.†

In the case of the vein projected under a head of some 14 inches through an orifice in a thin plate 0.53-inch diameter, which was photographed s_0 , was found to be approximately equal to 0.57 r , r being the radius of the orifice. If we assume, therefore, s_0 to vary nearly inversely as the square root of the velocity, we can here put $s_0 = .57 r \left(\frac{\sqrt{14}}{\sqrt{34.64}} \right) = \text{say } .45 r = \text{say } 4.00 \text{ lines}$. Again, we may allow, in the absence of any more precise data, that for a diameter of 1.5985 inches, and a head of 34.64 inches, $i_{(a)}$ has nearly the same value as for an orifice of 0.4 inch diameter, and a head equal to $34.64 \times \left(\frac{.40}{1.5985} \right) = \text{say } 8.7 \text{ inches}$, when, according to experiments Nos. 15, 16, 17, 18 and 19, of Table V, we may put approximately $i_{(a)} = c_c = 0.42$ on an average, along the portion of natural vein 54 lines or 4.7955 inches long, which corresponds, as regards position with reference to the orifice and reservoir, to the cylindrical tube.

Substituting these numbers for the respective symbols in the last equation (14), we find the computed velocity ratio $c_{(disc. \text{ cylin.})} = \frac{v_{cylin.}}{v_{simple \text{ orifice}}}$ to be 1.26, as against $\frac{41}{31} = 1.32$

obtained by direct experiment, indicating a deficiency of about 5 per cent. in the computed velocity.

While a small part of this difference may be the result of the disengagement of the fluid particles produced by the attraction of the sides of the tube, and of the transverse action of gravity during the passage of each sheet of water from the reservoir end O R (Fig. 13), to the other extremity S T, of the tube, the greater portion of it is, in all probability, due to the fact that the filaments of the naturally contracted vein are not dispersed in a uniform and continuous manner over the entire cross-section of the cylinder, as was assumed, at least for a length of one diameter or so beyond the face O R of the reservoir. The actual conditions of the flow through the simple tube are apparently intermediate between the theoretical conditions upon which the above computation is based and those of a stream flowing through a divergent tube of the form or S T (Figs. 14 and 15) added to a mouth-piece o R having the shape of the naturally contracted vein.

* See Experimental Enquiries, concerning the principles of the lateral communication of motion in fluids, applied to the explanation of various hydraulic phenomena, by citizen J. B. Venturi, translated from the French by W. Nicholson; second edition, included in Tracts on Hydraulics, edited by Thos. Tredgold, page 134; London, printed for Josiah Taylor, 1826.

† See page 136, Exp. 6—same work by Venturi.

EXAMPLE 2.

Buff* found that with a short cylindrical tube $\frac{3}{10}$ inch in diameter and $\frac{5}{10}$ inch long the coefficient of discharge was 0.861 under a head of $2\frac{1}{2}$ inches. As the coefficient of discharge into air through a simple orifice of the same diameter as the tube and under the same head, may be taken at 0.65 nearly, the ratio of the discharging capability of the tube to that of the simple orifice in a thin plate is $0.861 \div 0.65 = 1.3246$.

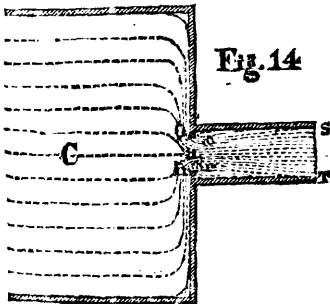
We may in this case put approximately $s_0 = 9r = 1.35$ inch, and $i = .41$, whence, substituting these values for the symbols, in the above formula and 0.50 inch for l , we find this ratio to be equal to 1.23 nearly.

The difference between the observed and the computed coefficient of velocity is therefore .0946, indicating a deficiency in the latter coefficient of some 8 per cent., due to the causes just described.

The increased discrepancy of 8 per cent, as compared to that of 5 per cent. in example 1, is, I presume, due here to the greater transverse effect of gravity in the cylindrical vein—during its passage from the reservoir to the outer end of the tube, with the comparatively small velocity generated by a head of $2\frac{1}{2}$ inches.

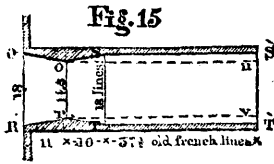
I have taken the liberty to introduce here in extenso a chapter from Hydraulic Tables, Coefficients and Formulæ, by John Neville, Esq., Civil Engineer, M.R.I.A., &c., &c., on the conditions of flow, &c., in short cylindrical tubes, with and without entrance contracted by a diaphragm, wherein a method is suggested for calculating the discharge from such tubes. This course was followed with a view to convenience for reference, &c., in perusing some remarks which I have ventured to offer respecting some of the statements, etc., contained in the said chapter.

At pages 160 to 164 of Mr. Neville's valuable work, 3rd edition, dated London, 1875, we find the following:—

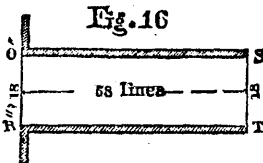


The contracted vein *or* is about 0.8 times the diameter *O R*; but it is found, notwithstanding, that water in passing through a short tube of not less than $1\frac{1}{2}$ diameter in length, fills the whole of the discharging orifice *S T*. This is partly effected by the outflowing column of water carrying forward and exhausting the air between it and the tube, and by the external air then pressing on the column, so as to enlarge its diameter and fill the whole tube. When once the water approaches closely to the tube, or is caused to approach, it is attracted and adheres with some force to it. The water between the

* Annalen der Physik and Chemie von Poggendorf, 1839, Band 46, page 243, or Neville's Hydraulic Tables, coefficients and formulæ, page 148. Third Edition. London, 1875.

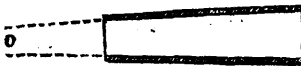


tube and the *vena contracta* is, however, rather in a state of eddy than of forward motion, as appears from the experiments of Venturi* with the tube shown Fig. 15, giving the same discharge as the simple cylindrical tube (Fig. 16.)



where $\acute{O} \acute{R} = \acute{O} \acute{R}$, $\acute{O} \acute{S} = \acute{O} \acute{S}$, $\acute{S} \acute{T} = \acute{S} \acute{T}$. If the entrance be contracted by a diaphragm, as at $O R$, Fig. 14, the water will also generally fill the tube, if it be only sufficiently long. Short cylindrical tubes do not fill when the discharge takes place in an

Fig. 17



exhausted receiver, but even diverging tubes (See Fig. 17) will be filled under atmospheric pressure when the angle of divergence ϕ , does not exceed 7 or 8 degrees, and the length be not very great nor very short.

When a tube is fitted to the bottom or side of a vessel it is found that the discharge is that due to the head measured from the surface of the water to the lower or discharging extremity of the tube. It must, however, be sufficiently long, and not too long, in order to get filled throughout. Guilglielmini first referred this effect to atmospheric pressure, but the first simple explanation is that given by Dr. Mathew Young, in the Transactions of the Royal Irish Academy, Vol. VII., page 56. Venturi, also, in his fourth proposition, gives a demonstration.

The values of the coefficients for short cylindrical tubes, which are given (page 156), have been derived from experiments. Coefficients which agree pretty closely with them, and which are derived from the coefficients of discharge through an orifice in a thin plate, may, however, be calculated as follows: Let C be the area of the

* Venturi found (1) that through an orifice $\acute{O} \acute{R}$ pierced in a thin plate in the side of a reservoir, whose diameter was 18 French lines (old system of measures) = 1.5985 English inches — 4 French cubic feet = 4.8384 English cubic feet of water are discharged in 41 seconds under a head of 32.5 French inches = 34.6476 English inches. (2.) He fitted to this orifice the conical mouth piece $\acute{O} \acute{R}$, $\acute{o} \acute{r}$, of the proportions shown in Fig. 15, and having nearly the form of the natural contracted vein, when under the same head the same quantity of water was discharged in 42 seconds. (3.) By introducing the mouth-piece $\acute{O} \acute{o}, \acute{r} \acute{R}$ (Fig. 15) alone into the cylindrical tube Fig. 15, as shown in Fig. 18, the same volume of water was discharged in 32.5 seconds. (4.) To the mouth-piece $\acute{O} \acute{o}, \acute{r} \acute{R}$, he added the tube $\acute{o} \acute{S} \acute{T} \acute{T} \acute{r}$ (Fig. 15), and the duration of the flow, all other things being equal was only 31 seconds. (5.) He replaced the compound tube $\acute{O} \acute{o} \acute{S} \acute{T} \acute{T} \acute{r} \acute{R} \acute{O}$ by the simple cylindrical tube Fig. 16, having the same diameter and length, and the

efflux of 4.8384 feet took place again in 31 seconds. (6.) Lastly, when he had amended the portion $\acute{o} \acute{S} \acute{T} \acute{r} \acute{o}$ (probably by rounding the angles at \acute{o} and \acute{S}) the time required for discharging the constant quantity of 4.8384 cubic feet was reduced to 30 seconds, under the same head of 34.6476 inches.

approaching section (Fig 14), A the area of the discharging short tube, and a the area of the orifice $O R$, which admits the water from the vessel into the tube: also put, as before, h for the head measured from the surface of the water to the centre of the tube and diaphragm $O R$; v for the actual velocity of discharge at $S T$; v_a for the velocity of approach in the section C towards the diaphragm $O R$; and c_c for the coefficient of contraction in passing from $O R$ to $o r$; then $C \times v_a = A \times v$, the contracted section $o r = c_c \times a$, and consequently the velocity at the contracted section is equal to $\frac{A v}{a c_c} = \frac{C v_a}{a c_c}$. Now a theoretical head equal to $\frac{v^2 - v_a^2}{2g} = \frac{v^2 \left(1 - \frac{A^2}{C^2}\right)}{2g}$

is necessary to change the velocity v_a into v by the action of gravity; but as the water at the contracted section $o r$, moving with a velocity $\frac{A v}{a c_c}$, strikes against the water between it and $T S$, moving, from the nature of the case, with a slower velocity,* a certain loss of effect takes place from impact. If this be supposed sudden, then writers on mechanics have shown that a total loss of head, equal to that due to the difference of the velocities, $\frac{A v}{a c} - v$, before and after the impact must take place.

This loss of head is therefore equal to $\frac{\left(\frac{A}{a c_c} - 1\right)^2 v^2}{2g}$, whence the whole head

$$(60.) \quad h = \frac{\left(1 - \frac{A^2}{C^2}\right) v^2 + \left(\frac{A}{a c_c} - 1\right)^2 v^2}{2g}$$

from which the velocity from a short tube is found to be:

$$(61.) \quad v = \sqrt{2gh} \left\{ \frac{1}{1 - \frac{A^2}{C^2} + \left(\frac{A}{a c_c} - 1\right)^2} \right\}^{\frac{1}{2}}$$

Now as $\sqrt{2gh}$ would be the velocity of discharge were there no resistances or

loss sustained it is evident that $\left\{ \frac{1}{1 - \frac{A^2}{C^2} + \left(\frac{A}{a c_c} - 1\right)^2} \right\}^{\frac{1}{2}}$ becomes as it were a coeffi-

cient velocity. When the diameter of the diaphragm $O R$, becomes equal to the diameter $S T$ of the tube, $A = a$, and as the coefficient of velocity becomes equal to the coefficient of discharge when there is no contraction, in such case this coefficient which we call *cof.* is expressed by the formula

$$(62.) \quad \text{cof.} = \left\{ \frac{1}{1 - \frac{A^2}{C^2} + \left(\frac{1}{c_c} - 1\right)^2} \right\}^{\frac{1}{2}}$$

When the diaphragm is placed in a tube of uniform bore, then $C = A$ and

$$(62\frac{1}{2}) \quad \text{cof.} = \frac{1}{\frac{A}{a c_c} - 1} = \frac{c_c}{A - c_c}$$

and the loss of head, in passing the diaphragm becomes:

$$(62\frac{3}{4}) \quad n = \left(\frac{A}{a c_c} - 1\right)^2 \times \frac{v^2}{2g}$$

* Vide Sir Robert Kane's translation of Rühlman's book on Horizontal Water Wheels, p. 40.

It is evident from the equations that $\frac{A}{a}$ and c_c depend mutually on each other, and that they cannot be assumed arbitrarily.

When the approaching section C is very large compared with the area A

$$(63) \quad \text{cof.} = \left\{ \frac{1}{1 + \left(\frac{1}{c_c} - 1 \right)^2} \right\}^{\frac{1}{2}}$$

If $c_c = 0.64$, the last equation gives $\text{cof.} = .872$; if $c_c = .601$ $\text{cof.} = .833$; if $c_c = .617$ $\text{cof.} = .847$; and if $c_c = .621$ $\text{cof.} = .856$. These results are in excess of those derived from experiments with cylindrical short tubes, perfectly square at the ends and of uniform bore. As some loss, however, takes place in the eddy between or , Fig. 14, and the tube, and from the friction at the sides, not taken into account in the above calculation, they will account for the difference of not more than from 4 to 6 per cent. between the calculation and experiment. If c_c be assumed for calculation equal .590, then cof. equals .821; and as this result agrees very closely with the experimental one, c_c should be taken of this value in using the foregoing formulae, from (60) to (63 for practical purposes. The thickness of the diaphragm itself and the relation of that thickness to the diameter, as well as the form of the orifice a , are necessary elements in the consideration of this question."

REMARKS.

Considering that the natural contraction of the liquid vein projected through a simple orifice, is destroyed gradually in a cylindrical tube, from a point between the orifice OR in the reservoir, and the section of maximum contraction or (Fig. 14) up to the point to which the tube must extend to furnish a full stream, the water in this contracted section or , cannot, it seems to me, be looked upon as striking *suddenly* against the body of water between it and the end section TS , hence the consequent reduction in the total head, cannot be exactly the amount of pressure corresponding to the difference between the total theoretical velocity due to the full head and the actual velocity of the stream at its exit from the tube.

Streams passing from short cylindrical tubes into the open atmosphere invariably carry a certain quantity of air along with them, and in order that air may be able to mix with the water, it is necessary that the absolute pressure of the vein at the mouth of the tube should be different from that of the atmosphere. From this circumstance it must not be inferred, however, that the presence of atmospheric air, or some other gaseous fluid in the tubes, is essential, in order that the filling of the same may take place, with the resulting increased discharges in comparison to those afforded by simple orifices of equal diameters and under the same respective hydrostatic pressures; the air or any other gas that may be in the tubes, no doubt, assists in causing these to fill with water, but that is all.

The statement that "cylindrical tubes do not fill when the discharge takes place " in an exhausted air receiver," is apparently incorrect, for Mr. Hachette says he is certain of having produced the phenomena of additional tubes under such a receiver, in vacuum.* The same experimenter also managed to obtain a clear, contracted vein within a cylindrical tube 0,1332 ft. diameter, and 0,3117 ft. long, which was perforated near its middle and quite around its perimeter with a dozen small holes; but this operation, it is stated, had to be performed with great caution, as a slight agitation was then sufficient to produce contact, causing a flow with full tube to take place.

I have seen no detailed description of the experiments made by Mr. Hachette. It would be interesting to know what the pressure was in a cylindrical tube running full, say at a distance of half a diameter or so from the orifice in the reservoir, when the pressure in the receiver of the air pump was down to near 0. According to the theory

*See Spon's Dictionary of Engineering, page 1,901.

of Daniel Bernouilli: that the pressure which a fluid exerts against the sides of a tube in which it moves, is equal to the head, minus the height due to the velocity of the stream, the absolute pressure in Mr. Hachette's tube, near the spot pointed out, must, under such circumstances, have been less than 0, provided that the head of water used in making the experiment exceeded, say $1\frac{1}{2}$ times, the small tension which could not be eliminated from the receiver,—that is to say, the exhausting power of the stream must have been greater than the minimum power of aspiration capable of producing or forming what is termed to be a vacuum, viz., a space devoid of ponderable matter of any kind, air included. Now, the internal condition of such a stream of water must be different, at least as regards absolute tension, from that of the space freed of all matter, which we call a vacuum; the question therefore presents itself: In what manner does an increase in the power of exhaustion, of a liquid vein touching the sides of a cylindrical tube, affect the conditions of molecular equilibrium of the substance, if any, that fills a space enclosed by a vessel placed in communication with the tube, after all ponderable matter, air included, is exhausted therefrom.

However this may be, I am inclined to believe that the increased discharge afforded by cylindrical and divergent tubes, is entirely due to the spreading action brought about by the adhesive or attractive properties of their sides or envelopes, by virtue of which the relations between the inertia and attraction, a cohesion of the particles of ponderable matter moved, are continually modified in the tube during the gradual enlargement of the sectional area embraced by the stream, the tendency being to create an absolute vacuum—and that the pressure of the atmosphere is not essential to the successful production of this state.

Venturi was mistaken in attributing the increased discharge to an excess in the pressure of the atmosphere on the fluid surface of the reservoir, viz: an excess proceeding from a vacuum tending to arise in the part of the tube where the greatest contraction took place; the partial vacuum produced in every case of efflux through such a tube is only the effect of the real cause of such increased discharge.

The fact of the compound tube, fig. 15, discharging, under a constant head, an equal volume of liquid in the same time as the simple cylindrical tube, fig. 16, coupled with the result, showing: that with the amended tube, a little less time was required to supply the same quantity of water in like conditions—all of which tubes have the same diameter at the ends, and also the same length along the axis—does not strike me as being conclusive evidence that the space between the envelope of the first named tube (fig. 15) and the natural contracted vein, or *venà contractà*, is occupied by eddy water *causing, on the whole, a sensible loss of velocity* in the stream flowing through this simple tube.

It appears to me that a smooth cylindrical channel, by the gradual attraction of the liquid fillets towards its sides, tends to produce an effect equivalent to that which would result from the application to the orifice OR Fig. 16 of a compound tube of a total length OS not exceeding that of the cylinder, composed of a conoidal mouthpiece with divergent extension of maximum discharging power, and at the same time the tube lessens the chances of mutual interference of particles; facilitating the passage of the excessively convergent conoidal vein ejected through an orifice with sharp edges, quite as much, if not more so, as the eddy water lodging in the said tube may obstruct it. I believe, that on the whole, instead of being slower in the cylindrical tube, the motion of the liquid fillets passing within the conoidal space swept out by the horizontal contracted vein is quite as rapid, independently of any additional acceleration due directly to the spreading out of the stream towards the sides of the tube, as that of the corresponding fillets of the naturally contracted vein. Instead of being in excess of the values derived from experiments, by from 4 to 6 per cent., the computed values of cof. (by means of equation 63) should, therefore, have proved deficient to about the same extent.

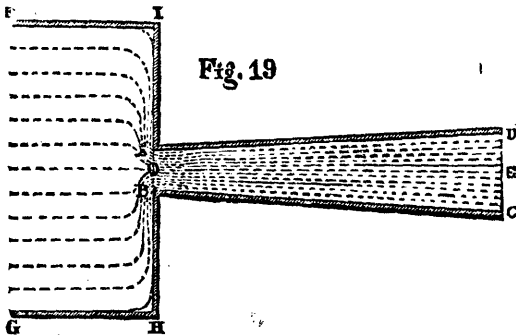
Where Mr. Neville says: "*When a tube is fitted to the bottom or side of a reservoir, it is found that the discharge is that due to the head measured from the surface of the water to the lower or discharging extremity of the tube,*" he must mean, no doubt, a cylindrical tube fitted to a convergent conoidal mouthpiece having the form of the contracted vein, for he refers to Venturi's fourth proposition as a proof of the correctness of this law.

The velocities at the lower ends of such tubes, fitted to conoidal convergent mouth pieces, happen, under ordinary circumstances, to agree tolerably well with those acquired by solid bodies after these have descended freely through spaces equal, in each case, to the head measured from the surface of the water to the discharging extremity of the tube. These coincidences do, however, in my opinion, no more possess the fundamental character which it is sought to attach thereto, than that other, if anything, more generally accepted so-called hydraulic law; "the velocity of a fluid at its passage through an orifice, made in the side or bottom, or top of a reservoir, is the same as that which a heavy body would acquire in falling freely through a space equal to that comprised between the level of the fluid surface in the reservoir and the centre of that orifice"—the acceptance of which experimental indication as a natural law, the celebrated Lorgna has conclusively shown not to be warranted by the facts and truths elicited by properly directed investigation.*

In their attempts at theoretical demonstrations of the law just enunciated, modern authors, in general, shelve all difficulties apparently without any scruples, by constructing a reservoir to suit themselves, viz., one having its sides joined with the orifice of efflux by easy convergent channels of approach, in order that, they state, the parallelism of the moving sheets or layers of liquid taken perpendicularly to the axis of the stream can be considered to be perfectly realized; it is clear, however, that this is in reality equivalent to dodging past the contracted vein, which, however, unwilling they may be to admit it, remains the stumbling block in their way.

DISCHARGE THROUGH DIVERGENT AJUTAGES OR TUBES.

1. TUBES A B C D A, APPLIED DIRECTLY TO THE WALL OF THE RESERVOIR, WITHOUT THE INTERVENTION OF A CONOIDAL MOUTH-PIECE, HAVING THE FORM OF THE NATURAL CONTRACTED VEIN.



If, in addition to the abstraction of gravity outside of the reservoir F G H I (Fig. 19), it is assumed, as was done in the case of cylindrical tubes, that the fluid filaments of a naturally contracted vein issuing through an orifice A O B, are dispersed in a uniform and continuous manner over the entire cross-section of the divergent tube A B C D, fitted to the orifice A B, in the reservoir, as shown in Fig. 19, at every point of their path along the axis O E, through this tube—notwithstanding that this hypo-

thesis is even perhaps a little further removed from the true conditions of the efflux through divergent tubes unprovided with conoidal mouthpieces, than it is from the conditions of the efflux through cylindrical tubes—the coefficient of efflux or discharge proper to a divergent tube such as A B C D, viz., the ratio of this discharge to that afforded in the same time and under the same head, by an orifice A O B, in a thin plate, can be determined as follows.

Here, as in plain cylindrical tubes fitted directly to the wall of a reservoir, the ever-varying ratio between the velocities which are respectively due to the forces f_{orif} and f_{cont} in the naturally contracted vein, is continually being transformed through

* See translation of first two chapters of his "Physicomathematical Theory of the motion of fluids issuing from orifices in reservoirs" appended hereto.

the intervention of the capillary attraction of the sides of each tube; the force f_{orif} being increased, not only in the tubes which are absolutely divergent, but also for tubes whose sides have a less convergence than those of a mouthpiece having the form of the naturally contracted vein—and the force f_{cont} being simultaneously modified in a contrary sense.

If, therefore, the force f_{orif} is transformed into $j f_{\text{cont}}$, j being any positive number whatsoever, greater than unity—considering that the total amount of momentum which can be developed in an element of mass by any two forces in the unit of time, or during any fixed period of time, must remain constant, so long as there is nothing added to nor subtracted from the sum of the forces—the expression :

$$\frac{\sqrt{i_{(a)} s_o + x}}{\sqrt{i_{(a)} s_o + i_{(y)} x}}$$

which represents, in a general way, the proportional velocity v_p or velocity ratio of the motions due to the two forces f_{cont} and f_{orif} at any point of the naturally contracted horizontal veins abstracted from gravity outside of the reservoir, in terms of the abscissa x —becomes converted in the divergent tube into:

$$\frac{\sqrt{i_{(a)} s_o + x} + \sqrt{i_{(y)} s_o + i_{(a)} x} - \sqrt{i_{(y)} s_o + i_{(a)} j x}}{\sqrt{i_{(a)} s_o + i_{(y)} j x}}$$

But here this fraction is not uniformly equal to unity, as was the case for cylindrical tubes.

In all tubes in general, all other things being equal, the proportional (not the actual) velocities, or the velocity ratios v_p of the moving fluid, evidently vary, along the axis, inversely as the areas πy^2 of their circular cross-sections, viz.: as $\frac{1}{y^2}$ so that

$$\frac{v_p}{v'_p} = \frac{1}{\frac{y^2}{y'^2}}$$

where v_p is the velocity ratio corresponding to the ordinate y and v'_p that corresponding to the ordinate y' .

But when the length $OE = x$ of the tube $ABCD$ is reduced to o , viz.: when this tube is removed altogether from the reservoir, and the fluid passes through the orifice AOB , we have for the proportional velocity or velocity ratio:

$$v_p = \frac{\sqrt{i_{(a)} s_o + o} + \sqrt{i_{(y)} s_o + i_{(a)} o} - \sqrt{i_{(y)} s_o + i_{(a)} j o}}{\sqrt{i_{(y)} s_o + i_{(a)} j o}} = 1 \quad (15)$$

Again, in conical tubes such as $ABCD$, $y^2 = (r + mx)$ where r is the radius of the small base and m represents the tangent of the semi-angle of divergence of the sides AD, BC , of the tube. Hence we have the relation:

$$\frac{\sqrt{i_{(a)} s_o + x} + \sqrt{i_{(y)} s_o + i_{(a)} x} - \sqrt{i_{(y)} s_o + i_{(a)} j x}}{\sqrt{i_{(y)} s_o + i_{(a)} j x}} = \frac{1}{\frac{y^2}{r^2}} = \frac{r^2}{y^2} = \frac{r^2}{(r + mx)^2} \quad (16)$$

whence: $\sqrt{i_{(y)} s_o + i_{(a)} j x} \left\{ 1 + \frac{r^2}{(r + mx)^2} \right\} = \sqrt{i_{(a)} s_o + x} + \sqrt{i_{(y)} s_o + i_{(a)} x}$

and:

$$j = \frac{2i_{(y)} s_o + x + i_{(a)} x + 2\sqrt{i_{(y)}^2 s_o^2 + i_{(y)} s_o x + x^2 i_{(y)}^2 + i_{(a)}^2 x^2} - i_{(y)} s_o \left(1 + \frac{r^2}{(r + mx)^2} \right)^2}{i_{(a)} x \left\{ 1 + \frac{r^2}{(r + mx)^2} \right\}^2} \quad (17)$$

Substituting therefore, in the expression $\sqrt{\frac{i_{(y)}s_o + i_{(y)}jx}{i_{(y)}s_o + i_{(y)}x}}$ which represents, as

explained in the case of the cylindrical tube, the ratio between the absolute number of liquid molecules passing the plane of the orifice A O B, in a thin plate, during a given time, and that flowing through the corresponding base A O B, of any tube of the length x , during the same time—the value of j just found in terms of x for the symbol, we obtain for the velocity $v_{\text{cone}}^{\text{A O B}}$ in the small base A O B, of any conical

divergent tube A B C D, whose length O E = l , applied directly to the side of a reservoir, viz. : without contracted mouthpiece :

$$\left(\begin{array}{l} \text{vel} \\ \text{small} \\ \text{base} \\ \text{simple} \\ \text{div} \\ \text{cone} \end{array} \right) = \sqrt{2g \left(\begin{array}{l} \text{coeff} \\ \text{vel} \\ \text{head} \\ \text{orif} \\ \text{equal} \\ \text{small} \\ \text{base} \end{array} \right) H \frac{\left[2i_{(y)}s_o + l + i_{(y)}l + 2\sqrt{i_{(y)}^2s_o^2 + i_{(y)}s_o l + li_{(y)}^2s_o + i_{(y)}l^2} \right]}{\left(1 + \frac{r^2}{(r + ml)^2} \right)^2 i_{(y)}s_o + i_{(y)}l} \quad (18)}$$

Let us now apply this formula to the determination of the velocities at the bases next to the reservoir, of some of the conical divergent tubes experimented with, for the purpose of comparing the computed ratio between the velocity in an orifice pierced in a thin plate and that in the small base of the tube, in each case with the corresponding velocity ratio deduced from experimental data.

EXAMPLE.

By fitting immediately to the side of a reservoir, viz. : without intermediate contracted mouthpiece, a divergent tube, whose length O E = $l = 9.2124$ inches, was nine times its diameter A B = $2r = 1.0236$ inch at the small end, the flare of its sides A D, B C, being $5^\circ-6'$ and the diameter of the large base D C = $2(r + ml) = 1.8441$ inches, Eytelwein found that with a constant head of 2.3642 feet = 28.37 inches, the coefficient of discharge for the base A B, was 1.18, the theoretic discharge being 1.

As already done in other cases, we may here assume, without risk of erring materially, that s_o varies inversely as the square root of the velocity—consequently, as for 14 inches head I found s_o to be equal to from 0.54 to 0.57 r we have for

a head of 28.37 inches: $s_o = 0.57 r \frac{\sqrt[4]{14}}{\sqrt[4]{28.37}} = 2917 \times \frac{1.934}{2.308} = \text{say, } 0.25 \text{ inch.}$

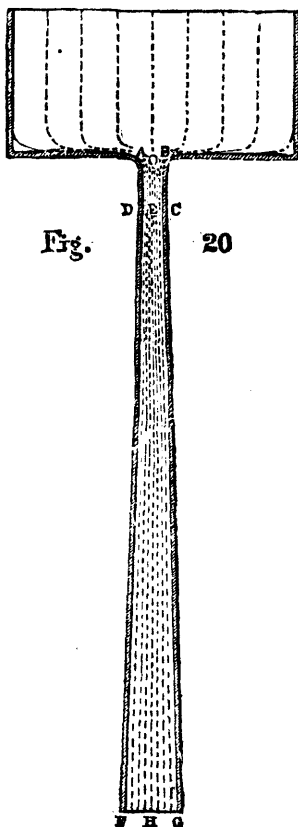
Again, judging by the results entered in Tables V and XIII, we may put approximately $i_{(y)} = 0.43$ and also $c_{\text{A O B}}^{\text{vel head orif}} = 0.630^2 = .3969$.

Substituting these values for the symbols in equation (18), we obtain 1.21 for the coefficient of discharge at the base A O B, through the tube A B C D, in place of 1.18 found by Eytelwein.

N.B.—I applied directly to the horizontal bottom of my circular reservoir, viz., without the intervention of a conoidal convergent mouth-piece, a conically divergent brass tube 12 inches or nearly 29 diameters long, whose small base was 0.422 inch in diameter and the large base 1.333 inches, the total angle of divergence of the sides being thus $4^\circ 22'$, and found the coefficient of discharge under water to be, on an average, 1.12 in the small base of the tube, with an effective head or difference of level between the water surfaces of the supplying and receiving reservoirs of 1.30 inches, as compared to a theoretic discharge of 1 at the same place—and 1.723 as compared to the actual discharge under water through an orifice in a thin plate.

I am not certain, however, that this tube was effective over its whole length—failing which, the lower portion must have proved more of an obstruction to the passage of the water than otherwise.

2° TUBES C D E G APPLIED TO THE SMALL BASE D C, OF THE CONOIDAL MOUTH PIECE A B C D, HAVING NEARLY THE FORM OF THE NATURALLY CONTRACTED VEIN.



Here the expression $\frac{\sqrt{i_{(a)} s_0 + x}}{\sqrt{i_{(a)} s + i_{(a)} x}}$ which,

as shown, denotes correctly, in general terms, the ratio of the velocity or motion proper to any point on the axis of the naturally contracted vein, abstracted from gravity outside the reservoir, to that in the orifice A O B, becomes transformed by virtue of the lateral capillary attraction of the tubular envelope, only after this natural vein A B C D, has described a portion of the trajectory $x = O E$, Fig. 20, viz.: into

$$\frac{\sqrt{i_{(a)} s_0 + x + x'} + \sqrt{i_{(a)} s_0 + i_{(a)} x + i_{(a)}' x} - \sqrt{i_{(a)} s_0 + i_{(a)} x + i_{(a)} j x'}}{\sqrt{i_{(a)} s_0 + i_{(a)} x + i_{(a)} j x'}}$$

where x' represents E H the length of the divergent tube. Now, considering that when the length x' of the divergent tube is reduced to 0, viz., when the tube is removed altogether and the fluid passes only through the mouth-piece A B C D, the proportional velocity or velocity ratio is simply, as shown above, equal to:

$$\frac{\sqrt{i_{(a)} s_0 + x}}{\sqrt{i_{(a)} s_0 + i_{(a)} x}}$$

and, moreover, as the velocity ratios corresponding to any two sections D C and F G, of the compound tube A B G F, must vary inversely as the squares of their diameters or radii, we have the following relation :

$$\frac{\sqrt{i_{(a)}^{(v)} s_o + x + x'} + \sqrt{i_{(a)}^{(v)} s_o + i_{(a)}^{(v)} x + i_{(a)}^{(v)} x'} - \sqrt{i_{(a)}^{(v)} s_o + i_{(a)}^{(v)} x + i_{(a)}^{(v)} jx'}}{\sqrt{i_{(a)}^{(v)} s_o + i_{(a)}^{(v)} x + i_{(a)}^{(v)} jx'}} = \frac{\sqrt{i_{(a)}^{(v)} s_o + x}}{\sqrt{i_{(a)}^{(v)} s_o + i_{(a)}^{(v)} x}} = \frac{D E^2}{F H} = \frac{r'^2}{(r' + mx')^2} \tag{19}$$

where r represents D E, and m the tangent of half the angle included between the sides D F and C G, whence we deduce :

$$j = \frac{\left\{ \sqrt{i_{(a)}^{(v)} s_o + x + x'} + \sqrt{i_{(a)}^{(v)} s_o + i_{(a)}^{(v)} x + i_{(a)}^{(v)} x'} \right\} \left\{ s_o + x \right\}}{x' \left\{ \sqrt{i_{(a)}^{(v)} s_o + i_{(a)}^{(v)} x} + \left(\sqrt{i_{(a)}^{(v)} s_o + x} \right) \left(\frac{r'^2}{(r' + mx')^2} \right) \right\}^2} - \frac{s_o + x}{x'} \tag{20}$$

If now we substitute this value of j for this symbol in the expression :

$$\frac{\sqrt{i_{(a)}^{(v)} s_o + i_{(a)}^{(v)} x + i_{(a)}^{(v)} jx'}}{\sqrt{i_{(a)}^{(v)} s_o + i_{(a)}^{(v)} x + i_{(a)}^{(v)} x'}}$$

which, as previously explained, represents the ratio which the absolute number of fluid particles, considered as solid molecules, that pass in the unit of time through the orifice in a thin plate A O B, as well as through the section of maximum contraction D E C, bears to the number of particles that flow, under the same conditions and during the same time, through the corresponding bases A O B and D E C of the compound tube A B C G F D A, we obtain for the velocity in the small base D E C of this tube :

$$\left(\begin{array}{l} \text{velo.} \\ \text{small} \\ \text{base} \\ \text{div.} \\ \text{tube} \\ \text{with} \\ \text{mouth} \\ \text{piece.} \end{array} \right) = \sqrt{2gH \left\{ \frac{\left\{ \sqrt{i_{(a)}^{(v)} s_o + x + x'} + \sqrt{i_{(a)}^{(v)} s_o + i_{(a)}^{(v)} x + i_{(a)}^{(v)} x'} \right\}^2 \left\{ s_o + x \right\}}{\left\{ \sqrt{i_{(a)}^{(v)} s_o + i_{(a)}^{(v)} x} + \left(\sqrt{i_{(a)}^{(v)} s_o + x} \right) \left(\frac{r'^2}{(r' + mx')^2} \right) \right\}^2} \right\}} \times \left(\begin{array}{l} \text{coeff.} \\ \text{velocity} \\ \text{natural} \\ \text{contracted} \\ \text{vein at} \\ \text{D E} \end{array} \right) \times \left(\begin{array}{l} \text{coeff.} \\ \text{velocity} \\ \text{orifice} \\ \text{D E C} \\ \text{mouth-} \\ \text{piece} \end{array} \right) \tag{21}$$

H standing for total head of water on the orifice A O B, and g for acceleration of gravity.

EXAMPLE 1.

I applied to the bottom of my circular reservoir of about 4 inches diameter, a conoidal mouth-piece A B C D (Fig. 20), having nearly the form of the contracted vein issuing from an orifice in a thin plate 0.4 inch in diameter. At the small base C D, of this mouth-piece, where the diameter was only 0.313 inch, I added a conical divergent tube C D F G, $x' = 9.96$ inches long, along the axis E H, and measuring 0.319 inch diameter at the small end C D, and 0.892 inch at the large end F G,

the angle of divergence between the sides C F, D G, being therefore $3^{\circ} 18'$; on account, however, of the slight difference of 0.003 inch between the diameter C D, at the small base of the mouth-piece and the corresponding base of the divergent tube, the angle of divergence between the base C D of the mouth-piece, and the base F G of the tube was actually $3^{\circ} 20'$.

In three experiments, under pressure heads of 13.5 and 15.1 inches, I found the mean coefficient of discharge under water, through this tube, to be 2.028 at the base C D, while, with the same heads, the corresponding coefficient of discharge of the mouth-piece A B C D, alone was only .975, on an average under water, for a head equal to, say $(2.028)^2 \times 14$ inches = 58 inches, whence it is clear that the discharging capability of the compound tube A B D G F C A, was 2.08 times greater than that of the mouth-piece alone.

In this instance, $A O = r = 0.2$ inch, $D E = r' = .1565$ inch, $O E = x = 1.00$ inch, $E H = x' = 9.96$ inches, $F H = r' + mx' = 0.446$ inch, $m = \text{tangent } 1^{\circ} 40' = .029097$.

s_0 may approximately be taken at $0.56r = 0.112$, judging by its value in other cases, and, by inspecting Tables I, II, and V, it will be seen that we can put $i_{(x)} =$

0.41 and .975 for $\left(\begin{array}{c} \text{coeff.} \\ \text{vel.} \\ \text{orif.} \\ \text{D E C} \\ \text{mouth-} \\ \text{piece.} \end{array} \right)$, the ratio of the theoretical velocity due to the head H, to the velocity of efflux through the orifice D E C, of the contracted mouthpiece, under a head of from 55 to 60 inches, also $\left(\begin{array}{c} \text{coeff.} \\ \text{velocity} \\ \text{natural} \\ \text{contracted} \\ \text{vein at} \\ \text{D E.} \end{array} \right) = 1$, nearly.

If we substitute these numbers for the symbols in the last equation and divide by $2g H$, we find by computation 1.973 for the coefficient of discharge or velocity through the base D E C, against 2.028, by experiment.

The discrepancy between the computed and the observed coefficients of discharge is probably due to an unavoidable want of accuracy in some of the factors which were introduced into the computation, and a part of the excess of the latter over the former co-efficient is also to be attributed to the great disengagement and consequent diminished mutual interference of the fluid particles moving within such tubes, in comparison to what takes place in the naturally contracted vein issuing from an orifice in a thin plate. Furthermore, the profile of the mouthpiece differed slightly from that of a perfect naturally contracted vein formed under a uniform pressure, or in the open atmosphere, the said embouchure being a little more convergent than the vein.

EXAMPLE 2.

Theoretical determination of ratio of velocity in small base of divergent tube with cycloidal mouth-piece, experimented with, in 1853, at Lowell, Mass., by Mr. J. B. Francis—to theoretical velocity due to head.

Mr. Francis, the celebrated American hydraulician, fitted to the vertical side W Z of a reservoir, a conoidal mouth-piece a 1.0 foot in length from N to R, formed by the revolution of a semi-cycloid A U, generated by a point U, in a circle O, 0.635 foot in diameter, rolling along the base A M, as shown in Fig. 21, with a cylindrical prolongation U C D V, 0.1 foot long from U to C, having a diameter of 0.1017 foot between these two points. To this compound mouth-piece he joined, in a horizontal position, a divergent cast-iron tube C D L K, made in four parts b c d e, each 1 foot in length, screwed together and ground smooth inside on a mandril, with emery, but not polished, having the form of a frustum of a cone, 0.1454 foot, wide at E F, and 0.4085 at K L, with sides E K, F L, containing an angle of 5° i, joined to the cylindrical portion U C D V, of the mouth-piece by means of an arc of a circle of about 22.69 feet radius, tangent to both the conical frustum E K L F produced, and the cylinder U C D V. Although the discharge took place under water, the tube proved to be effective only for the first 3 feet, viz.: up to I J, or probably for a length intermediate between 3 and 4 feet.

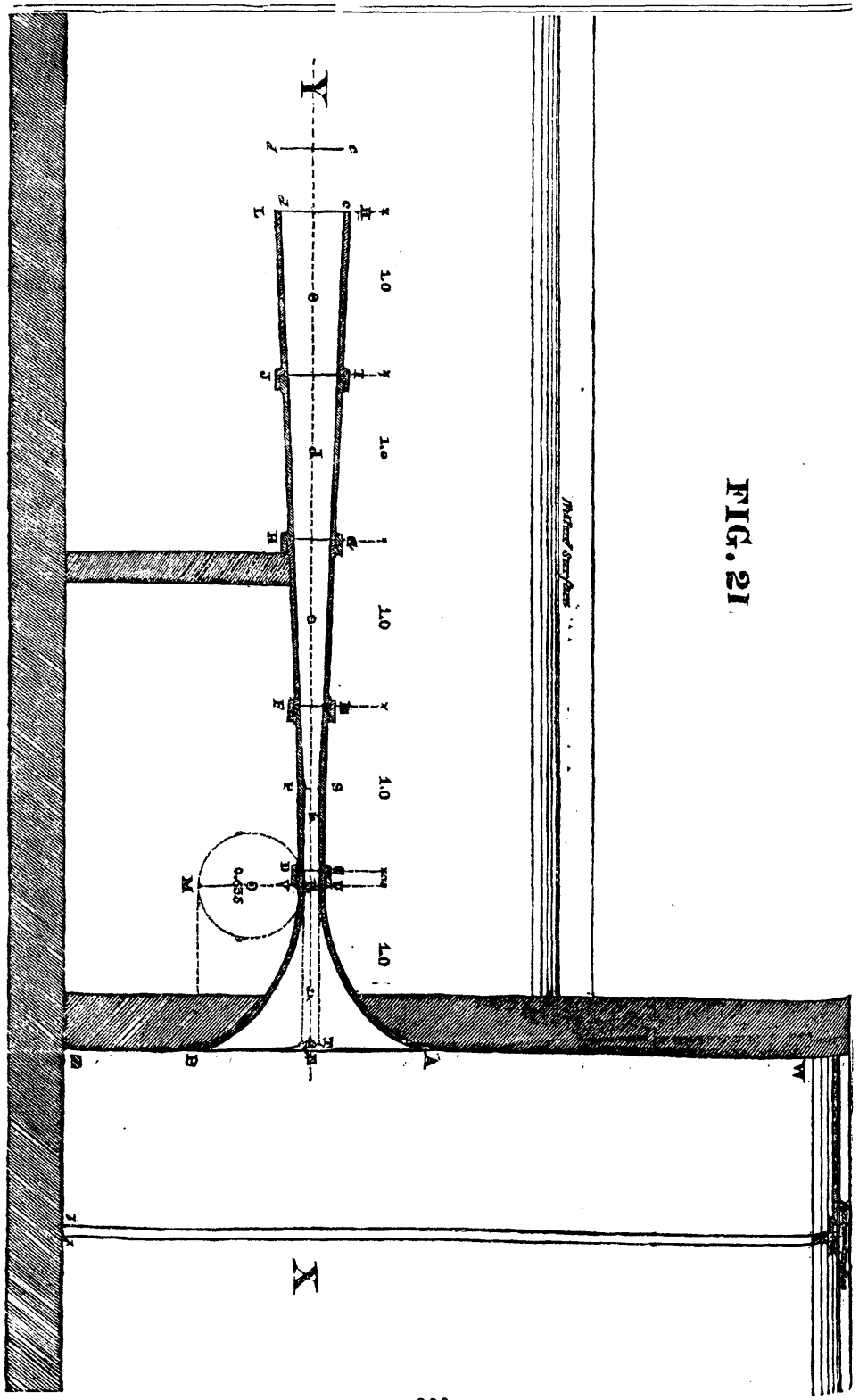


FIG. 21

The following characteristic results obtained are extracted from Table XXVII, of experimental data given at page 221, Lowell Hydraulic experiments, 3rd edition, 1871:

TABLE XVII $\frac{1}{2}$.

Nos. of experiments.	Orifice in thin plate and parts of the compound tube used. See fig: 21.	Diameter at the place of discharge. See fig: 21.	Differences of level between the water surfaces of the supplying and receiving reservoirs, or effective head H producing the discharge.	Maximum ratios of velocities at smallest section to velocities due to the heads.
		Feet.	Feet.	
94	Orifice.	0.1017	0.0916	0.5642
96	"	0.1017	0.4835	0.5797
99	"	0.1017	1.0242	0.5915
97	"	0.1017	1.4987	0.5928
2	a	CD = 0.1018	0.0340	0.8183
6	"	" -- "	0.2300	0.8626
11	"	" -- "	0.6590	0.9367
18	"	" -- "	1.5158	0.9439
37	a b	EF = 0.1454	0.8544	1.5919
49	a b c	GH = 0.2339	1.0999	2.1643
62	a b c d	I J = 0.3209	1.1772	2.4306
78	a b c d e	KL = 0.4085	1.2823	2.4213

After making various deductions from the results of his 101 experiments on the discharge under water through the divergent tube and mouth-piece just described, Mr. Francis discusses, at pages 126, 127, 128 of his work, the application of Bernouilli's theory in connection with the large coefficients of efflux or velocity arrived at by him, as follows:

"According to Bernouilli's theory, the velocity of the water at its final discharge from the tube should be that due to the head;* in experiment 62 this velocity is 8.7018

*Call A the area of the section, and V the velocity of the water at a b (Fig. 21), B the area of the section, and v the velocity at c d; h = the head or difference of height of the surface of the water in compartments X and Y. The motion having become permanent, we have:

$$A V = B v.$$

The volume of water included between the sections a b and c d in the small time t will move to a b' c' d'; the volume included between the sections a' b' and c d is common to both positions, every particle in one having its counterpart in the other, both in position and velocity. In finding the change in the living force in the two positions, we need only consider the volumes a a' b b' and c c' d d'. These volumes are equal, and assuming the water to be pure and at its maximum density, the weight of each is $62.382 A V t$ pounds.

The living force of the volume a a' b b' is $\frac{62.382 A V t}{g} V^2$

" " " c c' d d' is $\frac{62.382 A V t}{g} v^2$

The increase of living force in passing from one position to the other being

$$\frac{62.382 A V t}{g} (v^2 - V^2)$$

(1)

feet per second; the velocity at other parts of the compound tube would be inversely as the squares of the diameters; at the smallest section C D, the velocity must be greater than at the final discharge G H, in the ratio of 1 to $\left(\frac{0.3209}{0.1018}\right)^2 = 9.9367$. To give this velocity at the smallest section without the divergent tube would require the effective head of water to be increased from 1.1772 feet to $1.1772 \times (9.9367)^2 = 116.24$ feet, the increase being 115.06 feet; if the pressure of the atmosphere was great enough, its pressure, to this extent, would be rendered active. The total pressure of the atmosphere is usually about 34 feet, and this, of course, is the limit to which it can be rendered active. Abstracting from the effects of vaporization, whenever the exhausting effect of the divergent tube exceeds the pressure of the atmosphere (added to the pressure due to the actual head of water at the smallest section), breaks which must occur in the mass of water in the compound tube, at or near the smallest section, and the flow through the smallest section will be the same as if the discharge took place in a vacuum. In experiment 62, the exhausting effect of the diverging tube, according to Bernouilli's theory, exceeds three times the actual (absolute) pressure at the smallest section, and if it had produced its full effect, according to theory, or even one-third of that effect, breaks must have occurred in the mass of water near the smallest section.†

“The ratio of the actual velocity of the water at its final discharge, to the velocity, according to Bernouilli's theory, is 0.2446, in experiment 62, or about one-quarter of the velocity due the head, indicating a loss of about $\frac{1}{6}$ of the living force. It is difficult to see how so much can be lost. There are no abrupt changes in velocity, and the interior surfaces of the mouth-piece and diverging tube are smooth and free from sensible irregularity. The slight oxidation observable after some of the experiments appears to have produced no sensible loss, as in experiment 62, which gave the greatest result, there was considerable oxidation, while in other experiments giving a less effect, there was no oxidation.”

“The chief discrepancy between the hypothesis on which Bernouilli's theory is founded and the real conditions of the motion, appears to be due to the retarding effects of the walls of the tube. According to the hypothesis, the velocity in all parts of the same section is the same; Prony's well known formula for the motion of water in pipes is founded upon the idea that the principal retardation is due to the sides; whence it follows, that the velocity must be least at the sides and greatest at the centre. Darcy‡ made many experiments on the subject by means of Pitot's tube, and found that in long, straight pipes there was a material variation in the velocities at different distances from the centre, and determined a formula expressing the law of the variations. It would not be safe to apply this formula to these experiments on account of the short length and varying diameter of the compound tube, but it is clear that variations in the velocity must exist to an extent which must greatly modify the results deduced from Bernouilli's theory.”

This increase of living force is produced by the action of gravity on the volume of water $A \sqrt{t}$ descending through the height h , which is equivalent to an amount of work represented by $62.382 A \sqrt{t} h$. (2)

By the doctrine of living forces, the living force (1) is equivalent to the amount of work represented by $\frac{62.382 A \sqrt{t}}{2g} (v^2 - V^2)$. (3)

The amount of work in (2) and (3) must be equal; we have, therefore:

$$62.382 A \sqrt{t} h = \frac{62.382 A \sqrt{t}}{2g} (v^2 - V^2);$$

from which we deduce $h = \frac{v^2 - V^2}{2g}$

If V is very small relatively to v , it may be neglected, and we have

$$h = \frac{v^2}{2g}, \text{ and } = \sqrt{2g h}$$

†When Mr. Francis speaks of breaks occurring in the divergent stream when the exhausting effect exceeds that due to the pressure of the whole atmosphere, he, no doubt assumes, the same as Mr. Neville, that the tubes cannot run full in a vacuum.

‡Recherches expérimentales relatives au mouvement de l'eau dans les tuyaux, par Henry Darcy, Paris, 1857.

I suppose it is on account of the comparatively small divergence of the sides of his tube that Mr. Francis did not consider it of importance to make an allowance for the loss of head due to the variation in the element of mass moved at every instant along the path of the stream, from the smallest to the largest section of the tube, as was done in the theoretical computation of the discharge through cylindrical tubes, given at page 64, which I took from the work of Mr. J. Neville.

It was, in part, for the purpose of ascertaining approximately to what extent such losses of head may occur in tubes whose sides diverge at a small angle, that I undertook the experiments recapitulated in Table XI (page 28) on the stemming power of the naturally contracted vein in a divergent tube, under the ordinary pressure of the atmosphere.

These experiments show that a water column pressure varying from .67 to .71 of the pressure corresponding to the total fall from the water surface of the reservoir of supply to the orifice or inlet of the divergent tube, was accumulated in the receiving vessel before any liquid was lost or spilled laterally at the entrance of the tube. Therefore, the total loss of head caused by friction, viscosity, mutual interference, eddies and all other resistances must evidently have been less than from $(100 - 71) = 29$ to $(100 - 67) = 33$ per cent. of the total fall just referred to, while the stream was flowing from the small to the large end of the tube.

It appears, moreover, that this loss of head decreases simultaneously as the diameter of the vein and the fall from the surface of the supplying water to the orifice of the tube increase; hence, it must evidently have been less than 29 per cent. in Mr. Francis' experiment No. 62, considering that the orifice of his divergent tube was 1.22 inches instead of only 0.305 inch in my own tube, and the head of water used by him 14.1264 inches, viz.: only 1 inch less than my own fall H , = 15.15 inches in experiment Q, Table XI.; if, however, in addition to the water column pressure, we take into consideration the increased discharge obtained when the flow takes place in a closed, divergent, tubular envelope, the velocity head in Mr. Francis' experiment would be about 6 times as large as the fall in my experiment Q.

I think, all things considered, not much, if anything beyond $\frac{1}{2}$ of the total head of water used by Mr. Francis in his experiment No. 62, could have been lost while the stream travelled from the small to the large end of his divergent conical tube, notwithstanding that the interior conformation of this tube differed somewhat from that used by me.

The ratio of the actual velocity of the water at its final discharge from the tube, to the velocity due to this reduced head acting on the larger base of the tube is thus, in experiment No. 62, equal to $\frac{0.2446}{\sqrt{\frac{1}{2}}} = .2825$, the loss of living force indicated being still as large as $\frac{1}{2}$ of the whole amount.

The chief discrepancy between the hypothesis on which Bernoulli's theory is founded and the real conditions of motion in the liquid stream cannot, in my opinion, be due to the retarding effects of the walls of a conical divergent tube 0.1018 foot in diameter at the small end, having the comparatively insignificant length of 3 feet or 29 diameters, wherein the office of a large portion (if not the whole) of the capillary attraction of the very material of which the tube is formed, is to increase the velocity of the enclosed stream.

The profile of the cycloidal mouth piece A U C D V B, having nearly 11 diameters C D in length inclusive of the cylindrical extension, which was used by Mr. Francis, apparently in imitation of Michelotti, differed much from the outline of the longitudinal section of a vein of corresponding minimum diameter C D and length as naturally formed in the atmosphere, or in any other gaseous medium under a uniform pressure or in vacuo, which is shown approximately by a dotted line in Fig. 21. By assuming that the cycloidal mouth-piece performed the same functions as the natural conoidal vein form just described, both when used alone and in connection with a divergent tube,* we may attempt to determine, in an approximate manner, the

*This view, however, is not strictly correct, for with a cycloidal mouth-piece the vein must continue to contract for some distance beyond the orifice C D or U V, and furthermore the pressure within the mouth-piece is necessarily variable, especially when used with the divergent tube.

numerical values of the coefficients of velocity at the small base C D. for the tubes a b, a b c and a b c d, which are respectively 2·1, 3·1 and 4·1 feet long, directly by means of formula (21) - (1°) by supposing these tubes to be nearly equivalent as regards discharging power, to tubes having true conical bores formed respectively by the revolution of trapeziums C D E F, C D G H, C D I J and C D K L, about the axis N Y - (2°) by taking for granted that their discharging power would not have been sensibly affected in any case, if instead of introducing a curved junction for the first half foot from C D, so as to avoid a sharp angle, the cylindrical portion U C D V, had been extended to meet the conical part K L F E, which junction would occur very nearly midways between E and C, or at P S = 0·50 ft., beyond C D.

According to hypothesis (1), and judging, as in previous cases, by the results given in the tables already referred to in preceding examples we may put, without risk of much error: $(i_{(a)}) = 0·43$ for the three tubes, viz.: a b, a b c, and a b c d):

$$r' = \frac{C D}{2} = \frac{0·1017}{2} = 0·05085 \text{ ft.} = \text{for tube a b, } \cdot 81 \text{ Q T;}$$

$$\text{for tube a b c, } \cdot 807 \text{ Q T;}$$

$$\text{for tube a b c d, } \cdot 805 \text{ Q T;}$$

where Q T represents the radius r , of a theoretical orifice assumed to be at the point Q, situated at a distance C T = $x = 1·08$ ft. back from C D, whence:

$$r = \text{for tube a b: } \frac{0·5085}{3} = 0·0628 \text{ ft.,}$$

$$\text{for tube a b c: } \frac{0·5085}{3·07} = 0·0630 \text{ ft.,}$$

$$\text{for tube a b c d: } \frac{0·5085}{8·05} = 0·0631 \text{ ft. Also,}$$

$$s_0 = \text{for tube a b: } 0·57 r = 0·035796 \text{ ft.,}$$

$$\text{for tube a b c: } 0·56 r = 0·03528 \text{ ft.,}$$

$$\text{for tube a b c d: } 0·56 r = 0·03534 \text{ ft.,}$$

$$x' = \text{for tube a b: } 1·0 \text{ ft.,}$$

$$\text{“ “ a b c: } 2·0 \text{ ft.,}$$

$$\text{“ “ a b c d: } 3·0.$$

$$\left(\begin{array}{c} \text{Coeff.} \\ \text{veloc.} \\ \text{nat.} \\ \text{cont.} \\ \text{vein} \\ \text{at} \\ \text{C D.} \end{array} \right) \times \left(\begin{array}{c} \text{Coeff.} \\ \text{veloc.} \\ \text{orif. C D,} \\ \text{mouth-} \\ \text{piece.} \end{array} \right) = \text{for tube a b: } 0·94,$$

$$\text{“ “ a b c: } 0·945,$$

$$\text{“ “ a b c d: } 0·95 \text{ for efflux under}$$

water; these last factors being taken in excess of those found by Mr. Francis for corresponding heads, as per Table XVII $\frac{1}{2}$, on account of the greater efficiency of the mouth-piece for the increased velocities generated by the divergent tube.

By substituting the above values successively for the symbols in equation (21), we obtain, after dividing by $\sqrt{2 g H}$, the following ratios of velocity at smallest section to velocity due to head; the tubes, as already stated, being considered as true frustums of cones, viz.:

$$\text{For tube a b: } 1·3606,$$

$$\text{“ “ a b c: } 1·8523,$$

$$\text{“ “ a b c d: } 2·0793.$$

The same ratios computed in accordance with hypothesis (2), are found to be—

$$\text{For tube a b: } 1·3590,$$

$$\text{“ “ a b c: } 1·8514,$$

$$\text{“ “ a b c d: } 2·0693.$$

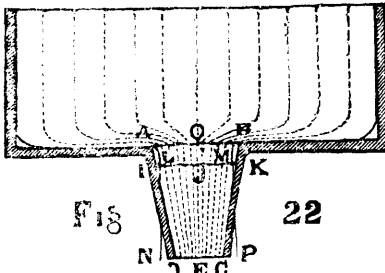
These three ratios are deficient in comparison to those derived from Mr. Francis' experiments, nearly 18 per cent., for each of the three tubes. This uniform discrepancy I attribute to a supplementary conversion of acceleration into mass effected in the excessively convergent cycloidal mouthpiece (as compared to the theoretical contraction of the natural liquid vein = $\sqrt{\frac{1}{2}}$ or ·8408), simultaneously with the reduction of the absolute pressure in the said mouth-piece through the agency of the divergent tube. In the case of the convergent mouth-piece, I conceive the process of transformation of the elements of energy to be the reverse of that obtaining in the divergent tube; in the latter the liquid is attracted by the sides, while in the

former its adherence to these sides is diminished; the pressure is, however, reduced in both instances.

Notwithstanding the unavoidable want of accuracy in some of the factors which had to be used in connection with the practical illustrations of the working of the theory given above, it is evident that this theory leads to results much superior, in point of concordance with observed facts, to those obtained with the aid of the theories now propounded; some of these latter results seem to me to be in direct contradiction with the actual state of matters as established by careful observations.

DISCHARGE THROUGH CONICAL CONVERGENT TUBES.

Although this class of tubes is as simple in conformation as the diverging tubes, the conditions under which the flow of liquid takes place through them, are variable not only with the degree of convergence of their sides, but also with their length.



1st. In tubes such as A B K I A, whose sides A I, B K converge less at every point of the axis O J, than the corresponding naturally contracted vein of equal length A B M L A, projected under the same head through an orifice in a thin plate, whose area is equal to that of the large base A O B of the tube, and of a length O J = l less than that for which j is a maximum, the fluid is unceasingly compelled to follow the sides A I, B K of the tube, as in the case of a plain conical divergent tube added

directly to the reservoir without mouth-piece. Formula (18) is therefore directly applicable to all such tubes; the distance O J, from the orifice or large base A O B, at which the convergent tube A B C D ceases to act in a similar manner to the divergent tube, and where j is a maximum, being determined in general by the relation:

$$\frac{dj}{dx} = d \left\{ \frac{2i_{(a)}s_0 + x + i_{(a)}x + 2\sqrt{i_{(a)}^2s_0^2 + i_{(a)}s_0x + xi_{(a)}^2s_0 + i_{(a)}x^2}}{i_{(a)}x \left\{ 1 + \frac{r^2}{(r+mx)^2} \right\}^2} - \frac{s_0}{x} \right\} \frac{1}{dx} =$$

$$\left\{ 1 + i_{(a)} + \frac{i_{(a)}s_0 + i_{(a)}^2s_0 + 2i_{(a)}x}{\sqrt{i_{(a)}^2s_0^2 + i_{(a)}s_0x + xi_{(a)}^2s_0 + i_{(a)}x^2}} \right\} \left\{ i_{(a)}x(r+mx) + 2i_{(a)}xr^2(r+mx) \right.$$

$$+ i_{(a)}xr^4(r+mx) \left. \right\} - \left\{ i_{(a)}(r+mx) + 2i_{(a)}r^2(r+mx)^3 - 4mi_{(a)}xr^2(r+mx)^2 + i_{(a)}r \right.$$

$$\times (r+mx) - 4mi_{(a)}xr^4 \left. \right\} \left\{ 2i_{(a)}s_0 + x + i_{(a)}x + 2\sqrt{i_{(a)}^2s_0^2 + i_{(a)}s_0x + xi_{(a)}^2s_0 + i_{(a)}x^2} \right\}$$

$$- \left\{ s_0 \text{ hyp. log. } x \right\} \left\{ r + mx \right\}^5 = 0 \tag{22}$$

I know of no experiment made with tubes so conditioned.

2nd. When the sides A D, B C, of a tube A B C D, converge at every point more than the corresponding outside portion of the naturally contracted vein A L N P M B, projected through an orifice in a thin plate equal to the large base A O B of the tube, or when they converge less than this naturally contracted or theoretical vein only for a part O J of its length, as in the tube A B C D, and for the remainder J E of the distance O E, from the large base A O B to the small base D E C, more than said portion of contracted vein A B P N A, it is clear that here also the same as in divergent tubes, motion assumes a permanent state in the tube taken as a whole, only after the initial fluid sheet occupying the plane A O B has passed the section D E C, contrary to what takes place in the naturally con-

tracted vein, in which the conditions of motion in the posterior portion A B M L A can evidently not be affected by any change that may take place in those of the fluid particles passing at D E C.

In all such tubes, any difference existing between the velocity of the fluid issuing from the tube at the small base D E C, and that of the naturally contracted vein A B M P N L A, at the corresponding section N D E C P, is the result of an artificially increased, or partly increased and partly diminished velocity, due to the force f_{cont} , viz., of that corresponding to $\sqrt{i_{(y)}^{s_0} + x}$ in the said natural vein. This transformed velocity may, in general, be represented by $\sqrt{i_{(y)}^{s_0} + jx}$, where j is a number greater than unity for increased velocities, and less than 1 for diminished motion, or rate of progress

of the vein, as regards the force f_{cont} . The expression: $\frac{\sqrt{i_{(y)}^{s_0} + x}}{\sqrt{i_{(y)}^{s_0} + i_{(y)}x}}$, which, as

already stated and explained, represents, in general, the velocity ratio v_p of the motions due to the forces f_{cont} and f_{orif} , at any point of the naturally contracted horizontal vein outside of the reservoir, is converted in the convergent tube A B C D, into:

$$\frac{\sqrt{i_{(y)}^{s_0} + jx}}{\sqrt{i_{(y)}^{s_0} + i_{(y)}x + \sqrt{i_{(y)}^{s_0} + x} - \sqrt{i_{(y)}^{s_0} + jx}}$$

and the same as for conical divergent tubes, we may put:

$$\frac{\sqrt{i_{(y)}^{s_0} + jx}}{\sqrt{i_{(y)}^{s_0} + i_{(y)}x + \sqrt{i_{(y)}^{s_0} + x} - \sqrt{i_{(y)}^{s_0} + jx}} = \frac{r^2}{(r - mx)^2}$$

where r stands for the radius A O = O B, and m for the tangent of half the angle of convergence; whence we deduce:

$$j = \frac{\left\{ \frac{r^2}{(r-m)^2} \left(\sqrt{i_{(y)}^{s_0} + i_{(y)}x} + \sqrt{i_{(y)}^{s_0} + x} \right) \right\}^2 - i_{(y)}^{s_0}}{x \left(1 + \frac{r^2}{(r-m)^2} \right)^2} \tag{23}$$

If, now, we substitute this value of j in the expression:

$$\frac{\sqrt{i_{(y)}^{s_0} + i_{(y)}x} - \sqrt{i_{(y)}^{s_0} + jx} + \sqrt{i_{(y)}^{s_0} + x}}{\sqrt{i_{(y)}^{s_0} + i_{(y)}x}}$$

which indicates the relation between the absolute number of particles that pass in an orifice in a thin plate having a diameter equal to A B, and those passing at the large base A B, of the convergent tube, we obtain:

$$\left[\frac{\left(\begin{smallmatrix} \text{coeff.} \\ \text{vel.} \\ \text{large} \\ \text{base A B} \\ \text{convergt} \\ \text{tube.} \end{smallmatrix} \right) \left(\begin{smallmatrix} \text{coeff.} \\ \text{vel.} \\ \text{orif A B} \\ \text{in thin} \\ \text{plate.} \end{smallmatrix} \right)}{\left(\begin{smallmatrix} \text{coeff.} \\ \text{vel.} \\ \text{large} \\ \text{base A B} \\ \text{convergt} \\ \text{tube.} \end{smallmatrix} \right)} \right] \times \tag{24}$$

$$\left[\frac{\sqrt{i_{(y)}^{s_0} + i_{(y)}l} - \sqrt{i_{(y)}^{s_0} + \left\{ \frac{r^2}{(r-ml)^2} \left(\sqrt{i_{(y)}^{s_0} + i_{(y)}l} + \sqrt{i_{(y)}^{s_0} + l \right) \right\}^2 - i_{(y)}^{s_0}} + \sqrt{i_{(y)}^{s_0} + l}}{\left(1 + \frac{r^2}{(r-ml)^2} \right)^2} \right] \frac{1}{\sqrt{i_{(y)}^{s_0} + i_{(y)}l}}$$

where l is substituted for $x = O E$, the length of tube.

Without a thorough knowledge of the laws governing the variations of $i_{(a)}$ and s_o , it is impracticable to determine accurately, by computation, the velocity at the small base C D of the tube.

Moreover, on account of the sharp turn of the liquid fillets about the angle of the junction of the tube and reservoir, it is probable that these do not adhere to the sides of the tube before striking against the same, wherefore a part of the efficiency assumed for the tube in constructing formula No. 24 is lost, and the discharge is also affected by friction.

The approximate determination of the coefficient of efflux for one of the conically convergent tubes, experimented with by Messrs. D'Aubuisson and Castel, referred to hereunder, was undertaken chiefly for the purpose of showing that the above formulæ lead in the right direction.

With a tube 1.767 inch in diameter at the large end A B (Fig. 22), 0.61 inch at the small end C D, having a length E O = 1.575 inch = nearly 2.6 diameters of the small base and sides A C, B D, inclined at an angle of $40^\circ, 20'$, the coefficient of efflux for the small end was found, by experiment, to be 0.87 under a head of 9.84 feet.

Putting, in this case: $i_{(a)} = .47$, $s_o = 0.6$ inch and $\left(\begin{smallmatrix} \text{coeff} \\ \text{Vel} \\ \text{orif} \\ \text{A B} \end{smallmatrix}\right) = 0.62$; also, $r = 0.8335$ inch, $l = 1.575$ inch and $m = \text{tang } 20^\circ, 10' = 0.36726$. We obtain, by using formula (24):

$$\left(\begin{smallmatrix} \text{coeff} \\ \text{Vel} \\ \text{base} \\ \text{A B} \\ \text{conv} \\ \text{tube} \end{smallmatrix}\right) = 0.1154 \text{ and } \left(\begin{smallmatrix} \text{coeff} \\ \text{vel} \\ \text{base} \\ \text{C D} \\ \text{conv} \\ \text{tube} \end{smallmatrix}\right) = \left(\begin{smallmatrix} \text{coeff} \\ \text{vel} \\ \text{base} \\ \text{A B} \\ \text{conv} \\ \text{tube} \end{smallmatrix}\right) \times \frac{1.767^2}{0.61} = 0.9686.$$

ON THE FLOW OF LIQUIDS THROUGH OBLONG ORIFICES IN THIN PLATES.

Numerous experiments were made by Messrs. Poncelet and Lesbros, at Metz, in 1826 and 1827, upon efflux through large rectangular orifices, pierced in a vertical brass plate 0.1575 inch thick, so as to obtain a perfect contraction of the stream. The widths of these apertures were generally 7.8737 inches, and in some cases 23.6211 inches, while their heights varied from 0.3937 inch to 7.837 inches.

Although these experiments are, with good reason, considered to be the most accurate available for practical purposes, on account of the uncertainty, as regards the effective head and nature of the contraction of the vein, arising from the fact of a depression taking place during efflux, in the water surface of the supplying reservoir, immediately behind the vertical side or partition which contains the orifice, they are obviously not suitable for use in connection with theoretical investigations.

The only experiments I know of which appear to me to have been made in the proper conditions and with the requisite amount of care, to be serviceable for theoretical purposes, are those by Messrs. Castel and D'Aubuisson de Voisins, with rectangular orifices 0.328 feet = 3.936 inches long and 0.033 feet = 0.399 inch high, pierced in a vertical partition; the ratio of the length to the breadth being, therefore, equal to 9.9398. The mean results obtained by these engineers are given in the following table:

TABLE XVIII.

Number.	h	H	$D = \frac{3}{2} c_d \sqrt{2g(H^{\frac{3}{2}} - h^{\frac{3}{2}})}$ = Discharge per second.	c_d
	Depth of upper side of orifice below water surface.	Depth of lower side of orifice below water surface.		Coefficient of discharge or velocity, the theoretical velocity due to the mean pressure of $\frac{2}{3} \left(\frac{H^{\frac{3}{2}} - h^{\frac{3}{2}}}{H - h} \right)$ on the orifice being equal to unity or 1.
	feet.	feet.	cubic feet.	
1	0·0491	0·0821	0·01607	0·728
2	0·0819	0·1149	0·1946	0·720
3	0·1147	0·1477	0·2242	0·719
4	0·1475	0·1805	0·2497	0·715
5	0·1804	0·2134	0·2723	0·710

In common with the last-named and other experimenters with oblong rectangular orifices and the like, I found, under a small head of about 3 inches, that the coefficients of efflux or velocity proper to annular and lunular-shaped orifices, are invariably greater than those corresponding to orifices which embrace the full area enclosed within the circumference of a circle.

1. When ratio between the breadth and the mean length of the annular space or opening formed by introducing a cylindrical rod, 0·185 inch diameter, in the reservoir opposite an orifice in a thin plate 0·4 inch diameter, was 8·55, the coefficient of discharge was about 0·7256, with the base of the cylinder in the plane of the orifice; this coefficient became, however, reduced to 0·68, when the cylinder protruded through the plate 0·2 inch beyond the plane of the orifice, as shown in table VI.

2. When this ratio was increased to 20·70, by introducing into an orifice 0·482 inch diameter, a disk 0·355 inch diameter and 0·048 inch thick, the coefficient of discharge rose to 0·7943 for the upper base of the disk in the plane of the orifice, and to 0·8098 for the lower base in the plane of this orifice, as per Table VIII.

When the ratio between the mean length and breadth of the ring-shaped aperture was still further augmented to 80·35, by introducing the disk just described into an orifice 0·584 inch diameter, the coefficient of discharge rose as high as 0·8907 for the lower base of the disk in the plane of the orifice, and 0·91 for the upper base in this plane, as per Table IX.

4. When the discharge took place through the lunular-shaped opening left between the circumference of a cylindrical rod 0·185 inch diameter and that of an orifice 0·4 inch diameter, as shown in the figure at the head of Table VII, the coefficient of discharge was 0·7016 while the base of the cylinder coincided with the plane of the orifice, and about 0·663 when the rod projected 0·2 inch below this plane.

In all these experiments of mine, however, the contraction was probably modified, and, to a small extent, destroyed along the longitudinal face of the rod or disk introduced into the reservoir and let down below the plane of the orifice, for which reason the discharge proved, perhaps, slightly larger in each case than it would have been, if the stream had been allowed to contract freely all around the perimeter of the orifice.

If the larger coefficients, obtained in the four cases just referred to, are corrected for this want of completeness of the contraction of the stream—approximately

in accordance with the empiric rules given by some authors, they become reduced, respectively, from 0.7256, 0.8031, 0.91 and 0.7016, to about 0.700, 0.77, 0.85 and 0.68; they remain much higher, however, in any case, than the coefficients which are proper to a circular orifice of equal area for efflux under the same head.

There is no apparent reason why the first slice or sheet of liquid leaving the orifice at the instant it is opened, should move off faster, under the same pressure, from an oblong than from a perfectly round or circular orifice in a thin plate, and I see no other cause for the increased discharge obtained than the following :

When one elementary slice or sheet of liquid of the oblong-shaped vein tends to detach itself from the next succeeding one, and that, owing to the intermittent action of the resistance or force of cohesion, the motion of the liquid particles, or fillets, becomes accelerated, and consequently the total area of the moving stream correspondingly diminished, the increased rate of contraction in the direction of the longest of the radii, which extend from the perimeter of the oblong orifice or vein to the centre of figure, as compared to that taking place along the shorter radii, produces, together with a change of form, also an enlargement of the sectional area embraced by the spurting liquid vein through the admixture of air with the water or otherwise—when the conditions of flow become similar to those of divergent tubes.

LIQUID PRESSURE, MOTION, ENERGY, &C.

Pressure is most frequently generated in liquids, whether in a state of rest or in motion, by gravity acting on a large number of particles superimposed to one another; but it also often results from the action of a piston moved by some exterior force. No matter how generated, it may be considered in the light of an artificial increase, in the natural force of repulsion co-existing with that of attraction between all molecules.

When the force of attraction is artificially increased, instead of that of repulsion, the result is the opposite of pressure, viz, dilatation or distention or exhaustion.

Liquid motion and energy are, in all cases, governed by the differences between the forces of attraction and repulsion obtaining at the origin and along the path of the stream.

If a pressure p , has to be applied during the small space of time $d t$, in order that a liquid particle may describe, within the sphere of molecular oscillations, the small distance $d x$, necessary to overcome the force of cohesion, together with the inertia of the said particle—according to the laws of uniformly accelerated motion—another

pressure $n p$, will have to act during a length of time $= d t \frac{\sqrt{p}}{\sqrt{np}}$ to cause the same particle to describe the distance $d x$, that is to say, the number of times which one and the same space $d x$, is passed over in the unit of time, say one second, by successive molecules, varies as $\sqrt{\quad}$, of the intensity of the pressure to which the particle is subjected.

In the case of a liquid vein issuing from an orifice in a reservoir by virtue of the action of gravity alone, the absolute velocity varies therefore, as the $\sqrt{\quad}$ of the depth of the centre of pressure on the orifice below the surface, being theoretically equal to $0.7071 = \sqrt{\frac{1}{2}}$ of that attained by a body after having descended freely through a space equal to the said depth, wherefore, abstracting all causes of incidental perturbation, the energy of such a vein is directly proportional to the pressure or head on the orifice.

This constitutes the basis of the generation of the absolute velocity and energy proper to a liquid vein taken as a whole, thus: if a circular vein having a mean diameter of say 1 inch between two points, A, B, 1 foot apart, of its trajectory, and formed under a water column pressure of 1 foot, takes say $\frac{1}{2}$ of a second to travel freely from A to B, another vein of the same dimensions between the said points, but

generated by a hydrostatic pressure of 4 feet, yet in every other respect formed under the same conditions as the first jet, will fill up the space of 1 foot, referred to between A and B in $\frac{1}{8} = \frac{1}{16}$ second:—wherefore the quantity of water supplied by

$\sqrt{4}$
vein No. 1 will bear to that afforded by vein No. 2 the ratio of 1 to 2, and energy will be developed in the ratio of 1 to 4.

The absolute rate of motion or velocity just referred to, which is proper to the whole of the elementary liquid slices of which every jet may be conceived to consist, is quite distinct, however, from the rate of progress of one and the same elementary sheet of liquid in assuming different positions successively along the path of the stream. It is by this relative motion or rate of advance, that the outline of the conoidal space swept out by the contracted vein and the distribution of pressure in tubes are essentially controlled. The relative velocities of an elementary volume of liquid ejected from the reservoir corresponding to the area of the orifice, are governed by the elementary impulses or increments of acceleration which are imparted, in rapid succession, to the increment of vein considered, from a state of rest all along its trajectory; these impulses having to overcome alternately cohesion and inertia combined and a reduced inertia alone—the whole as already explained in another part of the paper.

In the naturally contracted vein the pressure is null, or 0—from the theoretical orifice, which is situated at the plane, where the total acceleration or velocity, generated by the small impulses applied against cohesion and inertia combined, is equal to the velocity due to the impulses expended in overcoming a reduced inertia alone—to the end of the vein outside the reservoir; from the said orifice to the plane of rest, the pressure gradually increases, becoming equal to that due to the full head, at the said plane.

When a divergent tube is added to a conoidal mouth-piece, having the form of the naturally contracted vein, the molecular force of attraction is increased so as to produce a dilatation or distention in the liquid filling the mouth-piece, which probably diminishes in intensity, from the smallest section to the theoretical orifice, and thence to the plane of rest, where the full hydrostatic pressure again obtains. In the divergent tube itself, the exhaustion decreases gradually from the small to the large base, where it is reduced to a minimum. Thus, if the total velocity generated, by the addition of the divergent tube, at the smallest section, is to that obtained at the same place with the mouth-piece alone, in the ratio of 2 to 1, the force of attraction will be increased by a quantity equal to $2^2 - 1 = 3$ times the pressure due to the head of water on the centre of pressure of the section of the tube.

If the same divergent tube was added directly to the reservoir, viz., without the intervention of a conoidal mouth-piece, the force of attraction would also be increased, but to a less extent.

In a conically convergent tube, or over-convergent mouth-piece, of any description, added to the side or bottom of a reservoir, with or without natural conoidal mouth-piece, the force of repulsion or pressure diminishes during the flow of the liquid from the large towards the small base. In order that the whole volume of liquid may pass at the large base, which can be ejected through an orifice having an equal diameter, by virtue of the pressure in the reservoir, the force of attraction must be increased in the same manner as in the divergent tube, and *vice versa*, if the force of attraction is increased at the small base of a convergent tube, by the addition of a divergent tube, the discharging power of the former and of the two tubes combined is increased as compared to the power of a natural conoidal mouth-piece, having its orifice at the small end equal to the small base of the convergent tube

CONCLUDING REMARKS.

It was in the year 1645 that the Italian mathematician, Toricelli, enunciated the theorem which bears his name and may be stated as follows:—

“Generally and making abstraction of every obstacle or all cause of perturbation, the velocity of a fluid at its passage through an orifice made in the side of a

“reservoir, is the same as a heavy body would acquire in falling freely from the height comprised between the level of the fluid surface in the reservoir and the centre of that orifice.”

About the year 1738, Daniel Bernouilli propounded his theory, viz. :—“At any point of a system of hydraulic conduits or pipes, the absolute total head or pressure is composed of the pressure of the atmosphere, the actual hydrostatic pressure or head, the head due to the velocity of the water and the head consumed by friction and other resistances encountered between the water surface of the source of supply and the point considered.

Ever since, it would appear to have been the constant aim of all hydrodynamicians to determine the nature and intensity of the resistances to be overcome under all possible conditions, by making numbers of experiments varied in a thousand ways, from which empirical coefficients of friction, contraction, velocity and efflux could be deduced and formulas based thereon.

If, despite all the labours and pains taken by eminent men of all ages to place the science of hydraulics on a solid basis, there is still room for much improvement, judging by the discrepancies which exist between experimental data of apparently similar nature, furnished by different authors and the variations in the formulas given in works which are all held in equally high estimation, as also by the failure of water works systems to prove equal to the requirements of the services which they were calculated to perform, it must be attributed, I think, to the fact of no one having apparently thought it necessary to take into account, independently of all resistance caused by friction, sharp curves, sudden enlargements, etc., the influence of the force of cohesion or aggregation which unites the fluid molecules into one homogeneous mass, and prevents their isolation.

If I have alluded to the shortcomings of the theories advanced and of some of the experiments made by the learned authors whose names are mentioned and others, it is certainly not with any intention of making disparaging remarks respecting the arduous labours performed by them, but solely as a means of assisting in the advancement of a science the principles of which are still imperfectly understood, and, in hopes of attracting men of science, endowed with greater powers of penetration, and more generously favoured, as regards spare funds and time, than I am, to consider the suggestions thrown out herein with a view of placing the theory of hydraulics on a sounder basis.

APPENDIX.

PHISICO-MATHEMATICAL THEORY OF THE MOTION OF LIQUIDS ISSUING FROM ORIFICES IN RESERVOIRS, BY MR. LE CHEVALIER LORGNA.

INTRODUCTION.

It is not to be denied that certain parts of natural philosophy owe everything, so to speak, to the mathematical sciences—and that other parts are much indebted to them, for, these sciences have fortunately rendered tractable things, into which neither reason nor experience, alone or combined, would ever have been able to penetrate so far. But in a great number of other instances these sciences have really not been of any assistance towards making a forward step; unless we are prepared to accept, in the case of natural things, that which will never be, viz.: the truths of computation for truths of fact, but which has taken place to a singular extent in those instances where the character and conditions of the object are totally changed when

by abstraction, it is stripped of everything that constitutes it—as nature demands that it should be, in the structure of the world.

In point of fact there is not, for example, on the intimate affections and motions of compressible and incompressible fluids, a theory founded chiefly on mathematical principles which, as might happen in mathematical philosophy, could lay claim also with an equal right and above all exception, to a place in the natural science of nature.

And if such means of investigation were to fail us, what other course would there be at our disposal for penetrating deeply into the study of this science, considering that the constituent principles of the objects are unknown to us and that the various characteristic properties are closely interwoven with very obscure and imperceptible forces.

If I do not mistake, the mode of proceeding which seems most appropriate is that of very attentive observation and reasoning, making a judicious use of one and the other by the methods of decomposition and composition—to wit, by the methods of analysis and geometry and by profiting also, in case of need, of the symbols of the one, and the figures of the other, but invariably as instruments only, and when the things or their parts can, without being disfigured, assume the character of simple homogeneous quantities, be subordinated to mutual relations, and even be represented to the senses, under the abstract figures of geometry.

Would not that be the true use of mathematics in connection with natural philosophy? It is not meant that all suppositions are excluded from this manner of philosophising; it is sufficient that such assumptions be reasonable and reasonably admissible in physics—as the postulates are in geometry, and not ideal and arbitrary or made for the sole purpose of adapting the object to the laws of computation.

No doubt, this method is not that which is most followed, because it is not the most accepted, nor the easiest—and that it is much more convenient and pleasing to human pride to pretend having found than to find out actually what nature performs. It is for this reason that Mr. D'Aembert has not hesitated to declare that now-a-days every thing is accomplished by means of suppositions and computations. However, that may be, if it is not the simplest, this method is undeniably the surest and it leads to the truth, or at least to results which are not very far removed from the truth and which time does not obliterate so easily as it obliterates inexorably our comments. It is upon these principles that I have undertaken and effected this investigation, as by trial, and as well as it lay in my power—of the motion of liquids within and outside of the reservoirs where they are maintained at a constant level during the flow.

The principal properties which distinguish the liquids from any other known fluid, to wit: natural incompressibility, perfect mobility and the very strong affinity of aggregation commonly called reciprocal adherence of molecules—exert an influence on their affections, that without having a particular regard for these properties as indicated by the phenomena, we can never hope to attain sound knowledge as regards the very complex irregularities of their motions. The only time, it appears when we may dispense considering these properties, which are the cause of particular actions taking place among the molecules, one upon the other, is when none of them are disturbing the general movement; in this circumstance it is permitted to view the liquid in the light of an imperfect fluid and to subordinate it in a manner to the laws of dynamics.

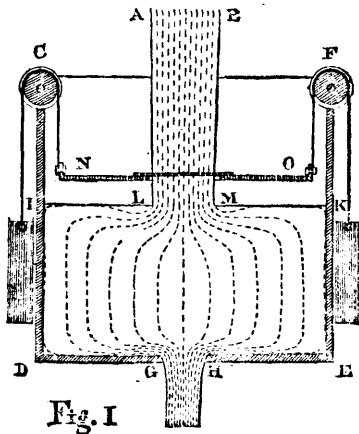
In such case, for example, I have thought a liquid vein in motion could be imagined to be established whose molecules are continuously urged on with a uniform velocity in one and the same direction; and by this means I have endeavoured, in another paper which will be found in this volume, to bring under the dynamical laws, the appreciation of the permanent impulsion of liquids against plane surfaces. But in every other condition of things, if the properties enunciated exert an essential influence on the phenomena, it will be necessary, in order that the theory may not be wrong, that it should always be based on facts and that it should invariably be directed in the path pointed out to us by these experiments alone wherein liquids have acted naturally and such as nature has constituted them.

I do not know if I have succeeded in my undertaking, as was my intention, but in any case the failure will be due to my want of ability and not to the method which I have laid down for my guidance.

CHAPTER I.

NATURAL PHENOMENA.

I.



Phenomenon 1.—If a perennial vein of water A B, (Fig. 1) flows into a reservoir placed underneath and having any form whatever C D E F, in which the orifice of the bottom G H, where the incoming water is to escape, is smaller than the area of the cross-section of the vein A B, it will be noticed that a certain quantity of water is first spilled and spreads over the closed bottom G D, H E, and then, after a certain time, the liquid assumes a height such as D I, above the bottom, the surface being continually agitated by the influx of the vein, and once the efflux is equalized with the influx, the water-level I K, remains stationary, as long as the same conditions continue to subsist; nevertheless, the flow here is interrupted in the direction of the vein at L M, and continues its course until after the liquid issues from the orifice G H.

II.

Phenomenon 2.—And if several openings, smaller or greater than G H, are pierced in thin plates of metal, which can be applied to the bottom D E, it will be remarked, that by using openings getting smaller and smaller, the surface I K, is formed and maintained at a level more and more elevated above the fixed bottom D E; on the contrary, by applying successively to the bottom, orifices getting greater and greater than G H, the permanent height D I, of the water above the bottom diminishes more and more, and even disappears entirely when the vein A B, flows freely past the bottom D E.

III.

Phenomenon 3.—But, if the inflowing vein is received in a recipient N O, placed quite close above the surface I K, pierced by small holes, so that the water may descend in very small fillets, it will be seen that the surface I K, remains sensibly horizontal during the flow, as if the body of liquid I D E K, was stagnant.

IV.

Corollary I.—It is therefore evident that the liquid spilled and spread on the bottom D E, is an over-flowing liquid.

Corollary II.—And that the surface I K, is the limit of the over flowing.

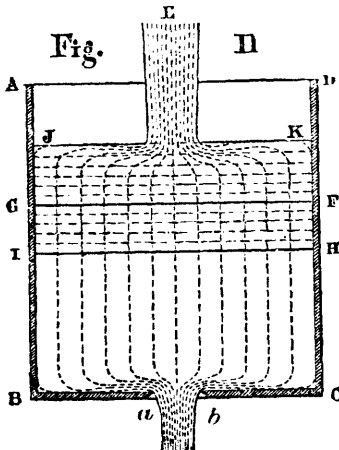
Corollary III.—And, as on the one hand, the sensible horizontality of the surface I K, during the flow, and on the other, the successive flowing necessary to supply the quantity discharged through the orifice G H, give rise to a sensible state of rest on one side and of motion on the other, the undisputable result of these phenomena is, that the condition of the flowage I D E K, is a certain singular state which participates both of rest and of motion, and which is, consequently quite distinct from the absolute state of either rest or motion.

V.

Scholium.—We shall see hereafter how these few certain phenomena, which are the real axioms of natural philosophy, enlighten reason and guide it in finding out possibly the properties of liquids issuing from orifices in reservoirs, when the water contained therein is maintained at a constant height above the level of the orifices. It is a decisive step in this very obscure matter, to have discovered, as we shall see, that the state of the liquids in the interior of vessels is in a state of overflowing and that this state is mixed and distinct from that of rest and motion taken in their absolute sense, but participating nevertheless of both.

But, before going any further, let us examine other phenomena which will show us more manifestly what is the use of these flowages, by moving their limits further and further away from the orifices of the vessels, while expelling the liquids successively through smaller and smaller orifices.

VI.



Phenomenon 4.—Let a glass recipient A B C D (Fig. II) be prepared, in the bottom of which an opening *a b*, is made. Let a perennial vein greater than the opening *a b*, continually throw into this vessel, during a given time, a given quantity of water, and let the water held back overflow into the vessel up to the elevation B G, there to assume the horizontal surface F G, the limit F G of the flowage being marked carefully on the glass.

This being done, let the vessel A B C D be removed from under the vein E, and after having let out some of the liquid through the opening *a b*, let this orifice be closed, and in place of the water

wasted let about an equal quantity of common oil be introduced. After this let us bring the vessel again under the vein E, so that the water may fall on the oil and traverse it to arrive at the surface of the water lying below; then let the orifice *a b*, be opened anew. After the lapse of a certain space of time during which one can see the oil ascend and descend alternately, it will be noticed: 1. That the surface of the oil stands still a little above the limit G F, indicated by the water, and the efflux of the water through the orifice becomes again permanent, as before the introduction of the oil. 2. That the surface of the water below the oil assumes and retains constantly a sensibly horizontal position, such as H I. 3. That the water introduced traverses the oil as if passing through a filter and enters the body of water underneath without producing any undulation therein, merely compensating for the discharge through the orifice *a b*, under the head afforded by the two heterogeneous liquids, as

was the case under the permanent height B G, of the originally overflowed homogeneous liquid.

VII.

Phen. 5.—If this experiment is repeated with an increased quantity of oil, it will be seen that the surface of the water lying underneath can be lowered permanently nearly down to the plane of the orifice *a b*, especially if this orifice is very small. Yet the oil continues to rest on top of the water, internally troubled on account of its affording a passage to the water which goes to compensate for the discharge, but remaining, with respect to itself, as a mass of stagnant liquid; and, moreover, it will be remarked that the greater the quantity of oil poured upon the water the more will the surface of the oil rise above the level J K, originally established.

Phen. 6.—If another apparatus is used, and instead of being introduced immediately into the oil—as in Fig. II, if the water of the perennial vein E be conducted separately through a pipe down to the surface I, H, of the body of water lying below the oil, as shown in Fig. III, it will be observed that as soon as the flow becomes permanent: 1. The oil on top of the water remains motionless, as if it was a solid body, even though the surface of the water should descend close to B G—which is admirable to behold. 2. The surface *f g*, of the oil remains, as before, above the level F G,—assumed by the overflow water, and yet a little higher, on account of the volume of oil displaced by the pipe kept immersed therein during the efflux. 3. Finally, if, in the various attempts, an account, as correct as the circumstances will permit, is kept, whether of the quantity of oil introduced or of the

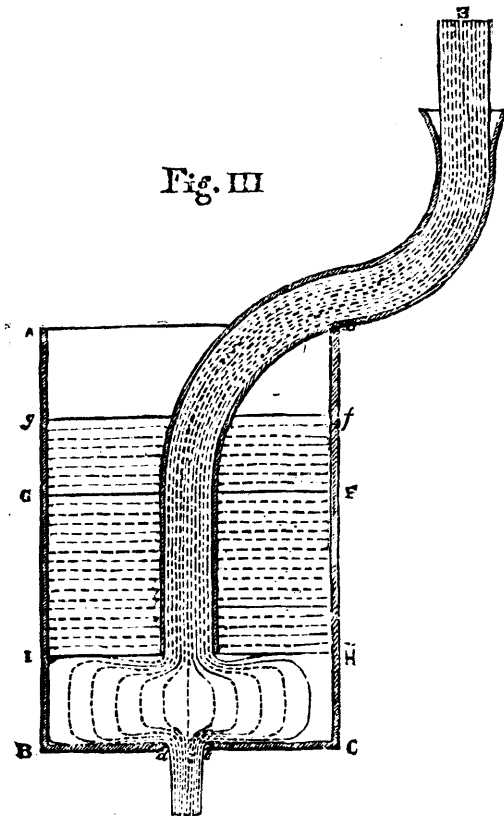


Fig. III

quantity of water expelled from the vessel by the oil poured in it, it is found, if I made no errors in taking these very delicate measurements, that after the permanent flow is established, the weight of the oil introduced remains constantly a little greater than that of the water expelled; this, it has appeared to me, should be attributed to the adherence of the oil to the sides of the vessel, owing to which adherence the pressure of the oil on the water underneath is somewhat diminished.

IX.

Corollary I.—In the meantime, it remains decided by those phenomena that the velocity of the water issuing from the opening *a b*, cannot, at all, be due, as was

thought by Newton, to the actual descent of the liquid from its permanent surface FG , to the plane of this same orifice $a b$ —whilst it might also be due to the various other falls from different other elevations, such as $I H$ (Figs. II and III), which is absurd; considering that there is a downward motion only in the water at the bottom of the vessel, and none whatever if the superimposed oil was substituted for water—which oil is quiescent and fixed in its position during the flow.

Corollary II.—And because the oil acts on the water lying below it, *per modum unius* (as a whole), like a loaded piston pressing upon the surface $I H$, of the water, it is evident that the pressure exerted around the opening (*pressione circumfusa alforo*) is not merely that of the perpendicular column, having this same orifice for a base, as was thought by M. M. Varignon, Hermann and many others, but, indeed, that of the whole body of liquid. For, since it is possible to bring down the surface $I H$, of the water, more and more towards the bottom, simply by increasing the height of the superimposed oil, and keeping up a uniform efflux by the introduction of water through a pipe or tube, as above indicated—and considering that the oil never acts otherwise than a piston, exerting an equal pressure on all points of the infinite section $I H$ —it follows that the action of any column, whatsoever, of definite dimensions, is not possible, nor can a determinate descent or fall take place, as was demonstrated in the preceding corollary.

Corollary III.—It is proven by the phenomena that the water maintained within reservoirs, at a uniform height above discharging orifices, is an overflown liquid and that in this overflown state, the pressure exerted by the mass of liquid around the opening acts like a piston to eject the water through this opening, and that consequently, the force which the water has at its exit from the vessel has not, any more, been imparted to it, by virtue of its actual descent or fall from the surface or limit of the overflow to the opening, than it has been produced merely by the pressure of the vertical fluid column having the opening for its base.

We can, therefore, plainly understand why the limit of the overflow rises the more above the level of the orifice, as this orifice diminishes in area—and that it falls lower and lower as the orifice is being enlarged, vanishing entirely, together with the overflow itself, when the supplying vein passes freely through the opening.

Corollary IV.—Furthermore, we can now clearly understand in what manner acts the sensible rest existing within overflown liquids, about the sensibly horizontal position of whose surface or limit of overflow there is no more any doubt, considering that it is principally the pressure which urges on the liquid towards the orifice. And this kind of downward movement of the liquid which, nevertheless, takes place in this overflown state, appears clearly to be but the successive reflux of the molecules towards the orifice on account of the successive compensating substitution of water for the water which flows out, this being a reflux which must make itself felt throughout from the bottom to the upper limit of the overflown liquid owing to the very delicate yieldingness of its parts, without actually expelling the water through the orifice. As to the manner in which subsist and are verified sensible rest in a body of overflown liquid and an interior downward motion having no part in the production of the flow in the orifices, it will supply the argument of another special exposition which will be made further on.

X.

Phenomenon 7. If once the flow from the glass receiver $A B C D$ (Fig II), which contains nothing but overflown water up to the level $F G$ —has become permanent, small pieces of Spanish wax, or of some other similar body slightly heavier than water, are dropped into the vessel along its sides, we observe that the small pieces of solid matter descend slowly towards the bottom in a nearly vertical direction—until having reached a point very close to this bottom—their path becomes visibly inclined and curved towards the opening, and when making their exit they all pass close to the edge of this orifice, forming a sensible determinate acute angle with the bottom. This phenomenon has been first observed by Mr. Daniel Bernouilli, afterwards by the "Abbe" Bossut, as may be seen in their excellent treatises of hydrodynamics, and I have punctually repeated and verified this observation last year.

XI.

Phenomenon 8.—Having gathered and measured the quantity of water which passed under different permanent heads in the reservoirs, through the orifices, whether pierced in thin plates or provided with additional tubes, it has thus been found that in all the experiments made by the most careful and trusty experimenters—the velocities acquired by one and the same fluid issuing through the same tube or orifice pierced in a thin plate—bear to each other the sub-duplicate ratio of the permanent heights of the fluid above the centre of the orifice. The more recent observations, viz., those which, through Royal munificence are just after being instituted on a grand scale at Turin (*Michelotti, Sper. Idraulica, e mem. dell' Ac. R. per gli anni 1784-85*), concur with all the observations made in bygone times in proving the truth of this law, so that there is perhaps not a single natural phenomenon so constantly established as this one.

Corollary —Therefore, from whatever elevations a heavy body at rest may descend freely, it can acquire, at the end of the motion, the actual velocities of the water issuing from the same orifice under different permanent heights of liquid in the reservoir, and, as according to the theory of uniformly accelerated motions, these velocities are to each other in the sub-duplicate ratio of the said heights, whatever they may be, it is unquestionable that the permanent heads, under which the water has run out with the said velocities—must be to each other as the heights through which a falling heavy body would have acquired the same velocities at the end of the fall.

CHAPTER II.

ENQUIRY INTO THE STATE OF OVERFLOWN LIQUIDS IN RESERVOIRS.

XII.

Prop. I.—The surface of a liquid abandoned to the free action of gravity, and constituted in perfect equilibrium in the vessel of any form whatsoever, which contains it, is horizontal or perpendicular in all its points to the direction of gravity.

See the proof of this proposition in the works on hydrostatics.

XIII.

Prop. II.—Reciprocally, a liquid contained in a vessel, of any form whatsoever, and abandoned to the action of gravity, whose surface is at every point horizontal or perpendicular to the direction of gravity, is in perfect equilibrium.

XIV.

Corollary I.—Therefore, if a liquid contained in a vessel is but sensibly constituted in equilibrium, its surface will be only sensibly horizontal or perpendicular in all its points to the direction of gravity.

Corollary II. And, reciprocally if the surface of a liquid contained in a vessel is sensibly horizontal all over, or perpendicular to the direction of gravity, the whole system will be sensibly in equilibrium.

XV.

Prop. III. The surface of the overflown water contained in reservoirs whence the liquid issues through orifices pierced in thin plates, fitted into the side or bottom, and wherein it is maintained during the flow at a uniform height above the centre of the orifices—remains always sensibly horizontal.

See Phenomenon 3 § III of the foregoing chapter.

Corollary. I Therefore such a system of overflow water maintains itself during the flow sensibly in a state of equilibrium in the interior of the reservoirs (§ XIV.)

Corollary II. But as in the interior of the reservoir, a motion must exist, in order that the efflux may be compensated for, there is not the shadow of a doubt (§ IV) but that the condition of this water is a mixed state which partakes both of continuous sensible rest and continuous motion.

XVI.

Prop. IV. This being so, to define the law and the natural symptoms proper to this state of overflow of the water in the interior of reservoirs.

Considering, in the first place, that in the permanent state we must suppose the efflux of the water through the orifice to be exactly equal to the supply at the upper part of the reservoir, it is unquestionable but that the outflow and the influx must take place simultaneously, otherwise, either, on the one hand, the outflow would not be uniform, or on the other hand, the upper limit of the overflow would not be constant. It is therefore indispensable that in the overflow liquid mass the passage of a quantity of water equal, neither more nor less, to that which issues through the opening or to that which comes in at the limit of the overflow, must take place and be verified at every instant; and as the whole body of the liquid is homogeneous, the water which comes in does, therefore, not pass by filtration through the overflow water, as it did through the oil (§ § VI, VII), but flows over immediately and spreads itself through the receiving water in the vicinity of the limit of the overflow, and it cannot reach the orifice to leave the vessel without the water which precedes it, and which is successively closer to this orifice having progressively made way for it. Hence the verification of this passage is effected by the successive translation and nearing to the orifice of the gradually anterior molecules. But on account of the perfect mobility of the water and the very delicate yieldingness of its parts, this effective interior motion cannot take place without the whole mass up to the exterior surface or limit of the overflow being affected by it. Hence there cannot exist in this mass absolute permanent rest nor permanent equilibrium between its parts—and consequently we cannot have an absolute permanent horizontality at the surface. Nevertheless, it is a fact (Phen. 3) that this surface maintains itself sensibly horizontal during the overflow, sensible equilibrium exists, therefore, between the parts of the water which is in the overflow state and consequently sensible rest in the whole system. But if there is, in this water, so constituted, neither an uninterrupted continuity of equilibrium nor of rest, because, contrary to fact, the surface should remain continuously and absolutely horizontal, nor yet an uninterrupted continuity of instability, because, likewise, contrary to fact, the sensibly permanent horizontality of the surface could not subsist either, as in the imperfect fluids, it is necessary that in this singular condition of the water a perpetual succession of states of equilibrium and instability should occur.

Hence, motion and rest, viz., instability in the parts and return to equilibrium, must, necessarily, be successive. But, again, the horizontality of the surface and the egress through the orifice appear to be sensibly continuous. We must, therefore, conclude that the successive passages from rest to motion and *vice versa*, are, as much as can be so, a sudden operation of nature, instantaneous, very rapid. Therefore, the law and the systems proper to the overflow state of the water in the interior of reservoirs consist in the existence, within the overflow body of water, of a periodically variable condition, or of a particular kind of successive periodical passages from momentaneous rest to momentaneous motion, and from the latter again to rest—so that neither the rest of the system, from which results the sensibly continuous and permanent horizontality of the surface, nor the descensional motion which gives rise to the sensibly continuous and permanent reflux of the molecules towards the orifice—appear as if interrupted to the eye-sight.

Whence, it is evident of what nature is this mixed state, as we have stated, (§ IV), which participates of rest and motion, and is as distinct from either the absolute state of rest or the absolute state of motion as these two states are distinct from one another, and unique of its kind. Q. E. D.

XVII.

Scholium.—There is, therefore, no definite or undetermined size of reservoir, nor any kind of vessel to which the law which we have just defined, is particularly limited. Whatever may be the form of the vessel wherein the liquid has an established, permanent surface, and whatever may be the opening through which it flows out uniformly, the liquid is always in a true state of overflow, and when in this state, neither the size nor form of the vessel, nor of the opening, enter into consideration. This is the characteristic property by which it may be recognized and distinguished from other states.

XVIII.

Prop. V.—The actual velocity of any molecule whatsoever, which traverses the mass of overflowed water, during efflux, is always infinitely small.

For, as there is to be a successive passage from rest to descensional motion, and from the latter to rest, and so on, always alternatively, during the flow, all the small spaces described successively by a molecule will always intervene between two stationary periods, or periods of rest; and, consequently, there cannot be any descending molecule, in the act of falling which did not start from rest in the immediately preceding instant. But there is no determinate force which can impart, in an instant, a definite velocity to any body starting from rest. Wherefore, the actual velocity of any molecule whatever, descending through the mass of overflowed water, will be, of necessity, infinitely small. Q. E. D.

XIX.

Corollary I.—If we suppose, therefore, a liquid which flows out with an infinitely small velocity, as soon as the efflux is permanently established, that sensible equilibrium exists between the parts of the system.

Corollary II.—In this state, therefore, which is that of the overflow, it is also quite evident that the law of sections, reciprocally proportional to the velocities, cannot strictly hold good in the overflowed mass, as it does when the liquids move freely. For to make sure of such a law obtaining within the mass, it would be necessary either to use vessels of a definite form and size, which the nature of this state does not require, or to subordinate the momentary velocities of the molecules which traverse the mass to a law quite different from that which has really been shown to exist—which velocities are alternately extinguished at the renewal of equilibrium, and revived at the cessation of the same—and the alternative action being very persistent and imperceptible. Whence, it follows that the theories of the most illustrious hydrodynamicians on the motions of liquids issuing from orifices in reservoirs, are, perhaps wrongly founded on this law, which is necessarily excluded from the state of the overflow.

XX.

Scholium.—It is very difficult to reconcile a continuous acceleration of motion in the overflowed water contained in reservoirs with the phenomena, and especially with those which show us openly that the velocity of the flow is due to the pressure of the water around the orifice, and never to the actual free fall from the upper limit of the overflow to the place of egress. The momentary stations, owing to which the sensible equilibrium of the parts is renewed at every instant, while they interrupt, at every instant, the downward course, preventing the velocity acquired by the molecules from being retained by them, and removing, at its origin, all acceleration—are, at the same time, those which give rise to an interior sensibly uniform but always elementary velocity being revived at every instant of rest, which constitutes an admirable economy of nature certainly well worthy of being developed and clearly pointed out, if I have succeeded in doing it properly.

XXI.

Scholium.—Hence, so long as the water contained in the vessels is in an overflow state, the system of the mixed state which we have defined, is preserved (§ XVI.) and the velocity of the molecules can never be definite nor receive a determination. In order that this forever elementary velocity, and which, as we have said, always reappears after rest, may receive a determination, the water must pass from the overflow to the free state, which is truly the state wherein the water is not prevented from flowing with the velocity and in the direction of the motion which animates it, whether on account of the natural motion or owing to the forces by which it is solicited to move on.

XXII.

Scholium.—Because it has been demonstrated (§ XVIII) that the celerity $d c$ of any molecule whatever, passing through the mass of overflown water, is always indefinitely small, and that, besides, dynamics have shown to us that the initial velocity of a free point excited by any power whatever g , is proportional to the product $g d t$, of the power g , by the indefinitely small space of time $d t$, during which it remains applied to the same point, if any molecule whatever of overflown liquid solicited by the pressure around the orifice (§ IX, Coroll. III) becomes a free point, and that we call g the force or pressure which excites it, the velocity of this molecule in the instant $d t$, will be expressed by the product $g d t$. Therefore, this velocity which was $d c$, indeterminately in the state of overflow, becomes $g d t$, in the free state, and is determined by the equation $d c = g d t$. Hence, at whatever point of the overflown system this passage of the molecules from the state of overflow to the free state may occur, we will always have the equation:—

$$(A) \quad d c = g d t = 0.$$

XXIII.

Corollary I.—It is therefore demonstrated that equation (A) cannot hold good within the mass of liquids maintained at a uniform height in reservoirs in the actual and effective state of overflow such as they are in, and that it is applicable only to the free state; that is to say, when in overflown liquid masses, the passage from the former to the latter state takes place.

Corollary II.—And, therefore, remaining firm in the resolution to make no mental distinctions nor pliable hypotheses adapted to the laws of computation, but to conclude only what the phenomena or the rigorous reasoning lead us to conclude, we see, from what all that has been presented heretofore, that the motions which are commonly attributed to overflown liquids by hydrodynamicians are inexorably excluded from their midst.

XXIV.

Scholium.—No one perhaps, has come so near as Mr. D'Alembert to recognizing, in the liquids enclosed in vessels, the state of overflow which participates of the two states of motion and rest and which is yet essentially distinct from either. It is sufficient to examine the principles upon which he has based his theory of the motions of fluids to be convinced of this. And truly our equation (A) (§ XXII) which draws legitimately its origin from having taken cognizance of this state, might be used as a fundamental principle for solving all the problems of this illustrious geometrician, if a simple hydrodynamical speculation was my aim. But then a state of motion only would be assumed all through and not the actual state of overflow, which is the object aimed at, wherein this equation can in no way hold good. (§ XXIII).

We see by this, in what condition of things his theory agrees with the facts, viz., by supposing that the fluids are not in a state of overflow, but that they flow without the alternatives of descent or movement and equilibrium, which alternating actions destroy all acceleration and all continuity in the motions.

Scholium.—But for fear that by proceeding further with this enquiry which could easily be done, I might confound the objects, and render obscure the very clear ideas which we have just formed respecting the interior condition of liquids in the state of overflow, I will now explore, guided by the steps which have already been taken, the exterior movement of these liquids after they have passed from the overflow to the free state; and this will form the argument of the next chapter.

In the two remaining chapters (3rd and 4th) of his “Phisico-Mathematical Theory,” Lorgna treats of the motions of liquids after they have emerged, as he says, from the state of overflow existing within reservoirs, through orifices pierced in their sides or bottoms, and of the contraction of the stream in horizontal, vertically descending and vertically ascending jets.

After explaining in what manner the liquid molecules issuing from orifices in reservoirs, wherein the liquids are maintained at a constant height above the centres of those orifices, are solicited by natural gravity and by the coaction of the pressures around the orifices combined, the author manages, by an ingenious train of reasoning, to fix the height due to the actual velocity in an orifice pierced in a thin plate at:

$$2 H \times 2 \left(\frac{\sqrt{5} - 1}{2} \right)^3 = 0.472127 H$$

and arrives at:

$$2 A a \left(\frac{\sqrt{5} - 1}{2} \right)^3 - y \left(x + 2 A \left(\frac{\sqrt{5} - 1}{2} \right)^3 \right) = 0, \text{ or}$$

$$a \left(.472 A \right) - y \left(x + .472 A \right) = 0$$

for the equation of the hyperbolic conoid of the contracted fluid vein—where A represents the permanent height of the fluid above the orifice, a the radius of this orifice, y the radius of a cross-section of the vein taken at any distance x, from the plane of the opening.

Putting $a = x = 1$, in the last equation, it becomes:

$$.472 A - y \left(1 + .472 A \right) = 0, \text{ whence:}$$

$$y = \frac{(.472 A)^2}{(1 + .472 A)^2} = \left\{ \begin{array}{l} \text{radius DE (Fig. 8) of circular cross-section of vein at a} \\ \text{distance of, say, } \frac{1}{2} \text{ diameter of the orifice, from its plane,} \end{array} \right\}$$

which is the formula of the hyperbolic conoid of Newton.

The curve traced out by the extremities of the ordinates (y), calculated by means of this formula is, however, utterly at variance with the profile presented by the naturally contracted liquid vein, the contraction of which is much greater than that of the corresponding computed vein-form, as clearly shown by Venturi in the following table extracted from his “Experimental Enquiries”

Authors of Experiments.	Value of D E (Fig 8) found by actual measurement.	Value of D E (Fig. 8) calculated by the preceding formula.
Poleni (de Castellis, § 35)	0.79	0.97
Michelotti; Sperim. Idraul., Tom. I., Exper. 46; Tom. II., Exper. 4	0.83	0.99
Bossut (Hydrolyn, Art. 437, Exper. 9)	0.818	0.99
Venturi, with 35 inches charge and a horizontal circular orifice, 18 old French lines=1.5985 English inches in diameter.....	0.798	0.984

“It is evident,” says Venturi, “that the contraction of the vein, as found by experiment, is incomparably greater than can be produced by the acceleration of gravity, even in descending streams. But what can we say of horizontal and ascending jets, in which assuredly the action of gravity does not take place, but in which, nevertheless, the contraction is observed nearly in the same manner as in descending currents? The contraction of the stream is therefore very different from the Newtonian hyperboloid.”

Venturi further adds: “Desirous of proving that the vein does not possess the whole velocity arising from the height of the fluid above the centre of the orifice, Lorgna relates the experiments of Kraft,* which are not applicable to the question, because they were made with cylindrical pipes, and we have seen that such pipes always destroy part of the velocity of the fluid; consequently we cannot establish any rule from them which shall apply to orifices through thin plates.† He wishes not to determine the velocity of ascending jets by the height to which they rise, because he is apprehensive that the preceding part of the stream or jet is urged, and supported by the succeeding part nearly to the height of the charge. Nevertheless, if we intercept the jet all at once, the last portions of water fly to the same height as those which preceded them, without having any continued column of the fluid below to follow and support them; these last portions must, consequently, have received, at their passage through the orifice, all the velocity which was necessary to raise them nearly to the surface of the fluid in the reservoir.”

*Acta Petron. vol VIII.

†Torcelli took notice of this difference at page 168 of his works, “*quoties cumque autem aqua per tubum latentem recurrens per angustias transire debuerit, falsa omnia reperies.*”

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APPENDIX No. 26.

TABLES OF DISTANCES, Etc., Etc.

INLAND NAVIGATION OF CANADA; OCEAN ROUTES
THENCE TO FOREIGN COUNTRIES; CANADIAN LAND
ROUTES TO THE SEABOARD; GOVERNMENT
RAILWAYS AND TELEGRAPH LINES, Etc., Etc.

BY

G. F. BAILLAIRGÉ, Deputy Minister Public Works.

APPENDIX No. 26.

PART I.

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- No. 2. Draught of water, St. Lawrence Navigation.
- No. 3. Distances between the principal places from Montreal to Quebec, along the centre line of the ship channel.
- No. 4. St. Lawrence Navigation: Levels of river and lakes above tide water at Albany and Three Rivers, according to different authorities.
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- No. 8. Lake navigation from head of Lake Superior to Three Rivers, length, breadth, depth, area and elevation above the sea at Three Rivers.
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(Ref. to 40,995.)

TABLES OF DISTANCES, ETC.

No. 1.—ST. LAWRENCE NAVIGATION.

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

From	To	Sections of Navigation.	Statute Miles.	
			Intermediate.	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.....	203	643
Father Point.....	Rimouski.....	do	6	649
Rimouski.....	Bic.....	do	12	661
Bic.....	Ile Verte	do	39	700
Ile Verte (opp. Saguenay).....	Quebec.....	do	126	826
Quebec.....	Three Rivers	do to Tide-water	74	900
Three Rivers.....	Montreal	do	86	986
Montreal	Lachine.....	Lachine Canal.....	8½	994½
Lachine.....	Beauharnois.....	Lake St. Louis.....	15½	1,009½
Beauharnois.....	Ste. Cécile.....	Beauharnois Canal.....	17½	1,021
Ste. 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 Croyle's Island	Farran's Point Canal	½	1,071
Upper end Croyle's Island.....	Williamsburg or Morrisburg	River St. Lawrence.....	10½	1,081½
Williamsburg.....	Rapide Plat	Rapide Plat Canal.....	4	1,085½
Rapide Plat.....	Point Iroquois Village.....	River St. Lawrence.....	4½	1,090
Point Iroquois Village.....	Upper end Presqu'île.....	Point Iroquois Canal.....	3	1,093
Presqu'île.....	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 Ste. Claire.....	25	1,636
Foot of St. Mary's Island.....	Sarnia.....	River Ste. Claire.....	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 Ste. Marie 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-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 ascent from tide-water to Lake Superior is now assumed to be not less than 602½ feet, above tide-water at Three Rivers, and 601.78 above tide-water at New York, according to the most recent information obtained up to 7th April, 1883.

For details respecting the various sections of rivers and canal navigation, viz.:—the intermediate and total distances; the intermediate and total rise above tide-water; the dimensions and depth of each canal, and of each lock, &c., on the St. Lawrence route of navigation and its tributaries, &c., see tabulated profiles Nos. 4, 5, 13, 14, 15, 29 of Appendix No. 30 of General Report on Public Works, 1867 to 1882.

For dates of opening and closing of Navigation, see Appendix No. 18. G.F.B.

No. 2.—Draught of Water—St. Lawrence Navigation.

Sections of Navigation.	Minimum depth available in 1884.	Depth when work now in progress is completed. — See Remarks at No. 7.
Dredged Channel—Quebec to Montreal—in progress.....	25	27½
Lachine Canal—Enlargement completed.....	12	12
Beauharnois Canal—To be enlarged or another canal to be constructed on north shore opposite	9	12
Cornwall Canal—Enlargement commenced in 1876	9	12
Williamsburg Canals—Enlargement commenced in 1884	9	12
Murray Canal—Now being constructed; not on main line of navigation.	10	10
Burlington Bay Canal—Not on main line of navigation.....	10	10
Welland Canal—Enlargement completed	12	12
Sault Ste. Marie Canal—State of Michigan—Enlargement completed.....	16·8	16·8

No. 3.—DISTANCES OF PLACES BETWEEN MONTREAL AND QUEBEC.

Measured in English Statute Miles along the centre line of the Ship Channel.

From.	To.	Statute Miles.	
		Intermediate	Total.
Montreal, Island Wharf, opp. Custom House	Longue Pointe	6½	6½
Longue Pointe	Pointe aux Trembles, <i>en haut</i>	4	10½
Pointe aux Trembles, <i>en haut</i>	Varenes.....	3½	13½
Varenes	Cap St. Michel.....	2½	15½
Cap St. Michel.....	Verchères	5½	21½
Verchères.....	Plum Island Light.....	1½	22½
Plum Island Light.....	Contrecoeur Channel, upper entrance	6½	28½
Contrecoeur Channel, upper entrance.....	Lavaltrie.....	14	30½
Lavaltrie	Contrecoeur Channel, lower entrance.....	4½	35
Contrecoeur Channel, lower entrance.....	Lanoraie	1½	36½
Lanoraie	Sorel, opposite Lighthouse	8½	45
Sorel, opposite Lighthouse	Ile de Grace Light	3½	48½
Ile de Grace Light.....	Stone Island Light.....	3½	52½
Stone Island Light	Light-ship No. 1	5½	57½
Light ship No. 1	do 2	2½	60½
do 2	White Buoy	4½	64½
White Buoy	Light-ship No. 8.....	6½	71½
Light-ship No. 3	Port St. Francis	4½	75½
Port St. Francis.....	Three Rivers.....	6½	82
Three Rivers	Becancour, Iron Buoy at Bend.....	5½	87½
Becancour, Iron Buoy at Bend.....	Champlain	6	93½
Champlain	Batiscan Wharf.....	7½	101½
Batiscan Wharf.....	Cap Lavraut.....	4	105½
Cap Lavraut.....	Cap à la Roche, centre of new channel....	3½	109½
Cap à la Roche, centre of new channel.....	Cap Charles.....	2½	111
Cap Charles.....	Richelieu Rapids	9	120
Richelieu Rapids	Platon Wharf	4½	124½
Platon Wharf.....	Ste. Croix	5½	130½
Ste. Croix	Ecureuils	1½	132
Ecureuils	Pointe aux Trembles, <i>en bas</i>	7	139
Pointe aux Trembles, <i>en bas</i>	Cap Rouge	12	151
Cap Rouge.....	Quebec, Custom House Wharf.....	9½	160½

No. 4.—ST. LAWRENCE NAVIGATION.

LEVELS of River and Lakes above Tide Water at Albany and Three Rivers, according to the following authorities:—

Sections of Navigation.	Above Tide Water at Albany.	Above Tide Water at Three Rivers.						
	U.S. Engineers, 1816, 1876, 1882, 1883.	Admiralty Charts, 1817, 1818, 1822, 1823.	Rubidge, 1846.	Ottawa Ship Canal Survey — Shanley, 1858.	Ottawa Ship Canal Survey — Clarke, 1859.	Department of Public Works Report, 1867.	Canal Commission Report, 1871.	Department of Public Works Report, 1882.
Albany, River Hudson....	0·00							
Three Rivers, River St. Lawrence		0·00	0·00	0·00	0·00	0·00	0·00	0·00
Montreal, River St. Lawrence			12·75	13·00	12·75	13·25	11·00	11·75
Kingston, Lake Ontario....		1817.						
Oswego do	245·15	232·20	234·00			231·00	234·00	240·00
Lake Erie, Survey of 1816.	564·85							
do do 1878.	571·68							
do Report of 1882..	568·67							
do Canadian authorities		1818.						
Lake Ste. Claire		564·00	564·00			564·00	564·00	566·75
Lake Huron		1822.						
Georgian Bay, Lake Huron		590·00	594·00			578·00	574·00	578·75
Lake Michigan		594·00	594·00	572·00	574·00	578·00	578·00	576·75
						580·00	578·00	578·75
Lake Superior, Sault Ste. Marie	Mean Elevation above tide water at New York.	1823.						
	601·78	627·00				600·00	600·00	602·75

REMARKS.

(a.) The tide water at Albany signifies the mean low water, which is about one foot above extreme low water.—See telegram from Major D. L. Malloy, Deputy State Engineer and Surveyor, State of New York, No. 32,607, of 12th March, 1883.

MEAN RISE AND FALL OF TIDE AT ALBANY AND NEW YORK.

(b.) According to a telegram received 23rd April, 1883, from John G. Parke, Acting Chief of Engineers at Washington, U. S., the mean rise and fall of the tide at Governor's Island, Harbour of New York, is 4·40 feet, and at Albany it is 2·32 feet. See No. 33,865.

DECLIVITY OF THE RIVER HUDSON FROM ALBANY TO NEW YORK.

(c.) According to a letter dated Washington, U. S., 1st May, 1883, from Richard D. Cutts, Assistant in charge of United States Coast and Geodetic Survey Office, the difference of level during low water, between Governor's Island, Harbour of New York, and Albany, or the total declivity between the two places, is 4·27 feet. See No. 34,047. See remarks *d, e, f*, next page.

No. 5.—THREE RIVERS TO MONTREAL.

ELEVATION above lowest tide water observed at Three Rivers, as established by levels taken during the construction of the North Shore Railway, 1876 to 1879, and in February, 1883.

Designation.	Datum— North Shore Railway, Montreal and Quebec.	Rise.	
		Inter- mediate.	Above low water Three Rivers
Lowest water observed at Three Rivers by R. Steckel, up to 19th September, 1881	39·55	0·00	0·00
Top of S.E. corner of Richelieu Co.'s wharf at Three Rivers.....	50·55	17·00	17·00
Bench mark, top of railway bridge, River St. Maurice, 2 miles up stream	90·00	33·45	50·45
Bench mark, top of railway bridge, at Terrebonne.....	81·17	8·83	41·62
Top of coping, old entrance Lock No. 1, of Lachine Canal, Montreal, distance from railway bridge, Terrebonne, about 19 miles.....	67·19	13·98	27·64
Lowest water recorded at Montreal since September, 1882: on 8th-9th November, 1879, and 6th October, 1881, at foot of Lachine Canal, old Lock No. 1.	51·28	15·91	11·73
Top of lower mitre sill of old Lock No. 1, at foot of Lachine Canal, Montreal	35·86	15·42	—3·69
Low water level adopted by Harbour Commissioners at present: Depth on mitre sill, 16; previous lower-water level, Harbour Commissioners: on mitre sill, 17; summer water datum of the Montreal Water Works: on mitre sill, 19.			
Top of coping, old Lock No. 1, above lower mitre sill.....	67·19	31·33	27·64
Flood level of highest water above Victoria Bridge, April, 1853.	79·61	43·75	40·06
Summer water of Flats of Lake St. Peter, 10·50 feet: corresponds to a depth of 17 feet on the lower mitre sill of Lock No. 1, Montreal.			

REMARKS.—Continued.

See preceding table No. 4, St. Lawrence Navigation.

(d.) The tide water at Three Rivers is the lowest water recorded up to 19th September, 1881. It is 17 feet below the bench mark on the south-east corner of the wharf of the Richelieu and Ontario Company at Three Rivers.—See memoranda, dated 21st February, 1883, No. 33,687.

(e.) The elevation of low water surface, 11·73, say 11·75 feet, at Montreal, above tide water at Three Rivers, represents a depth of 15·40 feet of water on top of the mitre sill of old Lock, No. 1, at foot of Lachine Canal.

(f.) The mean elevation of Lake Superior above the sea refers to the level of mean tide at New York.—See telegram from Major Farquhar, Engineer, dated Detroit, 7th April, 1883, No. 33,368.

G. F. B.

No. 6.—HARBOURS OF THREE RIVERS AND MONTREAL.

HIGH and low water levels referred to tide water at Three Rivers and to top of lower mitre sill old Lock No. 1, at foot of Lachine Canal, Montreal.

Designation.	Datum— Montreal Harbour Engineers.	Datum— North Shore Railway Engineers.	Above top of lower mitre sill of old Lock No. 1, Lachine Canal, Montreal.	Elevation above tide water Three Rivers
Lowest water observed at Three Rivers, 19th September, 1881.....	84·69	39·55	(—)3·69	0·00
Top of lower mitre sill, old Lock No. 1, at lower entrance of Lachine Canal.....	81·00	35·86	0·00	(—)3·69
Lowest water observed at Montreal from September, 1852, to 8th-9th November, 1879, and to 6th October, 1881.....	96·42	51·28	15·42	+11·73
Low water, Montreal Harbour, as lately adopted by Harbour Commissioners.....	97·50	52·36	16·50	+12·81
Low water, Montreal Harbour, as previously adopted.....	98·00	52·86	17·00	+13·31
Summer water datum of Montreal Water Works—T. C. Keefer.....	100·00	54·86	19·00	+15·31
Level of coping of old Lock No. 1.....	112·33	67·19	31·33	+27·64
Flood level of highest water above Victoria Bridge, April, 1858.....	124·75	79·61	43·75	+40·06
Ordnance bench mark on ramp of revetment wall in front of the Bonsecoure Market—				
Per Engineers of Shsarer scheme.....	119·63	74·49	38·63	+34·94
Per John Sutcliffe, C.E.....	119·61	74·47	38·61	+34·92
Per Montreal Harbour Engineers.....	119·57	74·43	38·57	+34·88

No. 7.—ST. LAWRENCE NAVIGATION.

REMARKS respecting dredged channel between Quebec and Montreal, and the draught of water through the Canals on the main line of the St. Lawrence Navigation.

DREDGED CHANNEL BETWEEN QUEBEC AND MONTREAL.

The deepening of the ship-channel between Montreal and Quebec to 25 feet at low water, was completed in 1882. By the Act 46 Vic., chap. 38, assented to on 25th May, 1883, authority was given to raise the sum of \$900,000 to continue the dredging to a depth of 27½ feet. Dredging was commenced by the Montreal Harbour Commissioners on 18th June, 1883, and has been vigorously carried on up to the present time, except for the necessary interruption during winter. A description of the work will be found in Appendix No. 10, pages 133-38. The width of the dredged portions of the channel varies from 350 to 450 feet.

CANALS—RIVER ST. LAWRENCE ROUTE.

When the enlargement of the canals was decided upon in 1871, the scale of navigation on the St. Lawrence route, was throughout fixed at an available depth of twelve feet of water. This was authorized to be carried out in 1873.

In 1875, strong representations were made of the desirability of deepening the various channels for the passage of vessels drawing fourteen feet of water.

This was assented to by the Government, and orders were accordingly given to place the foundations of all permanent structures, on those parts of the works not then under contract, at a depth corresponding to 14 feet of water on the mitre sills of the locks.

The orders thus given applied to all the principal works on the main line of navigation between Lake Erie and the City of Montreal.

The locks on the enlarged canals throughout, are to be 270 feet long between the gates, 45 feet in width, and when completed, are to have a depth of 14 feet of water on the sills.

This will enable vessels of almost any ordinary build to pass, carrying fully one thousand tons burden; but as the tendency seems to be towards increasing the breadth of beam and sectional area of freight vessels, it is probable that the canals will ere long be navigated by a class of vessels capable of carrying fully 1,500 tons.

For preceding and further details, see pages 4 and 5, Report of John Page, Chief Engineer of Canals, dated 16th February, 1880, published the same year.

SAULT STE. MARIE CANAL.

According to a telegram, No. 33,238, dated 5th April, 1883, from Major Farquhar, Engineer in charge of this work, the maximum lift of the new lock of the enlarged canal is 18.6 feet, and the minimum lift 16.8 feet.

G. F. BAILLAIRGÉ,

D.M.P.W.

OTTAWA, 29th November, 1884.

No. 8.—LAKE NAVIGATION.

LAKE SUPERIOR TO TIDE-WATER.

Names of Lakes, and of Rivers connecting the same.	STATUTE MILES.			DEPTH IN FEET.		Area in Square Miles.	Elevation above sea, at Three Rivers.
	Greatest length.	Greatest breadth.	Average breadth.	Greatest.	Mean.		
Superior	390	160	80	.....	900	32,000	602½
St. Mary's River.....	35	4	1	60	30	.....	58½
Michigan	345	84	58	.....	1,000	22,400	578½
Green Bay	109	25	18	.....	500	2,000	578½
Mackinaw Straits.....	50 Not added below.	20	10	200	40	.....	578½
Georgian Bay.....	130	55	40	.....	500	.....	576½
Huron	270	105	70	900	450	23,000	576½
Ste. Claire River.....	33	.....	.....	50	35	.....	.....
Ste. Claire Lake.....	25	25	20	27	15	360	570½
River Detroit.....	25	3	1	37	20	.....	.....
Lake Erie	250	60	38	204	90	10,000	566½
Niagara River.....	35	3	1	.....	30	.....	.....
Lake Ontario.....	190	52	40	600	412	6,700	240
Lake St. Francis.....	38	5	4	80	36	132	142
Lake St. Louis.....	15	7	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...	2,112	Inclusive of River portions.....		.....		96,867	.....
do do do	1,778	Exclusive of River portions.....		.....		.....	.....

No. 9.—ST. CLAIR FLATS SHIP CANAL, MICHIGAN, U. S.

EXTRACT from the Annual Report of the Chief Engineer, U.S.A., to the Secretary of War, U.S., dated Washington, D.C., October, 1882.

“This canal was projected in 1866, the object being to afford a straight channel 300 feet wide in the clear, and 13 feet deep, and modified in 1874 so as to make the canal 200 feet wide, with a depth of 16 feet, and the amount expended to June 30, 1881, \$591,544.09, has resulted in securing a channel of this width and depth.” (See Appendix 118 of the Report.)

No. 10.—ST. MARY'S FALLS SHIP CANAL.

This canal, which overcomes the rapids in the St. Mary River, connecting the waters of Lakes Huron and Superior, is situated in the State of Michigan, and was first projected in 1837. The canal was not, however, commenced until 4th June, 1853, and the first boat passed through the old canal on 18th June, 1855. Cost of old canal to 14th May, 1855, \$999,802.46 In 1870, the enlargement of the canal was commenced and it was opened to navigation on 1st September, 1881, but not completed until 1882, up to which time the cost of the enlargement had been \$2,405,000. The upper reach of the enlarged canal is 5,500 feet long; least width 103 feet: width at upper entrance 500 feet. The new lock of the enlarged canal is 515 feet long, 80 feet wide in chamber, 60 feet wide between gates, with 16 feet depth of water on sills during mean low water; total lift varies from 16½ to 18 feet. The two old locks at the foot of the canal are each 350 feet long, 70 feet wide at top, 61 feet wide at bottom of chamber, 70 feet wide between gates, with 12 feet depth of water on sills.

Years.	Gross Receipts.	Tonnage.	No. of Sail Vessels.	No. of Steamers.	No. of Passages.	Opened.	Closed.
1855	\$ 4,374 66	106,296				June 18.....	Nov. 23.
1856	7,575 78	101,458				May 4.....	do 28.
1857	9,406 74	180,820				do 9.....	do 30.
1858	10,848 80	219,819				April 18.....	do 20.
1859	16,941 84	352,642				May 3.....	do 28.
1860	24,777 82	403,657				do 11.....	do 26.
1861	16,672 16	276,639				do 3.....	do 14.
1862	21,607 17	359,612				April 27.....	do 27.
1863	30,574 44	507,434				do 28.....	do 24.
1864	34,297 31	571,438	1,045	366	1,411	May 2.....	Dec. 4.
1865	22,339 64	409,063	602	395	997	do 1.....	do 3.
1866	23,069 54	458,530	555	453	1,008	do 5.....	do 3.
1867	33,515 54	556,898	839	466	1,305	do 4.....	do 3.
1868	25,977 14	432,563	817	338	1,155	do 2.....	do 3.
1869	31,579 96	524,884	939	399	1,388	do 4.....	Nov. 29.
1870	41,898 43	680,825	1,397	431	1,828	April 29.....	Dec. 1.
1871	33,865 45	752,100	1,064	573	1,637	May 8.....	Nov. 29.
1872	41,232 44	914,735	1,212	792	2,004	do 11.....	do 26.
1873	44,943 16	1,204,445	1,549	968	2,517	do 5.....	do 18.
1874	38,922 97	1,070,857	833	901	1,784	do 12.....	Dec. 2.
1875	41,199 04	1,259,533	569	1,464	2,033	do 12.....	do 2.
1876	46,867 30	1,541,676	684	1,733	2,417	do 8.....	Nov. 26.
1877	44,351 43	1,439,215	1,401	1,050	2,451	do 2.....	do 30.
1878	49,437 00	1,667,136	1,091	1,476	2,567	April 8.....	Dec. 3.
1879	41,385 63	1,677,071	1,403	1,618	3,121	May 2.....	do 3.
1880	44,552 78	1,734,890	1,718	1,735	3,503	April 28.....	Nov. 15.
1881	Collection of tolls discon- tinued, June 9, 1881.	2,092,757	1,706	2,117	4,004	May 7.....	Dec. 5.
1882		2,468,088	1,663	2,739	4,774	April 21.....	do 3.
1883		2,042,259	1,458	2,620	4,315	May 2.....	do 11.

Until the 9th June, 1881, the canal was owned and operated by the State of Michigan, the tolls collected being applied to defray the operating expenses. At 9 a.m. on that day, the ownership and control were transferred to the United States, and thereafter the canal was free.

The tonnages given in the table are to be understood as "registered tonnage." The "freight" tonnages differ considerably from this column, but it is only since the canal passed under control of the United States that a distinction between the two has been made in the canal records.

In addition to those enumerated under the heads "Sail Vessels" and "Steamers," the column "No. of Passengers" includes all passages of the canal by rafts and other unregistered craft.

In 1879 the number was.....	100
1880 do	50
1881 do	181
1882 do	312
1883 do	237

A change in the laws prescribing the manner of computing the tonnage for register went into effect in 1883, the result being to reduce the amount of registered tonnage below that of 1882, while, as a matter of fact, the actual tonnage ("freight" tonnage) passing the canal in 1833 exceeded that of 1882 by 237,584 tons, thus:—

1882 Registered tonnage, 2,468,088.	Freight tonnage, 2,029,520
1883 do 2,042,259.	do 2,267,105

See No. 53,864, from Brig.-Genl. Poe, U.S.A.

No. 11.—TABLE showing the smallest locks on the several lines of navigation; also the dimensions of the largest vessels which may pass through them.

Name of Canal.	Dimensions of Lock in Feet.			Dimensions of Vessels in Feet.			Tonnage of Vessels.
	Length.	Breadth.	Depth of water on Sills.	Length.	Breadth.	Draught of water when Loaded.	
Lachine.....	270	45	12	250	44	12	1,000
Beauharnois.....	200	45	9	180	44	9	700
Cornwall.....	200	55	9	180	54	9	750
Williamsburg.....	200	45	9	180	44	9	700
Welland.....	270	45	12	250	44	12	1,000
St. Ours Lock.....	200	45	7	180	44	7	800
Chambly.....	118	23½	7	110	23	6½	230
Rideau.....	134	23	5	120	31½	4½	250
St. Anne's.....	200	45	9	180	44	9	700
Carillon.....	200	45	9	180	44	9	700
Grenville.....	200	45	9	180	44	9	700
Culbute.....	200	45	6	180	44	6	550
St. Peter's.....	200	49½	18	199	49	17½	1,000
River Trent.....	131	32½	4½				
<i>United States Canals.</i>							
Erie.....	110	18	7	102	17½	6½	220
Champlain.....	100	18	5	92	17½	4½	80
Sault Ste. Marie (new).....	515	80	18	490	58	16	To pass several vessels.
do (old).....	350	70	12	320	67	12	2,000

For details respecting the various canals, see tabulated profiles, Nos. 4, 5, 12, 13, 14, 15 and 29, of Appendix No. 30, in General Report on Public Works, 1867 to 1882.

No. 12.—LAKE ST. JOHN.

The lake is about 100 statute miles on an air line from Quebec; $41\frac{1}{2}$ statute miles, by the shortest road, from Chicoutimi, and 110.97 statute miles from Tadoussac, *via* the Petite Décharge and the River Saguenay.

Greatest length, from Belle-Rivière, near foot of lake and at its south-east end, up to outlet of River Mistassini at the north-west end, or towards head of lake.....	27 $\frac{3}{4}$ statute miles.
Greatest width across the lake from outlet of the River Péribonca to the outlet of the River Ouïatchouan, or from north to south along the Meridian.....	20 statute miles.
Width on Meridian across centre of lake.....	17 $\frac{1}{2}$ statute miles.
Contour of lake, per map of 1880, by Commissioner of Crown Lands, Quebec.....	85 statute miles.
Area of lake, per E. E. Taché, Deputy Commissioner of Crown Lands, Quebec.....	365 40 miles.
Elevation of lake above the sea, according to report of A. L. Light, Chief Engineer, Government Railways, Quebec, dated 8th March, 1881.....	278 feet.
Elevation of lake above the sea, per map of 1880.....	300 feet.
Elevation of lake above the sea, per Richardson, at mouth of Ashuapmouchouan, in June, 1870.....	293 feet.
Depth of lake is said to vary generally from 3 feet at one mile from shore, to 12 and 54 feet at $1\frac{1}{2}$ to 3 miles from shore, and to 60 feet towards the middle of the lake.....	3 to 60 feet.

See Note S, Part III., Appendix No. 8, of General Report on Public Works, 1867 to 1882.

Bouchette, in his Topographical Dictionary, represents the depth of the lake as being 240 feet at centre.

In 1884, Mr. Joseph Rosa, the Engineer in charge of the Saguenay District Works, having been instructed to ascertain the depth of the lake towards its centre, states, in a letter addressed to the Deputy Minister of Public Works, under date 18th June, 1884, that the greatest depth he found is 225 feet; and that the mean depth is from 72 to 90 feet in the deepest part of the lake.

In spring the waters of the lake rise from 15 to 34 feet above its winter level, in the course of fifteen days.

In autumn, they rise 3 to 4 feet, suddenly, during high winds, but only for periods of short duration.

The spring floods retard the cultivation of considerable tracts of land around the lake, and have been the subject of great complaint.

In a letter, No. 10,666, of 29th December, 1880, from his Lordship D. Racine, Bishop of Chicoutimi, to Sir Hector L. Langevin, Minister of Public Works, it is stated that the outflow from the lake is much diminished by the Government slide and dams at the head of the Petite Décharge, wherefore he requests the Government to improve the other outlet called the Grande Décharge.

This request was assented to, and the improvement is being proceeded with.

Hydrographic Survey.

A hydrographic survey of Lake St. John was commenced by order of the Minister of Public Works, toward the beginning of July, 1883, in connection with its proposed

improvement for purposes of navigation. It was discontinued before winter, owing to the want of funds.

Winds.

The north-westerly and south-westerly winds are those to which the lake is most exposed.

Ice.

Ice begins to form in November, and the lake is afterwards frozen over so that it can be travelled upon with safety, with heavy loads, after the 10th of December.

Ice begins to disappear along the borders of the lake towards the middle of April.

The whole of the lake is free from ice towards the 12th of May.

Bed of Lake.

The bed of the lake, according to Sir William Logan and Mr. Richardson, one of his assistants, consists of limestone, which crops out on the western shore.

A full description of the geological features of the Lake St. John region will be found in the Report of the Geological Survey of Canada, from its commencement to 1863, the year of its publication. See extracts in Note H, Part III., Appendix No. 8, of General Report on Public Works, 1867, to 1882.

For further details respecting climate, soil, forests, settlement, &c., Lake St. John and Saguenay regions, see Appendix No. 8. General Report on Public Works, 1867 and 1882.

G. F. B.

No. 13.—RIVER ROUTE.

From Tadoussac, at the mouth of the River Saguenay, to the upper end of Lake St. John, as measured on the Admiralty Chart corrected up to 1871, and on the Map published by the Department of Crown Lands in Quebec in 1880.

Names of Places.	DISTANCE IN MILES.		Width of River Saguenay in Miles.	On which side of River Saguenay.	Depths at centre of River Saguenay during Low Tide.	Anchorage.	Remarks.
	Per Chart.						
	Nautical.	Statute.					
Tadoussac.....	0.00	0.00	0.75	On N.E. shore...	Fathoms. 104	Anchorage.....	Hills in rear 400 feet high.
Anse à l'Eau	0.50	0.58	0.80	do	88	do	Hills in rear 1,080 feet high.
Anse à la Barque	1.00	1.10	1.00	do	100	do	
St. Etienne Bay and River.....	10.50	9.00	1.15	On S.W. shore...	50	do	
St. Marguerite River	13.00	14.95	1.00	On N. shore.....	72	do	
Isles St. Louis (lower end)	17.00	14.90	1.30	1/2 m. from S. shore	39	do	
Isle St. Barthélemi.....	18.00	16.50	1.20	Near N. shore....	90	do	
River Petit Saguenay.....	18.50	21.28	1.30	On S. shore.....	90	do	
Anse St. Jean and River.....	24.00	21.80	2.50	do	118	do	
Cape Eternity Cove.....	28.00	32.20	2.00	On S.W. shore....	.....	.....
Cape Eternity	30.00	32.78	0.90	On S. shore.....	146	.....	Hills in rear of sienitic granite, 1,500 feet high.
Trinity Point.....	32.00	36.80	1.70	On N. shore.....	145	.....
Tableau	35.00	40.25	1.30	On S. shore.....	142	.....
Descente des Femmes	42.00	46.23	1.90	On N. shore.....	118	Anchorage.....	Hills of sienitic granite and gneiss.
Cap à l'Est.....	47.50	51.75	1.80	do	118	.....
Midway between.....	47.00	46.00	52.90	do	.....	.....
Cap à l'Ouest or	46.60	53.59	1.80	do	80	do	Opposite Cap à l'Ouest
Foot of Baie des Ha! Ha!	55.00	52.40	1.20	In channel	80	do	
Head of Baie des Ha! Ha!	53.00	60.26	2.50	On W. shore.....	5 near shore	do	
Petits Ilets.....	57.00	50.00	1.84	On N. shore	60	do	
Pointe aux Roches.....	57.00	63.25	1.50	do	3 1/2	do	
Chicoutimi	65.00	61.93	0.45	On S. shore.....	2	do	From Chicoutimi up to Terres Rompues the breadth of the river varies from 4 tenths to 3, 2 and 5, tenths of a statute mile in width.
River Chicoutimi.....	62.80	72.22	0.40	do	.....	do	From Terres Rompues up to Lake St. John the river is interrupted by numerous rapids.
River des Vases, Terres Rompues.....	67.15	77.22	0.20 to 0.50	do	.....	do	
River Shipshaw.....	68.02	78.22	0.58	On N. shore.....	2 to 1	Tide ends.....	
River aux Sabies.....	69.76	80.22	.....	do	No soundings....	.....
Grand Remous or Township line of Kinngami or River des Aulnates	73.02	83.97	0.50	On S. shore.....	do	.....
				On N. shore	do	.....

River Duclos.....	76-50	87-97	.....	do	.....	do	.....	In a westerly direction, at E. end of Lake St. John.
River Gervais.....	82-58	94-97	.....	do	.....	do	.....	In a N.W. direction, at E end of Lake St. John.
Junction of Grande and Petite Décharges.....	86-28	99-22	.....	Between N. & S	.....	do	.....	On a direct line across Lake to its western or upper end.
Mouth of Petite Décharge, at foot of Lake St. John.....	96-50	110-97	0-50	N.E. end of Lake	.....	do	.....
Mouth of Grande Décharge, at foot of Lake St. John.....	97-58	112-22	1-00	do	.....	do	.....
River Mistassini, <i>via</i> Grande Décharge.....	119-32	137-22	0-65	N.W. end of Lake	.....	do	.....
River Mistassini, <i>via</i> Petite Décharge.....	118-02	135-72	.....	do	.....	do	.....
River Peribonca, <i>via</i> do do	113-45	130-47	0-87	Most northerly shore of Lake.	.....	do	.....
River Chomouchouan do do	118-23	135-97	0-44	S.W. end of Lake	.....	do	.....
River Ouistachouan do do	113-03	129-97	.....	On S. shore	do	do	.....
River Métachouan do do	107-80	123-97	.....	do	do	do	.....

NOTE.—The distances measured on the Admiralty Chart are correct. The distances given by the sailing directions in the St. Lawrence Pilot, published in 1880, from St. Etienne Bay to Chicoutimi, appear to include 1½ mile from Tadoussac down to the mouth of the Saguenay.—G.F.B.

No. 14.—STATEMENT showing number of Trips, Tonnage and Crew of Steamers which have called at Chicoutimi, and at other places on the Saguenay, from 1840 to 1882, inclusively.

Year.	Number of Trips.	Tonnage.	Crew.	Steamers.
1840.....	2	524	40	Unicorn.
1841.....	1	262	20	do
1842.....	1	250	20	North America.
1843.....	5	1,830	120	do and Alliance.
1844.....	4	1,165	90	Alliance.
1845.....	5	861	95	Pocahontas.
1846.....	6	1,128	112	Lady Colborne.
1847.....				
1848.....	3	1,620	60	Alliance.
1849.....	9	1,035	135	Rowland Hill.
1850.....	9	1,035	135	do
1851.....	9	1,035	135	do
1852.....	9	1,035	135	do
1853.....	15	2,145	225	Saguenay.
1854.....	15	2,145	225	do
1855.....	15	2,145	225	do
1856.....	15	2,145	225	do
1857.....	15	2,145	225	do
1858.....	15	2,145	225	do
1859.....	15	2,145	225	do
1860.....	15	2,145	225	do
1861.....	19	5,320	570	Magnet.
1862.....	19	5,320	570	do
1863.....	19	5,320	570	do
1864.....	21	5,880	630	do
1865.....	21	5,880	630	do
1866.....	31	8,505	930	do and Champlain.
1867.....	54	27,706	2,085	do and Union.
1868.....	42	19,880	1,560	do do
1869.....	77	36,593	2,255	do do
1870.....	84	39,528	2,395	Advance, St. George, Clyde, Magnet, Union and Clyde.
1871.....	89	41,568	2,585	do do
1872.....	80	30,155	1,630	Union and Clyde.
1873.....	{ 14	6,100	280	} St. George, Clyde, Union, Saguenay.
	91	77,208	2,730	
1874.....	81	71,148	2,400	Saguenay, Union, St. Lawrence.
1875.....	88	76,666	2,640	do do
1876.....	90	81,115	2,700	do do
1877.....	96	82,356	2,880	do do
1878.....	106	92,861	3,180	do do
1879.....	78	72,929	2,340	do and St. Lawrence.
1880.....	77	73,985	3,250	do do
1881.....	100	69,698	3,500	do Union, St. Lawrence and Chicoutimi.
1882.....	67	66,959	2,880	do and St. Lawrence.
1883.....	78	70,256	3,120	do and Union.
1884.....	85	76,095	3,400	do do

*In 1847 steamers were engaged conveying immigrants from Grosse Isle to Montreal.

See No. 54,494, dated 9th December, 1884, from A. Gaboury, Secretary of the St. Lawrence Steam Navigation Company, Quebec.

No. 15.—STATEMENT of Sca-going Vessels which have loaded at and left the Ports of the Counties of Chicoutimi and Saguenay, from 1840 to 1883, inclusively, showing Number of Vessels, their Tonnage and Crew, for each year and each Port.

Year.	Chicoutimi.			Tadoussac.			Les Ecoumains.			Sault au Cochon.		
	No. of Ves-sels.	Tons Register.	Crew.	No. of Ves-sels.	Tons Register.	Crew.	No. of Ves-sels.	Tons Register.	Crew.	No. of Ves-sels.	Tons Register.	Crew.
1840												
1841												
1842												
1843												
1844												
1845												
1846												
1847												
1848												
1849												
1850												
1851												
1852	45	19,908	617									
1853	23	10,478	329									
1854	23	13,738	358									
1855	9	5,771	160									
1856	16	12,235	285									
1857	21	13,490	324									
1858	13	8,749	232									
1859	28	14,534	406									
1860	31	15,853	475									
1861	31	21,999	541									
1862	13	10,758	263									
1863	21	12,244	310									
1864	19	12,395	310									
1865	18	14,767	385									
1866	28	19,812	533									
1867	13	7,892	174									
1868	17	12,301	304									
1869	25	17,215	383	18	11,275	254	9	8,215	246			
1870	15	11,355	243	6	4,926	101						
1871	15	11,714	242	4	2,057	56						
1872	34	22,077	494	1	531	12						
1873	31	19,826	458	3	1,715	38						
1874	44	25,270	620	7	3,170	79	6	3,127	76	1	498	14
1875	34	17,266	442	5	2,021	57	1	654	14	6	3,275	77
1876	28	15,682	379	3	776	29	5	1,214	61	3	1,454	35
1877	27	18,093	398	5	3,215	73	1	271	91	8	4,441	101
1878	34	23,375	505	7	2,735	77	5	1,752	59	8	3,745	102
1879	34	18,160	420	6	2,583	67				5	2,631	73
1880	42	23,907	543	4	1,855	48	7	2,578	80	10	4,494	117
1881	34	19,584	431	8	4,104	96	8	3,971	104	7	3,777	85
1882	29	17,614	372	2	1,149	26	7	3,424	92	5	2,994	62
1883	36	20,831	452	4	2,306	52	4	1,729	46	10	4,512	115
1884	33	17,058	384	3	2,007	43	11	5,256	135	7	3,298	81

See No. 54,634, dated 12th December, 1884, from Hon. J. G. Blanchet, Collector of Customs, Quebec. For further details see Appendix No. 8, General Report Public Works, 1867-1882.

No. 16.—RIVER ST. LAWRENCE AND DAWSON ROUTE.

No. 5.—From Straits of Belle-Ile to Port Arthur (Prince Arthur's Landing), on north shore of Lake Superior, and to Winnipeg.

From	To	Sections of Route.	Statute miles.	
			Inter-mediate.	Total to Straits of Belle-Ile.
Straits of Belle-Ile.....	Quebec.....	Gulf and River St. Lawrence.	826	826
Quebec.....	Foot of Sault Ste. Marie ...	River and Lakes of the St. Lawrence.....	1,160	1,986
Foot of Sault Ste. Marie.	Head of Sault Ste. Marie...	Sault Ste. Marie Canal.....	1	1,987
Head of Sault Ste. Marie.	Pointe aux Pins.....	River St. Mary.....	7	1,994
Pointe aux Pins.....	Port Arthur.....	Lake Superior.....	270	2,264
Port Arthur.....	Lake Shebandowan.....	Dawson Route, by land.....	45	2,309
Lake Shebandowan.....	Foot of Rainy River.....	Dawson Route, by chain of lakes and portages.....	192	2,501
Foot of Rainy River.....	Head of Rainy River.....	Dawson Route, by Fort Frances Canal.....	$\frac{1}{2}$	2,501 $\frac{1}{2}$
Head of Rainy River.....	North-West Angle of Lake of the Woods.....	Dawson Route, by Rainy River and Lake of the Woods.....	119 $\frac{1}{2}$	2,621
North-West Angle of Lake of the Woods.....	Fort Garry, Winnipeg.....	Dawson Route, by land.....	95	2,716

The steamboat voyage from Collingwood to Port Arthur is..... 530 Statute miles.

Length of Dawson Route, chain of lakes and portages, from Port Arthur to

Fort Garry, Winnipeg..... 452 do

Canadian Pacific Railway, from Port Arthur to Winnipeg..... 429 do

For details respecting route between Lake Superior and the Red River at Fort Garry (Winnipeg), see Reports of S. J. Dawson, C.E., dated 20th April, 1868, and 1st May, 1869, printed by order of the House of Commons of Canada, in 1868 and 1869. G. F. B.

No. 17.—TABLE of approximate distances between various points from Mouth of Red River, at Head of Lake Winnipeg, down to Grand Rapid, at mouth of the North or Main Saskatchewan, towards foot of Lake, and thence along the Saskatchewan up to Fort Edmonton, as per maps published in 1878, 1880. &c.

Name of Localities.	Inter- mediate distances.	Total distances from Mouth of Red River.
<i>Lake Winnipeg.</i>		
1. Mouth of Red River to Mouth of Saskatchewan, or from Head of Lake Winnipeg down to Grand Rapid towards Foot of Lake.....	260	260
<i>North or Main River Saskatchewan.</i>		
2. Mouth of Saskatchewan, on Lake Winnipeg, at Grand Rapid up to Foot of Cedar Lake.....	20	
3. Foot to Head of Cedar Lake.....	30	
4. Head of Cedar Lake to Cumberland House.....	115	
5. Cumberland House to Tobin's Rapids.....	52	
6. Tobin's Rapids to Fort à la Corne.....	92	
7. Fort à la Corne to Forks, North and South Saskatchewan.....	14	
8. Forks of Saskatchewan to Cole's Rapid.....	9	
9. Cole's Rapid to Carlton House.....	71	
10. Carlton House to Battleford, on original Pacific Railway Line.....	110	
11. Battleford to Fort Pitt.....	95	
12. Fort Pitt to Fort Saskatchewan.....	185	
13. Fort Saskatchewan to Fort Edmonton.....	20	
Total from Mouth of Red River to Fort Edmonton, at about 30 miles above intersection of original Pacific Railway Line.....		318
		1,073

See pages 392 to 395, Note A, Appendix No. 8 of General Report on Public Works, 1867 to 1882.
G.F.B.

No. 18.—REMARKS.

The navigation between the mouth of Red River and Fort Edmonton is performed by three steamers of the Hudson Bay Company, one of which plys between Red River and Grand Falls, near Lake Winnipeg. These falls are impassable for vessels. Here the Company has built a tramway, about four miles in length, to overcome the falls, which involves the transshipment of passengers and freight.

A second steamer runs from the head of the falls to Carlton House, say 400 miles.

A third steamer completes the journey, thence to Fort Edmonton, 410 miles.

The entire journey of 1,073 miles is said to occupy about a fortnight.

The depth available during low water is said to be from three to four feet or less.

For further details, see Appendix, page 65, Public Works Report, 1879-80 No. 11,090.

For distances from Prince Arthur's Landing to Winnipeg and westward by Canadian Pacific Railway, see tables of Appendix No. 30, parts III. and IV., of General Report of Public Works, 1867 to 1882.—G.F.B.

No. 19.—NAVIGABLE WATERS—Manitoba and North-West Territories.

Name of Rivers and Lakes.	Length.	Mean Width	Mean Depth.	Remarks.
	Miles.	Feet.	Feet.	
Lake Winnipeg.....	300	The "Anson Northup," the first steamer commenced running in 1859.
Lakes Manitoba and Winnipegosis.....	230	.....	.....
Red River (within Manitoba).....	90	.....	.....
Assiniboine River.....	350	150	4	
Souris River (Probable).....	120	100 to 135	2 to 3½	
Qu'Appelle River and Lakes.....	200	70 to 100	2 to 4½	
Long Lake.....	40	.....	.....
Main Saskatchewan.....	400	.....	.....
North do.....	800	.....	.....
South do.....	1,000	750 to 3000	5 to 8	
Athabaska River and Lake.....	500	900	See No. 18. The "Lily," an iron steamboat, belonging to the Hudson Bay Company has been running on this river during the five past years.
Peace River.....	700	.....	.....
Mackenzie River and Slave Lake.....	1,500	1200 to 3000	20 to 300	
Little Slave Lake.....	75	.....	.....

No. 20.—RIVER SASKATCHEWAN.

EXTRACT FROM MACOUN'S WORK ON MANITOBA AND THE GREAT NORTH-WEST, PUBLISHED IN 1882.

An approximate estimate of the number of cubic feet of water passing down the South Branch, the North Branch and the Main Saskatchewan, made by Prof. H. Y. Hind, in 1858, gives the following result:—

	Cubic feet per hour.
South Branch.....	123,425,616
North Branch.....	91,011,360
Main Saskatchewan, at Fort à la Corne.....	214,441,290
“ “ near Deering River.....	206,975,000

For particulars respecting the Saskatchewan, see pages 392 to 395 of General Report on Public Works, 1867 to 1882.

For further particulars about the Saskatchewan River, see the Report made by Professor H. Y. Hind, and published by order of the Legislature of Canada, 1859.

No. 21.—NAMES of vessels which were navigating the waters of Manitoba and North-West Territories in 1878 and 1879, as per Macoun's work, published in 1882.

Name of Vessel.	Name of River or Lake Navigated.	Canadian or American Vessel.	Remarks.
Alpha	Assiniboine and Lower Red Riv.	Canadian	Owned by the Winnipeg and Western Transportation Company.
Cheyenne.....	do	do	
Swallow	Lower Red River	do	
Prince Rupert....	do	do	
Keewatin.....	do	do	
Ellen.....	do	do	Owned by the Hudson Bay Company.
Colville.....	Lake Winnipeg.	do	
Northcote.....	Saskatchewan...	do	
Lilly.....	do	do	
Marquette.....	Assiniboine.....	do	
Manitoba.....	Red River.....	American	Owned by the Kittson or Red River Transportation Company, who own also fourteen barges of 1,800 tons capacity.
Dakota.....	do	do	
Selkirk.....	do	do	
Minnesota.....	do	do	
Grandin.....	do	Independent... ..		Owned by the Great Grandin Farm.

See Appendix No. 8, page 392 of General Report on Public Works, 1867 to 1882.

PORT NELSON.

No. 22.—EXTRACT FROM MACOUN'S WORK ON MANITOBA AND THE GREAT NORTH-WEST, PUBLISHED IN 1882.

Port Nelson is about eighty miles nearer to Liverpool, *via* Hudson Straits, than is New York. It is at the mouth of a river of the first class, carrying a body of water double that of the north and south branches of the Saskatchewan combined, and it reaches the sea through a narrow depression in the Laurentides, having a descent of about twenty inches in a mile, or, in round numbers, 700 feet in a little more than 400 statute miles from the spot where it debouches from Lake Winnipeg.

Port Nelson, moreover, is about the same distance from the edge of a vast fertile region in the North-West, exceeding 200,000,000 of acres in area, as Quebec is from Toronto.

For more than 200 years, from two to five sailing vessels on an average, frequently with war ships conveying them, have sailed annually from Europe and America to Port Nelson, or other Ports in Hudson Bay, and returned with cargoes the same season *via* the only available route, Hudson Straits.

For details respecting the navigation of Hudson Bay, see Appendix No. 8, pages 390 to 392, General Report, 1867 to 1882.

For notes respecting the Arctic Regions and Hudson Bay route, see pages 398 to 405 of the same report. G.F.R.

No. 23.—TABLE OF PRINCIPAL RIVERS throughout the World compared with the Rivers St. Lawrence and Ottawa.

Names.	Area of Drainage in Square Miles.	Length in Miles.	Discharge in Cubic Feet per Second.			Authority.
			Low Water.	Mean.	High Water.	
Amazon	2,400,000	4,000	.....	.....	1,700,000	Encyclopædia Britannica.
Mississippi	1,226,000	4,400	447,200	.....	1,270,000	C. Ellet, jun.
St. Lawrence.....	565,000	2,600	.....	900,000	.....	A. J. Russell, Esq.
Niagara	237,300	.....	370,589	389,000	406,000	New York State Reports.
Ganges	432,000	1,680	86,300	207,000	494,207	Sir C. Lyell.
Nile	520,200	2,240	23,100	220,000	.....	Encyclopædia Britannica.
Ohio, at Wheeling.	25,000	.....	1,400	.....	260,277	C. Ellet, jun.
Thames).....	5,080	215	1,330	.....	7,900	Encyclopædia Britannica.
Rhone	38,000	560	7,000	21,000	204,000	D'Aubuisson.
Rhine	88,000	700	13,400	33,700	164,000	do
Ottawa (Grenville)	80,000	700	35,000	85,000	150,000	Ottawa Survey.
French River.....	4,700	.....	9,500	.....	.....	do

See Report of T. C. Clarke, C. E., 2nd January, 1860, on Ottawa Ship Canal Survey.

APPENDIX No. 26.

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PART II.
—

TABLE OF DISTANCES, Etc., Etc.

OCEAN ROUTES

BETWEEN THE

Principal Ports of Canada and United States,
in North America,

AND THOSE OF

FOREIGN COUNTRIES.

APPENDIX No. 26.—*Continued.*

PART II.

INDEX TO TABLES OF DISTANCES.

- No. 1.—Quebec to Liverpool *viâ* Straits of Belle-Ile and Malin Head, north of Ireland.
- No. 2.—Head of Lake Superior to Liverpool *viâ* Straits of Belle-Ile and north of Ireland.
- No. 6.—Distances to Liverpool from Halifax, N.S., St. John, N.B., Portland, Me., and Quebec.
- No. 7.—Principal sea-ports of North America to Galway, Liverpool, Havre, Havana and Rio Janeiro.
- No. 8.—Canadian and Brazilian Mail Line of Steamships.
- No. 9.—The principal ocean steam routes throughout the world, from England to the West or to North America, West Indies, South America, Asia, etc.
- No. 10.—The principal ocean steam routes throughout the world, from England to the East or to India, China, Japan and Australia, by overland route.
- No. 11.—The principal ocean steam routes throughout the world, from England to the East by the Cape of Good Hope.
- No. 12.—Table of latitudes and longitudes of principal Canadian ports.
- No. 13.—Great circle or air line distances from principal ports of North America and Newfoundland to England and Japan.
- No. 14.—Definition of geographical or nautical and statute miles.

No. 1.—Quebec to Liverpool, *via* Straits of Belle-Ile and Malin Head, North of Ireland.

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>via</i> Belle-Ile and Malin Head, North of Ireland			2,661	3,060

No.2.—Head of Lake Superior to Liverpool, *via* Straits of Belle-Ile and North of Ireland.

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>via</i> Straits of Belle-Ile and North of Ireland.....	2,661	3,060
Total from head of Lake Superior to Liverpool, <i>via</i> Belle-Ile and Malin Head, North of Ireland.....	4,016	4,618
N.B.—Route <i>via</i> Straits of Belle-Ile shorter than <i>via</i> Cape Race.....	158	182

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

No. 3.—Quebec to Liverpool, *via* Cape Race and Malin Head, North of Ireland.

From	To	Sections of Navigation.	Geo-graphical 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.....	323	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>via</i> Cape Race and Malin Head, North of Ireland			2,819	3,242

No. 4.—Head of Lake Superior to Liverpool, *via* Cape Race and North of Ireland.

Sections of Navigation.	Geo-graphical Miles.	Statute Miles.
Head of Lake Superior, at Fond-du-Lac, to Quebec.....	1,355	1,558
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.....	158	182

No. 5.—Port Arthur (Prince Arthur's Landing), North Shore of Lake Superior, to Liverpool, *via* Straits of Belle-Ile and North of Ireland.

Sections of Navigation.	Geo-graphical Miles.	Statute Miles.
Port Arthur, North Shore of Lake Superior, to Quebec.....	1,250	1,438
Quebec to Liverpool, <i>via</i> Straits of Belle-Ile and Malin Head, North of Ireland.....	2,681	3,060
Total from Port Arthur to Liverpool, <i>via</i> Belle-Ile and Malin Head, North of Ireland.....	3,911	4,598
N.B.—Route <i>via</i> Cape Race longer than <i>via</i> Straits of Belle-Ile.....	158	182

No. 6.—Distance to Liverpool, from Halifax, N.S.; St. John, N.B.; Portland, State of Maine; and Quebec, as measured on Colton's Map of 1861.

Halifax to Liverpool, *via* Cape Clear.

From	To	Sections of Navigation.	Distance in Miles.	
			Geographical.	Statute.
Halifax, N.S.....	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, *via* Cape Clear.

St. John, N.B.....	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.....	230	380
		Total.....	2,820	3,243

Portland to Liverpool, *via* 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, *via* 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 N. end of Ireland.....	1,800	2,070
Malin Head.....	Liverpool.....	Down North Channel.....	182	221
		Total.....	2,819	3,242
Quebec to Liverpool, <i>via</i> Straits of Belle-Ile and Malin Head, North of Ireland.....			2,661	3,069

For further details, see preceding tables of distances.—G. F. B.

No. 7.—TABLE of distances from the principal seaports in North America to Galway, Liverpool, Havre, Havana and Rio Janeiro.

	Geographical Miles.
Portland, Me., to Liverpool.....	2,850
Louisburg, N.S., to Galway.....	2,100
do Liverpool.....	2,350
do Havre.....	2,450
do Havana.....	1,700
do Rio Janeiro.....	5,200
Halifax, N.S., to Galway.....	2,240
do Liverpool.....	2,500
do Havre.....	2,600
do Havana.....	1,600
do Rio Janeiro.....	5,100
St. John, N.B., to Galway.....	2,450
do Liverpool.....	2,700
do Havre.....	2,800
do Havana.....	1,550
do Rio Janeiro.....	5,050
Quebec to Louisburg, <i>Via</i> Cape North.....	742
do Galway { <i>Via</i> Belle-Ile.....	2,392
do do Cape Race.....	2,700
do Liverpool { <i>Via</i> Belle-Ile (2,651 Colton's map).....	2,649
do do Cape Race (2,819 do...)	2,808
do Havre { <i>Via</i> Belle-Ile.....	2,810
do do Cape Race.....	2,939
do Havana.....	2,891
do Rio Janeiro.....	5,546
Boston to Galway.....	2,600
do Liverpool.....	2,895
do Havre.....	2,993
do Havana.....	1,530
do Rio Janeiro.....	4,935
New York to Galway.....	2,700
do Liverpool.....	3,095
do Havre.....	3,228
do Havana.....	1,240
do Rio Janeiro.....	4,885
Philadelphia to Liverpool.....	3,275
do Havre.....	3,358
do Havana.....	1,190
do Rio Janeiro.....	4,990
Baltimore to Liverpool.....	3,450
do Havre.....	3,543
do Havana.....	1,160
do Rio Janeiro.....	5,000
Richmond to Liverpool.....	3,380
do Havre.....	3,473
do Havana.....	1,090
do Rio Janeiro.....	4,930
New Orleans to Liverpool.....	4,780
do Havre.....	4,838
do Havana.....	595
do Rio Janeiro.....	5,315

No. 8.—CANADIAN and Brazilian Mail Line of Steamships.

From	To	Inter- mediate Mileage.	Total Distances.	Remarks.
Montreal.....	Quebec.....	160	SS. "Comte d'Eu," 2,000 tons. SS. "Tancarville," 2,000 tons. Monthly to and from Montreal in summer, and to Halifax in winter.
Quebec.....	Gaspé.....	350	510	
Gaspé.....	Halifax.....	400	910	
Halifax.....	St. Thomas.....	1,584	2,494	
St. Thomas.....	Para.....	1,326	3,820	
Para.....	Maranhao.....	390	4,210	
Maranhao.....	Ceara.....	440	4,650	
Ceara.....	Pernambuco.....	390	5,040	
Pernambuco.....	Bahia.....	430	5,470	
Bahia.....	Rio Janeiro.....	825	6,295	
		6,295	

No. 9.—THE Principal Ocean Steam Routes throughout the world, with Distances in Nautical or Geographical Miles, and the average time in days, from England to the West—Canada, United States, West Indies, South America, Asia, &c.

From	To	Miles from Eng- land.	Days from Eng- land.	Remarks.
Liverpool.....	New York.....	3,046	12	
do.....	Quebec.....	2,634	10	
Southampton.....	St. Thomas (West Indies).....	3,570	14	
do.....	Jamaica do.....	4,270	17	
do.....	Colon or Aspinwall (Central America).....	4,820	19	
do.....	Panama do.....	4,860	20	
do.....	Calao (South America).....	6,250	29	
do.....	Valparaiso do.....	7,650	39	
do.....	Demerara do.....	4,460	20	
do.....	Bahia (Brazil).....	4,408	22	
do.....	Rio Janeiro (Brazil).....	5,140	26	
do.....	Buenos Ayres (La Plata).....	6,178	31	
do.....	San Francisco (by Panama).....	8,190	35	
do.....	Victoria, B.C. do.....	8,950	42	
do.....	Wellington (New Zealand) (by Panama).....	11,400	48	
do.....	Yokohama (Japan) do ..	12,710	56	
do.....	Shanghai (China) do ...	13,745	61	

No. 10.—THE Principal Ocean Steam Routes throughout the World, with Distances in Nautical or Geographical Miles, and the average time in Days, from England to the East—India, China, Japan and Australia, by Overland Route.

From	To	Miles from Eng-land.	Days from Eng-land.	Remarks.
Southampton	Gibraltar, Europe.....	1,151	5	
do	Malta, Mediterranean.....	2,132	9	
do	Alexandria, Africa.....	2,951	14	
do	Suez do	3,203	15	
do	Aden do	4,511	21	
do	Bombay, India.....	6,175	30	
do	Galle, Ceylon, India	6,645	32	
do	Madras do	7,190	36	
do	Calcutta do	7,960	40	
do	Penang do	7,853	38	
do	Singapore do	8,239	40	
do	Hong Kong, China.....	9,676	49	
do	Shanghai do	10,546	54	
do	Pekin do	11,273	59	
do	Nagasaki, Japan.....	11,016	60	
do	Yokohama, Yedo (re-named Tokio), Japan.....	11,586	65	
do	King George's Sound, Australia.....	9,975	48	
do	Melbourne do	11,315	54	
do	Sydney do	11,875	57	
do	Auckland, New Zealand.....	13,083	64	
do	Otago do	12,423	62	

The above may be shortened 4 days by the Continental Route from London to Marseilles *viâ* Paris and thence to Alexandria in 9 days instead of 14, as in the above *viâ* Gibraltar.

No. 11.—THE Principal Ocean Steam Routes throughout the World, with Distances in Nautical or Geographical Miles, and the average time in Days. Route to the East by the Cape of Good Hope.

From	To	Miles from Eng-land.	Days from Eng-land.	Remarks.
Southampton	Cape of Good Hope.....	5,850	38	
do	Natal.....	6,570	44	
do	Mauritius	8,162	53	
do	Madras, India.....	13,000	66	
do	Calcutta, India.....	13,770	69	
do	Melbourne, Australia.....	11,720	60	
do	Sydney do	12,280	64	
do	Otago, New Zealand	13,040	70	
do	Auckland do	13,540	72	
Melbourne, Australia.....	Liverpool, by Cape Horn.....	13,200	66	

See Mercator's Map of the World.

No. 12.—TABLE of Latitudes and Longitudes of Principal Canadian Ports.

	North Latitude.			West Longitude.		
	°	'	''	°	'	''
Halifax, N.S., dockyard observatory.....	44	39	04	63	35	00
Louisburg, N.S., lighthouse.....	45	54	39	59	57	15
Sydney do E. Church tower.....	46	08	45	60	12	50
Pictou do tower of custom house.....	45	40	50	62	42	10
Charlottetown, P.E.I., province building.....	46	14	10	63	07	37
St. John, N.B., time ball on custom house.....	46	16	42	66	03	45
Fredericton, N.B.....	46	03	00	66	38	15
Quebec, P.Q., citadel.....	46	49	12	71	12	15
Three Rivers, P.Q.....	46	23	00	72	33	00
Montreal do.....	45	31	00	73	33	00
Ottawa, Ont.....	45	23	00	75	42	00
Kingston, Ont., city clock.....	44	15	15	76	28	30
Toronto do lighthouse on Queen's Wharf.....	43	38	20	79	23	35
Hamilton do.....	43	54	00	79	57	00
Rondeau do lighthouse, south end of east pier.....	42	15	35	81	54	25
Port Colborne, Ont., lighthouse, west pier.....	42	53	00	79	19	30
Goderich do do.....	43	45	10	81	32	30
Collingwood do do on breakwater.....	44	31	00	80	02	10
Port Arthur.....	48	24	00	89	28	00
Winnipeg, Manitoba.....	49	52	00	97	08	00
Victoria, B.C.....	48	30	00	123	25	00

GREAT CIRCLE OR AIR LINE DISTANCES.

No. 13.—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.

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-Ile.....	892
Belle-Ile.....	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

No. 14.—DEFINITION OF GEOGRAPHICAL OR NAUTICAL AND STATUTE MILES.

A nautical mile, or a sea mile, is the length of one minute of longitude of the earth at the equator, at the level of the sea, or the $\frac{1}{21600}$ part of the earth's equatorial circumference. By the United States standard, and as used by the Coast Survey, its length is 1,152,664 common statute or land miles; 1855.11 metres; 2028.69 yards; or 6086.07 feet; consequently, one degree of longitude at the equator=69.160 land miles; and a land mile=0.86755 of a nautical mile. By British Standard the sea mile is about 4 inches longer than by United States. Sometimes one minute of mean latitude is taken as a nautical mile. A minute of latitude at the equator is about 6,046 feet; and at the Poles about 6,107; the mean of which is 6,076½ feet.

Lengths of a degree of longitude in different latitudes, and at the level of the sea. These lengths are in common land or statute miles, of 5,280 feet. Since the figure of the earth has never been *precisely* ascertained, these are but close approximations.

Degree of Latitude.	Miles.	Degree of Latitude.	Miles.	Degree of Latitude.	Miles.	Degree of Latitude.	Miles.	Degree of Latitude.	Miles.	Degree of Latitude.	Miles.
0	69.16	14	67.12	28	61.11	42	51.47	56	38.76	70	23.72
2	69.12	16	66.50	30	59.94	44	49.83	58	36.74	72	21.43
4	68.99	18	65.80	32	58.70	46	48.12	60	34.67	74	19.12
6	68.78	20	65.02	34	57.39	48	46.36	62	32.55	76	16.78
8	68.49	22	64.15	36	56.01	50	44.54	64	30.40	78	14.42
10	68.12	24	63.21	38	54.56	52	42.67	66	28.21	80	12.05
12	67.66	26	62.20	40	53.05	54	40.74	68	25.98	82	9.66

Intermediate ones may be found correctly by simple proportion. See Trautwine — at pages 74 and 75.

APPENDIX No. 26.

PART III.

TABLES OF DISTANCES, Etc.

INTERPROVINCIAL ROADS AND LAND ROUTES TO THE
SEABOARD; GOVERNMENT RAILWAYS AND GOVERN-
MENT TELEGRAPH LINES; TOGETHER WITH
TABLE OF THE BRITISH POSSESSIONS
THROUGHOUT THE WORLD; POPULA-
TION AND EXTENT OF THE GLOBE,
AND TABLE OF LARGEST EM-
PIRES, Etc., Etc., Etc.

APPENDIX No. 24.

PART III.

INDEX OF TABLES OF DISTANCES, &c.

- No. 1. Distances: New road, Quebec to Lake St. John.
- No. 2. Land route: Distances around Lake St. John.
- No. 3. Land route: Distances from St. Félicien, near west end of Lake St. John, to St. Jérôme, at south-east end of Lake, and thence to Baie des Ha! Ha!
- No. 4. Population of the Counties of Chicoutimi and Saguenay, from Census of 1881.
- No. 5. Table of distances from Quebec to Labrador, along the north shore of the St. Lawrence.
- No. 6. Population of various settlements between Tadoussac and Labrador, on the north shore of the St. Lawrence.
- No. 7. Distances: Prince Edward Island Railway and connections.
- No. 8. Distances from Quebec to Maritime Provinces *via* Intercolonial Railway.
- No. 9. Distances from Quebec to Maritime Provinces *via* Témiscouata Road and the Railways in the Valley of the St. John.
- No. 10. Distances from Port Arthur (Prince Arthur's Landing) to Winnipeg, by the Dawson route.
- No. 11. Distances from Quebec to Port Arthur and Winnipeg *via* North Shore and Canadian Pacific Railway.
- No. 12. Manitoba and North-West Territory. Population, property, navigation.
- No. 13. Government Telegraph Lines constructed and projected. Summary showing proportions of Land and Cable Telegraph Lines, owned or operated by the Government in the several Provinces.
- No. 14. Area and population of the Globe: Compiled, as far as possible, from the last Official Census of each country.
- No. 15. Table of the British Possessions throughout the World, with their Population and Area.
- No. 16. Table of largest Empires.
- No. 17. Population of the Globe by races.
- No. 18. Population of the Globe by religions.

No. 1—DISTANCES—New Road—Quebec to Lake St. John.

From	To	Intermediate Mileage.	Total Mileage.
Quebec.....	Boundary Post.....	15	
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 Ecores.....	11	115½
9th do do aux Ecores.....	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 146 miles, Quebec to Lake St. John.

REMARKS.

MAIL ROAD—QUEBEC TO LAKE ST. JOHN.

Messrs. Blaiklock and Duberger, Provincial Land Surveyors, first examined the country between Quebec and Lake St. John in 1847-48, for a road, but did not find a practicable route throughout.

In 1863, Messrs. Vallée and Picard located and opened, at their own expense, the first five miles of the road from Stoneham.

In 1864, with the aid of other citizens from Quebec, they continued to locate and open it as far as Lake Jacques Cartier, for a total distance of about thirty miles.

Mr. Jean Gagnon afterwards, at the request of the Reverend G. Tremblay, curate of Beauport, located the remainder of the line towards St. Jérôme, on the east side of Lake St. John, and stated that the aggregate length of the hills between Lake Jacques Cartier and Lake St. John did not exceed three and a-half miles.

In 1877, the Local Government of the Province of Quebec undertook the construction of the road, which is about twenty-four feet in width.

The depth of snow in winter varies from three to three and a-half feet.

RAILWAY—QUEBEC TO LAKE ST. JOHN.

A railway is now in progress of construction since 1879, from Quebec to Lake St. John, running south of Lake St. Joseph, from the crossing of the River Jacques Cartier direct to St. Raymond, thence *via* River Batiscan and Lake Edward to the Township of Roberval, near the River Oniatchouan, at Lake St. John, through a considerable extent of good agricultural and finely timbered country, and with practicable grades.

The summit intervening between the St. Lawrence and Lake St. John is 1,348 feet, and is at 123 miles from Quebec.

The summit can be surmounted by grades varying from 20 to 80 feet per mile for most of the distance, and from 80 to 132 on the remainder, say for twenty-five miles.

It is now constructed, and has been in operation during the past year, from Quebec to Lake St. Simon.

The length of the railway being constructed is as follows, viz. :—

	Miles.
Quebec to Lorette Junction, <i>vid</i> North Shore Railway (in operation).....	4
Lorette Junction to Lake St. Simon (in operation).....	41
St. Simon to Lake St. John (proposed).....	134

Probable total length, when completed..... 179

In the immediate vicinity of the railway there are six millions of acres of land, out of which three millions are reported as being well adapted for settlement.

See report of A. L. Light, Engineer-in-Chief of Government Railways, Province of Quebec, dated 9th March, 1881, in answer to an Order of the House of Commons, dated 14th February, 1881.

For progress of work and funds granted towards its construction, see Appendix No. 8, page 348, and Appendix No. 30, pages 861, 862 of General Report on Public Works, 1867 to 1882, viz. :—

\$384,000 by Federal Government, by Act 45 Vic., cap. 14, passed in 1882.

\$350,000 by Municipal Council, Quebec, under by-law of 9th February, 1883.

The Provincial Government of Quebec have granted \$5,000 in money and 5,000 acres of land per mile, on 170 miles, by Act 45 Vic., cap. 23, of 1882, and previous Acts passed.

See also No. 33,360, 9th April, 1883, from J. G. Scott, Secretary Lake St. John Railway Company.—G. F. B.

No. 1.—SUBSIDIES granted to Railway from Quebec to Lake St. John—Probable total length 179 miles.

Year.	Act.	By whom Granted.	Subsidy.
By Federal Government—			
1882.....	45 Vic., chap. 14...	St. Raymond to Lake St. John, 120 miles, subsidized at \$3,200 per mile, not exceeding in the whole.....	\$ 384,000
1883.....	46 do 25...	St. Raymond to Lake St. John, 25 miles, subsidized at \$3,200 per mile, not exceeding in the whole.....	80,000
Total by Federal Government.....			464,000
1882.....	45 do 23...	The Provincial Government have granted \$5,000 in money and 5,000 acres of land per mile, on 170 miles, by Act 45 Vic., chap. 23, of 1882, and previous Acts passed.	
Total by Provincial Government, exclusive of land subsidy.....			850,000
1883.....	.....	The Municipal Council of Quebec, under By-law of 9th Feb., 1883, have granted.....	350,000
Total Subsidies.....			1,664,000

LAND ROUTE.

No. 2.—DISTANCES around Lake St. John, as measured on the Map published by the Department of the Crown Lands, Quebec, in June, 1890.

Names of Places.	Inter- mediate Distances.	Total Distances.	Remarks.
	Statute Miles.	Statute Miles.	
Mouth of Petite Décharge.....			At E. end of Lake St. John.
St. Gédéon-de-Grand Mont.....	4'00	4'00	do By road not completed.
Mouth of Belle-Rivière.....	3'50	7'50	do By Shore Road.
St. Jérôme.....	4'50	12'00	At S. E. do do
Mouth of River Metabetchouan.....	6'00	18'00	On S. side of Lake St. John by Shore Road.
Pointe aux Trembles, or St. Louis-de- Chambord.....	5'00	23'00	do do
Mouth of River Ouiatchouan.....	4'50	27'50	do do
Notre-dame-du-Lac, or Roberval.....	6'00	33'50	On W do do
Pointe Bleue Mission, Branch Road.....	See below.		
St. Prime, on S. side River aux Iroquois	8'00	41'50	On S.W. do do
St. Félicien, on S. side of River Cho- mouchouan.....	See below.		
Outlet of River Chomouchouan.....	1'50	43'00	At S.W. end do
do Mistassini.....	5'50	48'50	At N.W. end do
do Peribonca.....	10'50	59'00	Northernmost end of Lake St. John, no road
Mouth of Grande Décharge.....	19'25	78'25	N.E. end, or foot of do
do Petite do.....	2'50	80'75	At E. end do do
From Notre-Dame-du-Lac, going north, to Pointe Bleue Mission or the Indian Reserve.....	4'50		On S.W. side of Lake St. John.
From St. Prime to St. Félicien on the S. side of the River Chomouchouan, fol- lowing the shortest road to the river, and afterwards going up the river...	7'50		St. Félicien is seven miles above outlet of River Chomouchouan.
Distance by direct unfinished road.....	8'50		Eight and one-half miles from St. Prime to St. Félicien by shortest, unfinished road shown on map of 1890.

G. F. B.

No. 3.—DISTANCES from St. Félicien, near upper or west end of Lake St. John, to St. Jérôme at south-east end of lake, and thence by the shortest post route to the Baie des Ha! Ha! as measured on the map published by the Department of Crown Lands, Quebec, in June, 1880.

Names of Places.	Inter- mediate Distances.	Total Distances.	Remarks.
	Statute Miles.	Statute Miles.	
St. Félicien.....	8 50	38 00	On S. side of River Chomouchouan, seven miles above its outlet at S.W. or upper end of Lake St. John.
St. Prime	8 00	29 50	At S. W. end of Lake St. John, Shore Road.
Pointe Bleue Mission—Indian Reserve	6 00	21 50	Branch road 4½ mls. north from Notre Dame
Notre-Dame-du-Lac, or Roberval.....	4 50	15 50	On S. W. side of Lake St. John, Shore Road.
Mouth of River Ouïatchouan.....	5 00	11 00	On S. shore do do
Pointe aux Trembles, or St. Louis de Chambord	6 00	6 00	do do do
Mouth of River Metabetchouan.....	0 00	0 00	At S. E. end do do
St. Jérôme (see note below).....	9 50	9 50	By the most direct road eastward.
Hébertville.....	14 50	24 00	By road on N. side of Lake Kinogami.
St. Syriac-de-Kaskouia (see note)	14 75	38 75	do do
Grand Brûlé do	12 00	50 75	By road on W. side of River Chicoutimi.
Chicoutimi do	10 00	60 75	At head or W. end of Baie des Ha! Ha! by shortest road southward
St. Alphonse-de-Bagotville.....	2 50	63 25	At S. W. end of Baie des Ha! Ha! by the shortest road southward.
N.B.			
St. Syriac de Kaskouia to St. Dominique, on east side of Rivière aux Sables		10 50	Road is along W. side of Rivière aux Sables.
St. Syriac de Kaskouia to Chicoutimi, by road along west side of Rivière aux Sables, except upper portion.....		20 50	Six and one quarter miles shorter than road passing by way of Grand Brûlé
Grand Brûlé to St. Dominique.....		16 50	By road up River Chicoutimi and down Rivière aux Sables.
Head of Baie des Ha! Ha! below Chicoutimi.....		24 30	By water route.
Head of Baie des Ha! Ha! above Tadoussac		60 26	do

REMARK.—The mileage, in the first portion of the above table, is given from St. Jérôme going upward to St. Félicien, and from St. Jérôme going downward to St. Alphonse.—G. F. B.

No. 4.—POPULATION of the Counties of Chicoutimi and Saguenay, from Census of 1881.

Names of Parishes, &c., from Lake St. John downwards.	Number of Families.	Number of Persons.	Total.		Remarks.
			Families.	Persons.	
COUNTY OF CHICOUTIMI.					
<i>Around Lake St. John.</i>					
Township of Normandin	53	322	.....	.....	W. end of lake.
St. Félicien	114	530	.....	.....	S. side of River Chomouchouan.
St. Prime	167	956	.....	.....	S.W. end of lake.
Notre-Dame-du-Lac, or Pointe Bleue, or Roberval	211	1,186	.....	.....	S.W. side of lake.
St. Louis de Chambord or Pointe aux Trembles	182	1,067	.....	.....	W. side of lake.
St. Jérôme	277	1,803	.....	.....	S.E. end of lake.
St. Gédéon-de-Grand-Mont	110	654	.....	.....	E. end of lake.
St. Joseph d'Alma	113	710	.....	.....	On island between Grande and Petite Décharges.
			1,227	7,228	
<i>Between Lake St. John and Chicoutimi.</i>					
Hébertville	421	2,501	.....	.....	1½ miles above Lake Vert.
St. Syriac de Kaskouia or Kinogami	40	262	.....	.....	N. side Lake Kinogami.
St. Louis de Rivière aux Sables	220	1,511	.....	.....	E. side Rivière aux Sables.
Grand Brûlé or Laterrière	172	1,320	.....	.....	6 miles below outlet of Lake Kinogami.
			853	5,594	
<i>Along the River Saguenay.</i>					
St. François-Xavier (Parish of Chicoutimi) ...	355	2,687	.....	.....	S. side of River Saguenay.
Ste. Anne	198	1,260	.....	.....	N. do do
Chicoutimi Town	327	1,935	.....	.....	S. do do
St. Fulgence	135	845	.....	.....	N. do do
St. Alphonse	153	1,071	.....	.....	W. end Baie des Ha! Ha!
Bagotville (village only)	88	508	.....	.....	do do
St. Alexis	287	1,749	.....	.....	S.W. do do
Anse St. Jean	89	653	.....	.....	S. side of River Saguenay.
			1,642	10,708	
Grand Totals			3,723	23,530	
COUNTY OF SAGUENAY.					
Tadoussac, at mouth of River Saguenay	209	1,542	299	1,542	N. side.
(Population of Village comprised in Parish. 59 families; 341 persons.)					

No. 5.—TABLE of Distances from Quebec to Labrador, along North Shore of the St. Lawrence.

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	St. Anne de Beaupré	6	22	do
St. 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	Ilets de Jérémie	18	203	Track req. through forest.
Ilets de Jérémie	Betsiamits (Betsiamits)	7½	210½	Beach used.
Betsiamits (Betsiamits)	Pointe aux Outardes	12	222½	do
Pointe aux Outardes	Manicouagan	15	237½	Track req. through forest.
Manicouagan	River Godbout	27	264½	do do
River Godbout	Pointe des Monts	12	276½	do do
Pointe des Monts	Trinité	7	283½	Beach used.
Trinité	Iles à Caribou	7½	291	do
Iles à 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 Iles	12	345	do do
Sept Iles	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 Sheldrake	7	416	do do
River Sheldrake	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	Nataskouan	64	541	do do
Nataskouan	Tshikaska	18	559	
Tshikaska	Mécatina	75	634	
Mécatina	Bonne Espérance	99	733	
Bonne Espérance	Blanc Sablon	24	757	Boundary of Labrador, Newfoundland and Canada.

No. 6. — POPULATION of various Settlements between Tadoussac and Labrador, on the North Shore of the St. Lawrence.

Names of Places.	Census Returns.		Church Returns.		
	No. of Persons.	No. of Persons.	No. of Families.	No. of Families.	No. of Persons.
	1871.	1881.	1864.	1881.	1891.
Tadoussac.....	765	1,542	Not obtained	131	1,070
Escoumains.....	1,023	520	do	163	1,133
Mill-Vaches.....		1,115	do	109	1,037
Portneuf.....	1,790		do		
Sault au Cochon.....			2	45	290
Ilets de Jérémie.....			1		
*Betsiamits (Betsiamits or Bersimis)	552		110	176	687
Pointe aux Outardes.....			5		
Manicouagan.....	86	120	3	13	100
*River Godbout.....			17	13	19
Pointe des Monts.....	106	243	3		
Trinité.....			3		
Ile aux Œufs.....					
Pointe aux Anglais.....				24	127
Rivière Pentecôte.....					
Cailles Rouges.....					
Ilets à Caribou.....				9	65
*Rivière Ste. Marguerite.....			2	83	385
*Sept Iles.....	191		35		
Rivière Moisy.....	336	241	18	22	114
Rivière à la Truite.....			2		
Cormoran.....			2		
Pigou.....			6		
Rivière au Souleau.....			2		
River Matemek.....			2		
River Chaloupe.....			2		
River Sheldrake.....			6		
Petit Manitou.....				24	133
Rivière au Tonnerre.....			5		
Rivière du Loup-Marin.....			3	16	90
River Magpie.....			6	42	240
Rivière St. Jean.....			13	27	173
*Longue Pointe.....			14	75	310
*Mingan.....	560		110		
Pointe aux Esquimaux.....	862	1,775	75	181	967
Betchouan, &c.....				35	177
Nataskouan.....	358	488	44	53	286
Nampissipi.....				22	90
Hâvre à la Croix.....					
Mécatina.....	280	410	Not obtained	48	254
Tête à la Baleine.....					
Baie des Moutons.....					
Tabatière.....				89	425
Anse des Dunes.....					
St. Augustin.....					
Blanc Sablon.....					
Bonne Espérance.....	266	341	Not obtained		
*Romaine.....				68	245
	7,175	6,787	491	1,468	8,457

*See remarks on next page.

In places of preceding table marked thus (*) the population is divided as follows:—

Name of Place.	Whites.		Indians.	
	No. of Families.	No. of Persons.	No. of Families.	No. of Persons.
Betsiamits	56	206	120	480
River Godbout.....	7	45	6	14
Rivière Ste. Marguerite and Sept Iles.....	18	110	65	275
Longue Pointe and Mingan.....	18	90	57	214
Romaine .....	.....	.....	68	245
	99	458	316	1,228

Population of settlements given in Census of 1871 and Census of 1881, include intermediate places:

The returns for 1864 were obtained from Rev. C. Arnaud, Oblat Missionary, and those for 1881 were furnished by the kindness of His Lordship the Bishop of Rimouski for places to Sault au Cochon to Romaine; and by Rev. Father Labege, Secretary to His Lordship the Bishop of Chicoutimi, for Tadoussac, Escoumains, Mille-Vaches and Portneuf.

No. 7.—DISTANCES—Prince Edward Island Railway and Connections.

From	To	Intermediate Mileage.	Total Mileage from Charlottetown.	Remarks.
Charlottetown	County Line.....	32	.....	via P.E.I. Railway.
County Line.....	Summerside	17	49	do
Summerside	Alberton	53	102	do
Alberton	Tignish	14	116	do
Charlottetown.....	Mount Stewart.....	22		
Mount Stewart.....	Georgetown	24	46	do
do	Souris.....	39	61	do

WINTER ROUTE via THE CAPES.

Charlottetown.....	County Line.....	32	.....	via P.E.I. Railway.
County Line.....	Cape Traverse.....	16	48	Stage.
Cape Traverse.....	Cape Jourimain	12	60	Ice boats.
Cape Jourimain	Au Lac	45	105	Stage.
Au Lac	St. John, N.B.....	131	236	Intercolonial Railway.
do	Halifax, N.S.....	145	280	do
do	Quebec, P.Q.....	542	647	do

WINTER ROUTE via GEORGETOWN AND PICTOU.

Charlottetown.....	Georgetown	46	.....	P.E.I. Railway.
Georgetown.....	Pictou.....	45	91	Steamer "Northern Light."
Pictou.....	Truro	52	143	Intercolonial Ry. (Pictou Branch).
Truro	Halifax, N.S.....	62	205	do do
do	St. John, N.B.....	214	357	Intercolonial Railway.
do	Quebec, P.Q.....	625	768	do

No. 8.—DISTANCES from Quebec to Maritime Provinces *via* Intercolonial Railway.

	Intermediate distances.	Distances from Quebec.	
	Miles.	Miles.	
Quebec to Moncton, N.B.....	500	.....	Intercolonial Railway.
Moncton to Truro, N.S.....	125	625	do
Truro to Halifax N.S.....	62	687	do
Quebec to Moncton, N.B.....	500	.....	Intercolonial Railway.
Quebec to St. John, N.B.....	89	589	do
Quebec to Moncton, N.B.....	500	.....	Intercolonial Railway.
Moncton to Point de Chêne, N.B.....	18	518	do
Pointe du Chêne to Summerside, P.E.I.....	35	553	P. E. I. Navigation Co. Steamers.
Summerside to Charlottetown, P.E.I.....	49	602	do Railway.
Quebec to Truro, N.S.....	625	.....	Intercolonial Railway.
Truro to New Glasgow, N.S.....	43	668	Pictou Branch do
New Glasgow to Pictou, N.S.....	9	677	do do
Pictou, N.S., to Charlottetown, P.E.I.....	50	727	P. E. I. Navigation Co. Steamers.
Quebec to New Glasgow, N.S.....	668	.....	Intercolonial Ry. and Pictou Branch.
New Glasgow to Straits of Canso.....	80	748	Eastern Counties Railway.
Straits of Canso to Sydney, C.B.....	120	868	Steamers <i>via</i> St. Peter's Canal.

No. 9.—DISTANCES from Quebec to Maritime Provinces *via* Témiscouata Road and the Railways in the Valley of the River St. John.

	Intermediate distances.	Distances from Quebec.	
	Miles.	Miles.	
Quebec to Rivière-du-Loup	126	.....	Intercolonial Railway.
Rivière-du-Loup to Edmundston, N.B.	80	206	Témiscouata Road.
Edmundston to Fredericton	160	366	New Brunswick Railway.
Fredericton to Fredericton Junction	22	388	Fredericton Railway.
Fredericton Junction to St. John	46	434	St. John and Maine Railway.
St. John to Halifax, N.S.	276	710	Intercolonial Railway.
Quebec to Fredericton Junction	388	.....	As above.
Fredericton Junction to McAdam Junction ..	40	428	St. John and Maine Railway.
McAdam Junction to St. Andrew's	43	471	New Brunswick and Canada Railway.
McAdam Junction to St. Stephen	35	463	New Brunswick and Canada Railway.
Quebec to Edmundston	206	.....	As above.
Edmundston to Woodstock, N.B.	113	319	New Brunswick Railway.
Woodstock to McAdam Junction	51	370	do and Canada Railway.
McAdam Junction to St. John	85	455	St. John and Maine Railway.
McAdam Junction to St. Andrew's	43	413	New Brunswick and Canada Railway.
McAdam Junction to St. Stephen	35	405	New Brunswick and Canada Railway.
	Intermediate distances.	Distances from Quebec.	
	Miles.	Miles.	
St. John, N.B., to Digby, N.S.	42	.....	} Steamer across Bay of Fundy. Windsor and Annapolis Railway.
Digby to Annapolis	18	60	
Annapolis to Halifax	130	190	
Digby to Yarmouth	67	127	Western Counties Railway.

N.B.—The above table, published in the preceding reports has been modified in accordance, with the most recent railway tables.

No. 10.—DISTANCES from Port Arthur (Prince Arthur's Landing, Lake Superior) to Fort Garry (Winnipeg) by the Dawson Route.

	Statute Miles.	
	Inter-mediate.	Total.
Port Arthur to Lake 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 Port Arthur is 532 miles.

The Dawson route has been superseded by the portion of the Canadian Pacific Railway now completed and in operation between Port Arthur (Thunder Bay, Lake Superior) and Winnipeg, *via* Rat Portage and Selkirk, a distance of 429 miles. See next table.

No. 11.—DISTANCES from Quebec to Port Arthur and Winnipeg, *via* North Shore Railway and Canadian Pacific Railway, to Ottawa; thence *via* Perth, Toronto and Orangeville, by Subsidiary Line of Canadian Pacific Railway, to Owen Sound; thence by C. P. R. Steamers across Lakes Huron and Superior to Port Arthur; thence by main line of Canadian Pacific Railway to Winnipeg.

SUMMER ROUTE BY RAILWAYS AND LAKE STEAMERS, 1884.

From	To	Statute Miles.	
		Inter-mediate.	Total.
Quebec.....	Montreal (St. Martin's Junction), North Shore Railway.....	159	159
	Ottawa, main line Canadian Pacific R'y...	108	267
	Perth, subsidiary line C. P. R.....	59	326
	Toronto Junction, 4½ miles from Toronto...	199	525
	Orangeville	43½	568½
	Owen Sound.....	73½	642
	Sault Ste. Marie Canal—Steamer, Lake Huron.....	250	892
	Port Arthur—Steamer, Lake Superior.....	280	1,172
	Winnipeg, main line Canadian Pacific R'y	429	1,601

N.B.—The route from Quebec, by North Shore Railway, to Montreal, is 171 miles; thence by Grand Trunk Railway to Toronto, 333 miles; thence to Toronto Junction 4½, or 508½ miles in all from Quebec.

For distances by above route to Port Moody and Yokohama from Liverpool, see Part IV, Table No. 2.

For comparative tables of distances from Liverpool, England, on the Atlantic, to Yokohama, Japan, on the Pacific, by the shortest ocean routes, and by the shortest trunk lines of railway in Canada and the United States, in North America, see Part IV.

For cost of construction of Canadian Pacific and North Shore Railways, for subsidies thereto and to other railways, and for other details, see Part IV.

No. 12.—MANITOBA and NORTH-WEST Territory—Population—Property—Navigation.

Localities.	1884.	
	Population.	Value of Assessable Property.
Emerson, frontier of United States, 65 miles from Winnipeg, branch Canadian Pacific Railway.....	1,500	706,725
Winnipeg	25,000	27,432,900
Portage la Prairie.....	2,551	2,300,000
Brandon.....	2,082	3,014,306
Regina.....	613	500,000
Calgary.....	300	500,000

Rivers.	Navigable Length.	Number of Steamboats.
	Miles.	
Red River.....	100	10
River Assiniboine.....	700	2
Lake Winnipeg	350	9
River Saskatchewan	1,000	5
Athabasca and Peace Rivers.....	1,000	1

No. 13.—GOVERNMENT TELEGRAPH LINES.
CONSTRUCTED.

Names of Stations.		Lengths—Distances in miles.			Established.
From	To	Inter-mediate.	Pro-gressive	Complete Lines.	
		Miles.	Miles.	Miles.	
<i>Newfoundland.</i>					
Port aux Basques.....	Cape Ray Lighthouse.....	14		14	April 1, 1883.
<i>Cape Breton Section.</i>					
Meat Cove.....	Aspee Bay.....	10½			Nov. 7, 1880; Aug. 1, 1882.
Aspee Bay.....	O'Neil's Harbour (House half way).....	15	25½		
O'Neil's Harbour.....	Ingonish North Bay.....	9	34½		April 1, 1882.
Ingonish North Bay.....	Ingonish Harbour.....	10½	45		
Ingonish Harbour.....	McLennan's.....	23	68		
McLennan's.....	Sta. Anne's (South Bay).....	19	87		
Sta. Anne's.....	Baddeck (Loop-line).....	13	100		Jan. 1, 1882.
Baddeck.....	Englishtown.....	6	106		July 19, 1882.
Englishtown.....	Kelly's Cove.....	2	168		
Kelly's Cove.....	Big Bras d'Or (of this ½ mile cable).....	6	114		
Big Bras d'Or.....	North Sydney.....	12½	126½		Nov. 7, 1880.
	Land lines.....	126			
	Cable.....	0½		126½	
<i>Magdalen Islands.</i>					
Amherst.....	Amherst Lighthouse.....	9			June 10, 1881.
Amherst Lighthouse.....	Etang du Nord Village.....	15	24		Dec. 1, 1881.
Etang du Nord Village.....	Etang du Nord Lighthouse.....	1	25		do
Etang du Nord Lighthouse.....	House Harbour (of this 100 mile cable).....	8	33		do
House Harbour.....	Wolfe Island.....	28½	61½		Sept. 25, 1881.
Wolfe Island.....	Grosse Ile.....	11	72½		Aug. 17, 1880.
Grosse Ile.....	Grand Entry.....	11	83½		Feb. 18, 1882.
do.....	Bird Rock (all cable).....	18½	101½		Aug. 20, 1881.
do.....	Meat Cove do.....	55	156½		Nov. 7, 1880.
	Land lines.....	83½			
	Cable.....	73		156½	
<i>Low Point, C.B., Nova Scotia</i>					
Lingan.....	Low Point.....	5		5	Aug. 1, 1881.
<i>Nova Scotia Section.</i>					
Dartmouth.....		0			
Musquodoboit.....		28½	28½		
Ship Harbour, via Clam Cove		23½	52		
Tangier.....		20½	72½		
Sheet Harbour.....		18	90½		
Beaver do.....		10	100½		
Liscomb.....		36	136½		
Sherbrooke.....		11½	148		
Isaac's Harbour.....		36	184		
Manthorn's Cove.....		3	187		
Torbay.....		10	197		
Whitehaven Loop.....		11	208		
				203	

No. 13.—GOVERNMENT TELEGRAPH LINES—Continued.

CONSTRUCTED—Continued.

Names of Stations.		Lengths—Distances in Miles.			Established.
From	To	Inter-mediate.	Pro-gressive	Complete lines.	
		Miles.	Miles.	Miles.	
BAY OF FUNDY.					
<i>Campo Bello Section, N.B.</i>					
East Port, Maine	Welchpool (Cable $1\frac{1}{2}$ mile)...	2 $\frac{3}{8}$			May 1, 1881.
Welchpool	Cable Hut (Liberty Cove)...	7 $\frac{1}{2}$		9 $\frac{1}{8}$	
<i>Grand Manan Section.</i>					
Liberty Cove.....	Cable Hut (Long Eddy) cable	7 $\frac{1}{2}$			Nov. 18, 1880.
Long Eddy.....	Flagg's Cove.....	3	10 $\frac{1}{2}$		
Flagg's Cove.....	Woodward's Cove	6	16 $\frac{1}{2}$		Nov. 26, 1880.
Woodward's Cove.	Grand Harbour	2	18 $\frac{1}{2}$		Jan. 18, 1881.
Grand Harbour	Seal Cove	4 $\frac{1}{2}$	22 $\frac{1}{2}$		Nov. 1, 1882.
Seal Cove	Southern Head	5 $\frac{1}{2}$	28 $\frac{1}{2}$		Jan. 18, 1881.
				28 $\frac{1}{4}$	
	Land.....	29			
	Cables	9 $\frac{1}{2}$			
	<i>Anticosti.</i>	38 $\frac{1}{2}$			
Gaspé Basin	L'Anse à Fougère.....	28			Oct. 16, 1881.
L'Anse à Fougère.....	South-West Point (all cable) across south channel of St. Lawrence.....	44 $\frac{1}{2}$	72 $\frac{1}{2}$	72 $\frac{1}{2}$	do
Fox Bay	Heath Point	23			Aug. 11, 1881. July 20, 1881.
Heath Point	South Point	32 $\frac{1}{2}$	55 $\frac{1}{2}$		
South Point	Shallop Creek	17 $\frac{1}{2}$	73		July 27, 1881.
Shallop Creek	Salt Lake	52 $\frac{1}{2}$	125 $\frac{1}{2}$		July 7, 1881.
Salt Lake	South-West Point	15	140 $\frac{1}{2}$		Oct. 19, 1881.
South-West Point.....	Jupiter River	7	147 $\frac{1}{2}$		Oct. 18, 1880.
Jupiter River	Otter River	17 $\frac{1}{2}$	165		
Otter River.....	Bec Scie River ...	22	187		Oct. 8, 1881.
Bec Scie River	Cape Eagle (Ellis Bay).....	10	197		
Cape Eagle.....	West Point	14	211		Aug. 1, 1881.
West Point.....	English Bay	3	214		July 1, 1882.
				214	
	Land Line	242			
	Cable	44 $\frac{1}{2}$			
				286 $\frac{1}{2}$	
<i>South Shore St. Lawrence.</i>					
Grand Métis	Gaspé Basin	206			
(Subsidized by Government —Great North-Western Telegraph Co.)					

No. 13.—GOVERNMENT TELEGRAPH LINES.—Continued.

CONSTRUCTED AND PROJECTED.

Names of Stations.		Lengths—Distances in Statute Miles.			Established.
From.	To.	Inter-mediate.	Pro-gressive	Complete Lines.	
<i>North Shore, St. Lawrence.</i>					
Murray Bay.....	St Fidèle.....	10	10	} 23rd July, 1881	
St. Fidèle.....	St. Siméon.....	11	21		
St, Siméon.....	Anse du Portage.....	23	44		
Anse du Portage.....	Tadouac (cable 1½ miles across mouth of Saguenay.....)	2	46	} 7th Nov. 1881.	
Tadouac.....	Bergeronnes.....	15	61		
Bergeronnes.....	Escoumains.....	12	73		
Escoumains.....	Sault au Mouton.....	16	89	} October, 1882.	
Sault au Mouton.....	Portneuf village.....	11½	100½		
Portneuf village.....	do lighthouse.....	9	109½		
do lighthouse.....	Sault au Cochon.....	7	116½	} August, 1883.	
Sault au Cochon.....	Betsiamits (Bersimis).....	31	147½		
Betsiamits (Bersimis).....	Pointe aux Outardes (cable)...	12	159½		
Pointe aux Outardes.....	Manicouagan.....	18	177½	} October, 1883.	
Manicouagan.....	River Godbout (cable).....	26	203½		
River Godbout.....	Pointe des Monts.....	18½	222½	} October, 1883.	
Pointe des Monts.....	Trinity Bay.....	7½	229½		
Trinity Bay.....	Pentecost.....	31	260½	} Dec., 1883.	
	Total in operation.....	206½			
Pentecost.....	Sept Iles.....	29½	281½	} Projected.	
Sept Iles.....	River Moisy.....	19	300½		
River Moisy.....	River Chaloup.....	45	345½		
River Chaloupe.....	Poste de Mingan.....	50	375½		
Poste Mingan.....	Pointe aux Esquimaux.....	18	413½		
Pointe aux Esquimaux.....	Nataskouan.....	64	477½		
Nataskouan.....	Tsshikaska.....	18	495½		
Tsshikaska.....	Wapitagum.....	42	537½		
Wapitagum.....	Mécatina.....	33	570½		
Mécatina.....	Secatitca.....	50	620½		
Secatitca.....	Bonne Espérance.....	49	669½		
Bonne Espérance.....	Blanc Sabion.....	24	693½		
	Miles.				
	Land lines.....	654½			
	Cable.....	39½			
				693½	

No. 13.—GOVERNMENT TELEGRAPH LINES—Continued.

CONSTRUCTED.

Names of Stations.		Lengths—Distances in Statute Miles.			Established.
From	To	Inter-mediate	Pro-gressive	Complete Lines.	
<i>Chicoutimi.</i>					
Baie St. Paul.....	St. Urbain.....	9		} 1st Sept, 1881.	
St. Urbain.....	Petit Lac Ha! Ha!.....	37	46		
Petit Lac Ha! Ha!.....	St. Alexis.....	31½	77½		
St. Alexis.....	St. Alphonse-de-Bagotville.....	3	80½		
St. Alphonse-de-Bagotville.	Chicoutimi.....	11½	92		
	Land line.....			92	
<i>North-West Lines.</i>					
Port Arthur.....	Fort Williams.....	6		} *1878. } Transferred to C. P. Ry. Co., 1st July 1882.	
Port William.....	Murillo.....	11½	17½		
Murillo.....	Buda.....	31½	49		
Buda.....	Upsala.....	37½	86		
Upsala.....	Bridge River.....	17	103½		
Bridge River.....	English River.....	15	118½		
English River.....	Butler.....	44	162½		
Butler.....	Wabigon.....	39	201½		
Wabigon.....	Eagle River.....	31	232½		
Eagle River.....	Rat Portage.....	66	298½		
Rat Portage.....	Telford.....	61	339½		
Telford.....	Whitemouth.....	30	369½		
Whitemouth.....	Selkirk.....	40½	410		
Selkirk.....	Winnipeg.....	23	433		
	Total.....				*433
Qu' Appelle Ry. Station.....	Fort Qu' Appelle.....	17		Jan., 1883.	
Fort Qu' Appelle.....	Touchwood.....	46	63	Sept., 1883.	
Touchwood.....	Humbolt.....	78	141	1878-9.	
Humbolt.....	Saskatchewan.....	55	196	Nov., 1883.	
Saskatchewan.....	Battleford.....	85	281	1878-9.	
Saskatchewan (Clark's Crossing).....	Prince Albert, Branch Line.....			83 Dec., 1883.	
Battleford.....	Meridian.....	84	365		
Meridian.....	Victoria Trail.....	80	445		
Victoria Trail.....	Hay Lake.....	56	501		
Hay Lake.....	Fort Edmonton.....	36	537	1878-9.	
				537	
	Total land line (operated by Sept).....			620	

No. 13.—GOVERNMENT TELEGRAPH LINES—*Continued.*

SYSTEM of Telegraph Lines and Cables now maintained by the Dominion Government,
676½ miles, or 79½ miles less than by the Route of 18c0.

CONSTRUCTED.

Localities.		Constructed	Miles.
From	To		
BRITISH COLUMBIA.			
Vancouver Island Land Lines—			
Victoria	Departure Bay.....	1878	74½
Nanaimo	Valdes	1881	15
Straits of Georgia Cables—			
Saanich Arm Crossing.....	.....	1878 & 1881	2
Gabriola Island do .....	.....	1881	1
Valdes Island	Point Gray	1881	20
Mainland British Columbia Land Lines—			
Point Gray	Granville.....	1881	15
Granville.....	New Westminster.....	1881	11½
New Westminster.....	Matsqui (including cables).....	1864 & 1881	35½
Matsqui.....	Cache Creek do	1864 & 1878	181
Cache Creek.....	Barkerville, Cariboo.....	1865 & 1878	272½
do	Kamloops.....	1878	48
Fraser River Crossings (main lines), 2 cables ½ mile each.....	.....	1881	½
Branch Lines—			
New Westminster to Ladner's Landing.....	.....	.....	18
(Including ½ mile cable crossing Fraser River).	.....	.....	7½
New Westminster to Port Moody.....	.....	.....	7½
Total miles .....		.....	702

Plus 44 miles of an additional wire between New Westminster and the United States boundary line, 8 miles from Matsqui.

Land line..... 678

Cables

702

MEMO.—The land line and San Juan Island cable route of 1864 was finally abandoned at the close of 1880, in favor of the Valdes to Point Gray route.

New Westminster is now the established transfer station of the Western Union Telegraph Company, but for checking purposes is designated "Sumas."

An alternative cable connection *via* Victoria, Vancouver's Island and Point Angelos, Washington Territory, will probably be made during 1883.

No. 13.—SUMMARY showing proportions of Land and Cable Telegraph Lines, owned, subsidized or operated by Government in the several Provinces.

	Distances in Miles.				Grand Total.
	Intermediate.		Progressive.		
	Land.	Cables.	Land.	Cables.	
Newfoundland—Subsidized line— Port aux Basques to Cape Ray.....	14	.....	14	.....	14
Nova Scotia— Sydney to Meat Cove.....	126	$\frac{1}{2}$	.....	.....	.....
Dartmouth to Torbay (subsidized).....	208	.....	334	$\frac{1}{2}$	.....
Low Point to Lingan.....	5	.....	339	$\frac{1}{2}$	.....
Barrington to Cape Sable Island.....	16	$1\frac{3}{4}$	335	$2\frac{1}{4}$	$357\frac{1}{2}$
*New Brunswick— Bay of Fundy lines.....	29	$9\frac{1}{8}$	29	$9\frac{1}{8}$	$38\frac{1}{2}$
*Quebec— South Shore (subsidized) from Grand Metis to Gaspé } Basin.....	206	.....	.....	.....	.....
Great North-Western Telegraph Company's Offices. }	.....	.....	.....	.....	.....
Magdalen Islands.....	$83\frac{3}{8}$	$78\frac{3}{8}$	$289\frac{3}{8}$	.....	.....
Anticosti Island.....	242	$44\frac{1}{2}$	$531\frac{3}{8}$	$117\frac{5}{8}$	.....
North Shore line.....	$231\frac{1}{2}$	$39\frac{1}{2}$	$752\frac{3}{8}$	$156\frac{5}{8}$	.....
Chicoutimi.....	92	.....	$844\frac{3}{8}$	.....	$1,001\frac{1}{2}$
North-West.....	620	.....	620	.....	620
British Columbia.....	678	24	678	24	702
	$2,540\frac{5}{8}$	$192\frac{1}{2}$	.....	.....	$2,732\frac{7}{8}$

*New Brunswick—Before the winter of 1884, a line about 43 miles in length, between Chatham and Escouminac, will be completed....

43

*Quebec—Before the winter of 1884, a line between Quebec and Grosse Isle Quarantine Station, land line sections about 45 miles, cables 6 miles, will be completed.....

51

Also, a further extension east of Pentecost, towards Mingan, about 150 miles.....

150

2,976 $\frac{1}{2}$

No. 14.—AREA and Population of the Globe. Compiled, as far as possible, from the last Official Census of each country; and where no Census has been made the figures are taken from the most reliable estimates.

Continent.	Country.	Years of Census.	Area, English Square Miles.	Population.
Europe	Austro-Hungary.....	1880	240,940	37,741,431
	Belgium	1880	11,373	5,519,841
	British Isles and Gibraltar, Malta, &c.....	1881	121,337	35,422,407
	Bulgaria		27,538	2,000,000
	Denmark and Iceland	1880	55,260	2,096,410
	France.....	1881	204,096	37,672,048
	German Empire.....	1880	203,744	45,194,177
	Greece	1879	19,353	1,979,775
	Holland	1880	13,679	4,270,098
	Italy	1881	114,408	28,459,451
	Montenegro		1,710	245,380
	Portugal.....	1879	35,812	4,745,124
	Roumania		49,262	5,376,000
	Russia, in Europe	1882	2,074,686	84,851,886
	Servia	1879	18,767	1,670,000
	Spain	1879	195,775	16,623,389
	Sweden and Norway.....	1881	293,849	6,391,398
	Switzerland	1880	15,991	2,864,102
	Turkey, in Europe		80,000	5,275,000
		Total.....		3,782,595	328,626,556
Asia.....	Afghanistan		278,600	2,500,000
	Aarbia (Ind.).....		1,500,000	3,256,000
	Beluchistan.....		140,000	1,000,000
	British India	1881	1,473,687	253,382,186
	Chinese Empire.....		4,539,750	434,580,000
	East India Islands.....		786,500	34,500,000
	Farther India.....		873,151	36,504,250
	Independent Turkistan.....		194,345	3,000,000
	Japan		147,629	35,925,313
	Persia		636,000	5,000,000
	Portuguese Settlements.....		7,134	877,500
	Russia, in Asia.....	1882	6,250,707	15,186,456
	Turkey do		729,981	17,536,465
		Total.....		17,557,284	843,257,170
Africa	Abyssinia.....		158,000	3,000,000
	Algeria.....		123,000	2,870,000
	British South Africa.....		546,230	1,890,500
	Central Africa, including Somah & Gallas		4,000,000	50,000,000
	Egypt.....		870,000	17,400,000
	Gold Coast, Sierra Leone, &c.....	1881	17,609	669,966
	Liberia.....		50,000	1,500,000
	Lower Guinea.....		280,000	2,000,000
	Madagascar.....		228,570	3,000,000
	Morocco.....		260,000	6,000,000
	Orange Free State.....		42,470	50,006
	Portuguese Settlements.....		697,365	2,410,000
	Sahara.....		2,500,000	5,000,000
	Senegambia.....		147,000	4,000,000
	Soudan.....		1,250,000	30,000,000
	Transvaal.....		114,360	700,000
	Tripoli		344,400	1,200,000
	Tunis.....		45,716	1,500,000
	Zanzibar.....		100,000	5,000,000
	Total.....		11,774,720	138,190,466

No. 14.—AREA and Population of the Globe, &c.—Continued.

Continent.	Country.	Years of Census.	Area, English Square Miles.	Population.	
America.	Dominion of Canada.....	1881	3,470,392	4,324,810	
	Greenland.....		750,000	10,000	
	Mexico.....		741,820	9,650,000	
	Newfoundland.....	1874	40,200	161,389	
	United States.....	1880	3,603,884	50,152,866	
				8,606,296	64,303,065
	Central America.....		164,900	2,600,000	
	West Indies.....		150,000	4,500,000	
	Argentine Republic.....	1880	1,357,896	2,540,000	
	Bolivia.....		500,870	2,325,000	
	Brazil.....		3,288,000	10,200,000	
	Chili.....	1882	182,790	2,234,000	
	Colombia.....		320,750	3,100,000	
	Ecuador.....		248,380	1,066,000	
	Guiana.....	1881	178,370	341,800	
	Patagonia.....		375,600	200,000	
	Paraguay.....		56,700	293,844	
Peru.....		503,380	3,374,000		
Uruguay.....	1880	69,800	450,000		
Venezuela.....	1881	403,276	2,075,245		
	Total.....		16,396,408	99,602,954	
Australasia	Australia.....	1881	2,946,555	2,235,734	
	New Zealand.....	1881	106,260	489,993	
	Tasmania.....	1881	26,215	115,705	
	Total.....		3,079,030	2,841,432	
Polynesia.....			350,000	30,000,000	

RECAPITULATION.

Europe	about	3,800,080	330,000,000
Asia	do	17,600,000	850,000,000
Africa	do	11,800,000	140,000,000
America	do	16,500,000	100,000,000
Australasia	do	3,100,000	3,000,000
Polynesia	do	350,000	30,000,000
Grand total.	.....	53,150,000	1,453,000,000

No. 15.—TABLE of the British Possessions throughout the World, with their Population and Area in English Square Miles, in 1881.

	Area.	Population.
	Eng. sq. miles.	
In Europe—		
British Islands.....	121,115	36,100,000
Gibraltar.....		23,991
Heligoland.....		2,001
Malta and Gozo.....	117	149,782
In Asia—		
British India (including Dependent States).....	1,558,254	254,000,000
Ceylon.....	24,702	2,758,166
Straits Settlements (Singapore, etc.).....	1,440	350,000
Aden (including Perim Island).....	70	35,163
Hong Kong.....	32	160,402
Labuan Island.....	30	6,000
In Africa—		
Gambia River.....	21	14,150
Sierra Leone.....	468	60,546
Gold Coast Colony.....	16,620	520,000
Lagos.....	75,270	
Cape Colony.....	240,110	1,249,824
Natal.....	18,750	361,537
Mauritius and dependencies (Rodriguez, etc.).....	704	359,419
Ascension Island.....	35	
St. Helena Island.....	47	5,059
In North America—		
Dominion of Canada.....	3,470,392	4,324,810
Newfoundland.....	40,200	161,389
British Honduras or Belize.....	6,500	27,452
Jamaica.....	4,256	580,834
Bahama Islands.....	5,794	43,521
Trinidad and other West India Islands.....	3,287	939,059
Bermuda Islands.....	41	14,431
In South America—		
British Guiana.....	85,000	252,186
Falkland Islands.....	4,740	1,543
In Oceania—		
New South Wales, Australia.....	310,937	750,000
Victoria do.....	87,884	862,346
Queensland do.....	668,225	213,525
South Australia.....	903,690	279,865
West Australia.....	975,824	30,200
Tasmania.....	26,214	115,705
New Zealand.....	106,260	489,993
Total of British Empire throughout the world.....	8,757,029	305,292,872

No. 16.—TABLE of Largest Empires.

	Area in square miles.	Population at last Census.	Population per square mile.
British Empire	8,757,029	305,229,872	34·7
Russian Empire.....	8,325,293	100,038,342	12·0
Chinese Empire.....	4,540,000	250,000,000	55·0
United States.....	3,002,852	52,152,866	17·3
Brazilian Empire.....	3,288,000	10,200,000	3·1
French Republic.....	204,096	37,672,048	184·5
German Empire.....	208,744	45,194,177	216·5
Spain (including Colonies).....	320,975	24,914,000	77·6
Italy.....	114,408	28,459,451	248·7

No. 17.—POPULATION OF THE GLOBE BY RACES.

TAKEN FROM KEITH JOHNSTON'S GEOGRAPHY, LONDON, 1880.

Indo-Germanic, or Aryan.....	550,000,000
Mongolian, or Turanian.....	635,000,000
Semitic and Hamitic.....	65,000,000
Negro and Bantu.....	150,000,000
Hottentot and Bushmen.....	150,000
Malay and Polynesian.....	35,000,000
American Indian.....	15,000,000
Total	1,450,150,000

No. 18.—POPULATION OF THE GLOBE BY RELIGIONS.

TAKEN FROM KEITH JOHNSTON'S GEOGRAPHY, LONDON, 1880.

Christians	375,000,000
Jews	7,000,000
Mohammedans.....	170,000,000
Buddists	503,000,000
Hindus.....	177,000,000
Heathen and Fetish Worshipers.....	170,000,000
Various and Unknown.....	48,000,000
Total.....	1,450,000,000

APPENDIX No. 26.
—PART IV.
—**COMPARATIVE TABLES OF DISTANCES, ETC.,**

FROM LIVERPOOL, ENGLAND, ON THE ATLANTIC,
TO YOKOHAMA, JAPAN, ON THE PACIFIC,
BY THE SHORTEST OCEAN ROUTES,
AND BY THE SHORTEST TRUNK LINES OF RAILWAY,
IN CANADA AND THE UNITED STATES IN NORTH AMERICA,
CONNECTING THE TWO OCEANS.

Ref. No. 35,526.

APPENDIX No. 26.

PART IV.

INDEX to Comparative Tables of Distances, &c., from Liverpool, England, to Yokohama, Japan, by the shortest Ocean and Railway Routes, through Canada to Port Moody and the United States to San Francisco.

No. 1...	A 1.....	QUEBEC Route:—Liverpool to Quebec <i>via</i> Cape Race; thence to Port Moody <i>via</i> North Shore and Canadian Pacific Railways; also, by water from Victoria, Vancouver Island, to San Francisco.
No. 1...	A 2.....	QUEBEC Route:—Liverpool to Quebec <i>via</i> Strait of Belle-Ile; thence to Port Moody <i>via</i> North Shore and Canadian Pacific Railways; also, by water from Victoria, Vancouver Island, to San Francisco.
No. 2...	B.....	QUEBEC, Owen Sound, Lakes Huron and Superior Route:—By North Shore Railway to Montreal; Canadian Pacific Railway to Ottawa; thence Subsidiary Line of C.P.R. to Owen Sound; thence across Lakes Huron and Superior to Port Arthur; thence C.P.R. to Port Moody. Summer route by railway and lake steamers, 1884.
No. 3...	C.....	QUEBEC and Chicago Route:—By North Shore Railway to Montreal; Grand Trunk Railway to Detroit; United States Railways to Chicago, St. Paul and Emerson; thence C.P.R. to Winnipeg and Port Moody.
No. 4...	D 1.....	LOUISBOURG and Quebec Route, with Branch Lines to St. John, St. Andrews, &c.:—By Intercolonial, North Shore and Canadian Pacific Railways.
No. 5...	D 2.....	LOUISBOURG, St. John, Mattawamkeag, Sherbrooke, Montreal and Port Moody Route:—By Intercolonial, New Brunswick, International, Grand Trunk and Canadian Pacific Railways.
No. 6...	E 1.....	HALIFAX and Quebec Route, with Branch Lines to St. John and St. Andrew's:—By Intercolonial, North Shore and Canadian Pacific Railways.
No. 7...	E 2.....	HALIFAX, St. John, Mattawamkeag, Sherbrooke, Montreal and Port Moody Route:—By Intercolonial, New Brunswick, International, Grand Trunk and Canadian Pacific Railways.
No. 8...	F 2.....	ST. JOHN, Edmundston and Quebec Route:—By Fredericton and Edmundston Railway, Témiscouata Road and Intercolonial Railway to Quebec; thence to Port Moody by North Shore and Canadian Pacific Railways.
No. 8...	F 1.....	ST. JOHN, Moncton and Quebec Route:—By Intercolonial Railway from St. John to Quebec <i>via</i> Moncton; thence to Port Moody by North Shore and Canadian Pacific Railways.
No. 9...	F 3.....	ST. JOHN, Mattawamkeag, Sherbrooke, Montreal and Port Moody Route:—By New Brunswick, International, Grand Trunk and Canadian Pacific Railways.
No. 10...	G 1.....	ST. ANDREW'S, Edmundston, Rivière du Loup and Quebec Route:—By New Brunswick Railway, Témiscouata Road and Intercolonial Railway; thence to Port Moody by North Shore and Canadian Pacific Railways.
No. 11...	G 2.....	ST. ANDREW'S, Mattawamkeag, Sherbrooke, Montreal and Port Moody Route:—By New Brunswick, International, Grand Trunk and Canadian Pacific Railways.
No. 12...	H.....	CHATHAM, New Brunswick, Edmundston and Quebec Route:—By Projected Railway.
No. 13...	A.....	DETAILS—Route A:—North Shore Railway, Quebec to Montreal; Canadian Pacific Railway, from Montreal to Port Moody. Portions completed and in progress, money and land subsidies, and expenditure, &c.
No. 14...	A.....	DETAILS—Route A <i>Continued</i> :—Canadian Pacific Railway—Main trunk, branch and subsidiary lines, 1884.

INDEX to Comparative Tables of Distances, &c., from Liverpool, England, to Yokohama, Japan, &c.—Continued.

No. 15...	B.....	DETAILS—Route B:—Comparative Statement of Distances from Montreal and Ottawa to Toronto, <i>via</i> Canadian Pacific and Grand Trunk Railways.
No. 16...	C.....	DETAILS—Route C:—Comparative Table of Distances from Quebec and other places to Port Moody, <i>via</i> North Shore, Grand Trunk, United States and Canadian Pacific Railways.
Nos. 17 & 18...	A to H..	COMPARATIVE Tables of Distances on the Various Routes indicated from Liverpool to the principal Seaports and Inland Ports of Canada, &c., and to Yokohama.
No. 19...	A to H..	SUMMARY—Routes A, B, C, D, E, F, G, H:—Comparative Statement of Distances between Liverpool and Yokohama on the respective Routes indicated through Canada, <i>via</i> Port Moody.
No. 20...	A 1, A 2	SUBSIDIES granted to North Shore Railway from Quebec to Montreal, and Canadian Pacific Railway, Montreal to Ottawa.
No. 21...	D 1, D 2	SUBSIDIES granted for the construction of a Railway from Oxford Station on the Intercolonial Railway to Louisbourg or Sydney, in the Province of Nova Scotia.
No. 22...	F 2, G 1	SUBSIDY granted for the construction of a Railway from Edmوندston or Little Falls, New Brunswick, to Intercolonial Railway at Rivière du Loup, Province of Quebec.
No. 23...	D 2, E 2, E 3, G 2	SUBSIDY granted to the International Railway Company for 49 miles of their Railway from Sherbrooke, in the Province of Quebec, to the International Boundary Line.
No. 24...	E 1, E 2, F 2, F 3	SUBSIDY granted for the construction of a line of Railway connecting Montreal with the Harbours of St. John and Halifax, by the shortest and best practicable route.
No. 25...	A 1, A 2	SUBSIDY granted for the construction of a Railway and Telegraph Line from Esquimalt to Nanaimo, on Vancouver Island, British Columbia.
No. 26...	I 1.....	PORTLAND, Montreal, Chicago and San Francisco Route:—By Grand Trunk and United States Railways.
No. 27...	I 2.....	PORTLAND, Niagara Falls, Chicago and San Francisco Route:—By Boston and Maine—Chicago, Detroit and Niagara Falls Short Line, and United States Railways.
No. 28...	J 1.....	BOSTON, Chicago and San Francisco Route:—By Chicago, Detroit and Niagara Falls Short Line and United States Railways.
No. 29...	J 2.....	BOSTON, St. Louis and San Francisco Route:—By New York, New Haven and Hartford—Pennsylvania, Cincinnati and Baltimore, and St. Louis and San Francisco Railways.
No. 30...	K 1.....	NEW YORK, Chicago and San Francisco Route:—By Chicago, Detroit and Niagara Falls Short Line—Chicago, Rock Island and Pacific—Union Pacific and Central Pacific Railways.
No. 31...	K 2.....	NEW YORK, Cincinnati, St. Louis and San Francisco Route:—By Cincinnati, Washington and Baltimore—St. Louis and San Francisco Railways.
No. 32...	K 3.....	NEW YORK, Indianapolis, St. Louis and San Francisco Route:—By Vandalia Line, and St. Louis and San Francisco Railway.
No. 33...	L 1.....	PHILADELPHIA, Chicago and San Francisco Route:—By Philadelphia and Reading—Chicago, Detroit and Niagara Falls Short Line, and United States Railways.
No. 34...	L 2.....	PHILADELPHIA, Cincinnati, St. Louis and San Francisco Route:—By Cincinnati, Washington and Baltimore, and St. Louis and San Francisco Railways.
No. 35...	L 3.....	PHILADELPHIA, Indianapolis, St. Louis and San Francisco Route:—By Vandalia Line, and St. Louis and San Francisco Railway.
No. 36...	M 1.....	BALTIMORE, Chicago and San Francisco Route:—By Baltimore and Ohio—Chicago, Rock Island and Pacific—Union Pacific and Central Pacific Railways.
No. 37...	M 2.....	BALTIMORE, Cincinnati, St. Louis and San Francisco Route:—By Cincinnati, Washington and Baltimore and St. Louis and San Francisco Railways.

INDEX to Comparative Tables of Distances, &c., from Liverpool, England, to Yokohama, Japan, &c.—*Continued.*

No. 38...	M 3.....	BALTIMORE, Indianapolis, St. Louis and San Francisco Route :—By Vandalia Line and St. Louis and San Francisco Railway.
No. 39...	N 1.....	RICHMOND, Louisville, St. Louis and San Francisco Route :—By Richmond and Ohio—Louisville and Nashville—Louisville, Evansville and St. Louis and San Francisco Railways.
No. 40...	N 2.....	RICHMOND, Cincinnati, St. Louis and San Francisco Route :—By Richmond, Fredericksburg and Potomac—Cincinnati, Washington and Baltimore—St. Louis and San Francisco Railways.
No. 41...	N 3.....	RICHMOND, New Orleans and San Francisco Route :—By Richmond and Danville—Western Railway of Alabama—Louisville and Nashville—Galveston, Harrisburg and San Antonio System—Southern Pacific and Central Pacific Railways.
No. 42...	O.....	NEW ORLEANS, and San Francisco Route :—By Galveston, Harrisburg and San Antonio System—Southern Pacific and Central Pacific Railways.
No. 43...	I 1 to O.	SUMMARY—Routes I 1, I 2, J 1, J 2, K 1, K 2, K 3, L 1, L 2, L 3, M 1, M 2, M 3, N 1, N 2, N 3, O :— Comparative statement of distances between Liverpool and Yokohama, on the respective routes indicated through the United States <i>via</i> San Francisco.

A 1 to H.

ROUTES THROUGH CANADA
VIA
PORT MOODY.

FOR DETAILS, SEE Nos. 1 to 25.

FOR SUMMARY OF CANADIAN ROUTES, SEE No. 19.

For Routes through United States *via* San Francisco,
see I 1 to O, or No. 26 to 42.

For Summary of United States Routes, see No. 43.

ROUTES A. 1, A. 2.

Distances from Liverpool, England, to Yokohama, Japan.

No. 1.—QUEBEC ROUTE.

By Main Trunk Line of North Shore and Canadian Pacific Railways.

Also Water and Railway Route to Victoria, Vancouver Island and San Francisco, California.

From	To	Intermediate Mileage Statute Miles.	Geographi- cal Miles.	Statute Miles.
Liverpool	Quebec <i>via</i> Cape Race..... Atlantic Ocean		2,819·0	3,249
Quebec.....	Three Rivers..... North Shore Railway	77	66·8	77
	St. Martin Junction, 12 miles from Montreal...	82	137·9	159
	Ottawa..... Canadian Pacific Railway	108	231·6	267
	Sudbury Junction.....	324	512·7	591
	Port Arthur.....	547	987·3	1,138
	Winnipeg.....	429	1,359·5	1,567
	Portage la Prairie.....	56	1,408·0	1,823
	Brandon.....	77	1,474·8	1,700
	Qu'Appelle.....	191	1,640·5	1,891
	Regina.....	33	1,669·2	1,924
	Calgary.....	482	2,087·3	2,406
	Stephen.....	128	2,194·0	2,529
	Savona Ferry.....	288	2,426·5	2,797
	Port Moody.....	215	2,613·1	3,012
Port Moody.....	Yokohama..... Pacific Ocean		4,374·0	5,042
Total—Liverpool....	Yokohama <i>via</i> Cape Race, Quebec and Main Trunk Line of North Shore and Canadian Pacific Rail- ways..... A. 1.		9,806·0	11,303
	Deduct difference between Cape Race and Strait of Belle-Ile.....		158·0	182
Total—Liverpool....	Yokohama <i>via</i> Strait of Belle-Ile..... A. 2.		9,648·0	11,121
Total—Quebec.....	do do		6,829·0	7,872
Liverpool.....	Port Moody <i>via</i> Quebec, N.S., and C. P. Railways.....		5,431·7	6,261
Port Moody.....	Nanaimo, Vancouver Island..... Strait of Georgia		39·0	45
Nanaimo.....	Victoria do do		63·3	73
Total—Liverpool....	do do do		5,534·0	6,379
Victoria.....	San Francisco, California..... Pacific Ocean		759·0	875
Total—Liverpool.....	do <i>via</i> Quebec and Port Moody.		6,293·0	7,254
Total—Quebec.....	San Francisco <i>via</i> Quebec and Port Moody.....		3,474·0	4,005

N.B.—For details respecting North Shore and Canadian Pacific Railways and branches, as regards portions completed, subsidies, cost, &c., see tables Nos. 13, 14, 20.

For comparative statements of distances on various routes, see tables Nos. 17, 18, 19.

ROUTE B.

Distances from Liverpool, England, to Yokohama, Japan.

No. 2.—QUEBEC, OWEN SOUND, LAKES HURON AND SUPERIOR ROUTE.

By North Shore Railway to Montreal; main trunk line of Canadian Pacific Railway to Ottawa; thence subsidiary line of Canadian Pacific Railway to Owen Sound; thence across Lakes Huron and Superior to Port Arthur; thence main line, Canadian Pacific Railway, to Port Moody.

Summer route by railway and lake steamers, 1884.

From	To	Intermediate Mileage. Statute Miles.	Geo- graphical Miles.	Statute Miles.
Liverpool.....	Quebec, <i>via</i> Cape Race..... Atlantic Ocean.....		2,819.0	3,249
Quebec.....	Three Rivers..... North Shore Railway	77	66.8	77
	St. Martin Junction, 12 miles from Montreal.....	82	137.9	159
	Ottawa..... Canadian Pacific Railway	108	231.6	267
	Perth..... Subsidiary line, Canadian Pacific Railway	59	282.8	326
	Toronto Junction, 4½ miles from Toronto.....	199	455.4	525
	Orangeville.....	43½	493.1	568.5
	Owen Sound.....	73½	556.9	642
	Sault Ste. Marie Canal..... Lake Huron	250	773.8	892
	Port Arthur..... Lake Superior	280	1,016.7	1,172
	Winnipeg..... Canadian Pacific Railway	429	1,388.9	1,601
	Portage la Prairie.....	56	1,437.5	1,657
	Brandon.....	77	1,504.3	1,734
	Qu'Appelle.....	191	1,670.0	1,925
	Regina.....	33	1,698.7	1,958
	Calgary.....	482	2,116.8	2,440
	Stephen.....	123	2,223.5	2,563
	Savona Ferry.....	268	2,456.0	2,831
	Port Moody.....	215	2,642.5	3,046
Port Moody.....	Yokohama..... Pacific Ocean		4,374.0	5,042
Total—Liverpool	Yokohama, <i>via</i> Quebec, North Shore Railway and subsidiary line of Canadian Pacific Railway, Lakes Huron and Superior <i>via</i> Cape Race.....		9,835.0	11,337
	Deduct difference between Cape Race and Strait of Belle-Île.....		158.0	182
	Yokohama, <i>via</i> Strait of Belle-Île.....		9,677.0	11,155

N.B.—For comparative statement of distances from Montreal and Ottawa to Toronto, *via* Canadian Pacific main trunk, subsidiary, and branch lines, and Grand Trunk Railway, see No. 15.
For comparative statement of distances on the various routes, see Nos. 17, 18, 19.

ROUTE C.

Distances from Liverpool, England, to Yokohama, Japan.

No. 3.—QUEBEC AND CHICAGO ROUTE.

By North Shore Railway to Montreal; thence Grand Trunk Railway to Detroit; thence United States Railways to Chicago, St. Paul and Emerson; thence Canadian Pacific Railway to Winnipeg and Port Moody.

United States and Canada.

From	To	Intermediate Mileage. Statute Miles.	Geo- graphical Miles.	Statute Miles.
Liverpool.....	Quebec <i>via</i> Cape Race Atlantic Ocean		2,819·0	3,249
Quebec.....	Montreal..... North Shore and C.P.R.	171	148·4	171
	Toronto..... Grand Trunk Railway	333	437·2	504
	Detroit..... United States Railways	231	637·6	735
	Chicago..... United States Railways	268	870·2	1,003
	St. Paul West.....	410	1,225·8	1,413
	Minneapolis.....	10	1,234·5	1,423
	Emerson.....	381	1,565·1	1,304
	Winnipeg..... Canadian Pacific Railway	66	1,622·3	1,870
	Portage la Prairie.....	56	1,670·9	1,926
	Brandon.....	77	1,737·7	2,003
	Qu'Appelle.....	191	1,903·4	2,194
	Regina.....	33	1,932·0	2,227
	Calgary.....	482	2,350·2	2,709
	Stephen.....	123	2,456·9	2,832
	Savona Ferry.....	268	2,689·4	3,100
	Port Moody.....	215	2,875·9	3,315
Port Moody.....	Yokohama..... Pacific Ocean		4,374·0	5,042
Total--Liverpool	Yokohama <i>via</i> Cape Race, Quebec and Chicago.....		10,069·0	11,606
	Deduct difference between Cape Race and Strait of Belle-Ile		158·0	182
	Yokohama <i>via</i> Strait of Belle-Ile, Quebec and Chicago.. ..		9,911·0	11,424

N.B.—For comparative table of distances from the various points along this route to Port Moody—See No. 18.

For comparative statements of distances on various routes—See Nos. 17, 18, 19.

ROUTE D 1.

Distances from Liverpool, England, to Yokohama, Japan.

No. 4.—LOUISBOURG AND QUEBEC ROUTE WITH BRANCH LINES TO ST. JOHN, ST. ANDREW'S, & C.

By Intercolonial, North Shore and Canadian Pacific Railways.

From	To	Intermediate Mileage. Statute Miles.	Geo- graphical Miles.	Statute Miles.
Liverpool.....	Louisbourg .....Atlantic Ocean.....		2,350·0	2,709
Louisbourg.....	Port Mulgrave.....Projected Railway	80	69·4	80
	New Glasgow....Branch Intercolonial Railway	80	138·8	160
	Truro.....	43	176·1	203
	Moncton.....Intercolonial Railway	125	284·6	328
	Chatham Junction.....	72	317·0	400
	Rimouski.....	237	552·6	637
	Rivière du Loup.....	65	69·0	702
	Quebec.....	126	718·3	828
	St. Martin Junction.....North Shore Railway	159	856·3	987
	Montreal.....	12	866·7	999
	Ottawa <i>via</i> St. Martin....Canadian Pacific Ry.	108	950·0	1,095
	Sudbury Junction.....	324	1,231·0	1,419
	Port Arthur.....	547	1,705·6	1,966
	Winnipeg.....	429	2,077·8	2,395
	Portage la Prairie.....	56	2,126·4	2,451
	Brandon.....	77	2,193·1	2,528
	Qu'Appelle.....	191	2,358·9	2,719
	Regina.....	33	2,387·5	2,752
	Calgary.....	482	2,805·7	3,234
	Stephen.....	123	2,912·4	3,337
	Savona Ferry.....	268	3,144·9	3,625
	Port Moody.....	215	3,331·4	3,840
Port Moody.....	Yokohama.....Pacific Ocean.....		4,374·0	5,042
Total—Liverpool.....	Yokohama <i>via</i> Louisbourg, Intercolonial, North Shore and Canadian Pacific Railways.....		10,055·0	11,591
Liverpool.....	Louisbourg.....Atlantic Ocean		2,350·0	2,709
Louisbourg.....	Truro.....Branch Intercolonial Railway		176·0	203
Truro.....	Halifax.....Intercolonial Railway		54·0	62
Total—Liverpool.....	Halifax <i>via</i> Truro and Intercolonial Railway.....		2,580·0	2,974
Liverpool.....	Louisbourg.....		2,350·2	2,709
Louisbourg.....	Truro.....		176·1	203
Truro.....	Moncton.....		108·4	125
Moncton.....	St. John.....		77·2	89
Total—Liverpool.....	St. John <i>via</i> Louisbourg, Truro, Moncton.....		2,711·9	3,126
	St. Andrew's do do.....		2,785·6	3,211
	St. Stephen do do.....		2,856·7	3,293

N.B.—For comparative statements of distances on various routes, and subsidies, see Nos. 17, 18, 19, 21.

ROUTE D 2.

Distances from Liverpool, England, to Yokohama, Japan.

No. 5.—LOUISBOURG, ST. JOHN, MATTAWAMKEAG, SHEBROOKE, MONTREAL AND PORT MOODY ROUTE.

From	To	Geo- graphical Miles.	Statute Miles.
Liverpool.....	Louisbourg.....Atlantic Ocean	2,350	2,709
Louisbourg.....	New Glasgow—See Route D 1.....	139	160
New Glasgow.....	St. John, N.B.....Intercolonial Railway	223	257
St. John.....	Mattawamkeag Junction...St. John & Maine and European & North American Railways.....	128	147
Mattawamkeag Junction.....	Lake Megantic..Projected continuation of International Ry.	117	135
Lake Megantic.....	Sherbrooke.....International Railway	60	69
Sherbrooke.....	Montreal.....Grand Trunk Railway	88	101
Montreal.....	St. Martin Junction.....Canadian Pacific Railway	10	12
St. Martin Junction..	Port Moody...Canadian Pacific Railway—For details, see D 1.....	2,475	2,853
Total—Louisbourg...	Port Moody.....Railway	3,240	3,734
Port Moody.....	Yokokama.....Pacific Ocean	4,374	5,042
Total—Liverpool.....	Yokokama, <i>via</i> Louisbourg, St. John, Mattawamkeag, Sher- brooke, Montreal and Port Moody.....	9,964	11,485

N.B.—For comparative statements of distances on the various routes, see Nos. 17, 18, 19.
For subsidies, see Nos. 21, 23.

St. John to Vanceboro'.....New Brunswick Railway, 91.5 Statute Miles.
Vanceboro' to Mattawamkeag.....Maine Central Railway, 56.0 do
Vanceboro' to Portland.....do do 250.7 do

ROUTE E 1.

Distances from Liverpool, England, to Yokohama, Japan.

No. 6.—HALIFAX AND QUEBEC ROUTE WITH BRANCH LINES TO ST. JOHN AND ST. ANDREW'S.

By Intercolonial, North Shore and Canadian Pacific Railways.

From	To	Intermediate Mileage. Statute Miles.	Geo- graphical Miles.	Statute Miles.
Liverpool.. .. .	Halifax, Nova Scotia.....Atlantic Ocean		2,500·0	2,881
Halifax	Truro.....Intercolonial Railway	62	53·8	62
	Moncton.....Intercolonial Railway	125	162·2	127
	Chatham Junction.....	72	224·7	259
	Rimouski.....	237	430·3	496
	Rivière du Loup.....	65	486·7	561
	Quebec.....	126	596·0	687
	Three Rivers.....North Shore Railway	77	662·8	764
	St. Martin Junction.....	82	733·9	846
	Ottawa.....Canadian Pacific Railway	108	827·6	954
	Sudbury Junction.....	324	1,108·7	1,278
	Port Arthur.....	547	1,583·3	1,825
	Winnipeg.....	429	1,955·5	2,254
	Portage la Prairie.....	56	2,004·0	2,310
	Brandon.....	77	2,070·8	2,387
	Qu'Appelle.....	191	2,236·5	2,578
	Regina.....	33	2,265·2	2,611
	Calgary.....	482	2,683·3	3,093
	Stephen.....	123	2,790·0	3,216
	Savona Ferry.....	268	3,022·5	3,484
	Port Moody.....	215	3,209·1	3,699
Port Moody.....	Yokohama.....Pacific Ocean		4,374·0	5,042
Total—Liverpool	Yokohama, <i>via</i> Halifax, Quebec and C.P.R.....		10,083·0	11,622
Liverpool.....	Halifax.....Atlantic Ocean		2,499·4	2,881
Halifax.....	Truro.....Intercolonial Railway		53·3	62
Truro.....	Moncton.....		108·4	125
Moncton.....	St. John.....		77·2	89
Total—Liverpool	St. John <i>via</i> Halifax and Moncton.....		2,738·8	3,157
St. John.....	St. Andrew's.....Grand Southern Railway		73·7	85
Total—Liverpool	St. Andrew's, <i>via</i> Halifax, Moncton and St. John.....		2,812·5	3,242

N.B.—For comparative statements of distances on the various routes, see Nos. 17, 18, 19.
For subsidy, see No. 24.

ROUTE E 2.

Distances from Liverpool, England, to Yokohama, Japan.

No. 7.—HALIFAX, ST. JOHN, MATTAWAMKEAG, SHEBROOKE, MONTREAL AND PORT MOODY ROUTE.

From	To	Geo- graphical Miles.	Statute Miles.
Liverpool	Halifax..... Atlantic Ocean	2,500	2,881
Halifax	St. John..... Intercolonial Railway	239	276
St. John	St. Martin Junction—For details, see Route D 2.....	403	464
St. Martin Junction..	Port Moody—For details, see Route D 1.....	2,475	2,853
Total—Halifax.....	Port Moody..... Railway	3,117	3,593
Port Moody	Yokohama..... Pacific Ocean	4,374	5,042
Total—Liverpool.....	Yokohama, <i>via</i> Halifax, St. John, Mattawamkeag, Sher- brooke, Montreal and Port Moody.....	9,991	11,516

N.B.—For comparative statements of distances on the various routes, see Nos. 17, 18, 19.
For subsidy, see Nos. 23, 24.

ROUTES F. 1, F. 2.

Distances from Liverpool, England, to Yokohama, Japan.

No. 8.—ST. JOHN, NEW BRUNSWICK AND QUEBEC ROUTE, with Branch Line to St. Andrew's.

By Fredericton and Edmundston Railway, Témiscouata Road and Intercolonial Railway to Quebec; thence by North Shore and Canadian Pacific Railways.

From	To	Intermediate Mileage. Statute Miles.	Geo-graphical Miles.	Statute Miles.
Liverpool.....	St. John.....Atlantic Ocean		2,700·0	3,112
St. John.....	Fredericton Junction.....New Brunswick Railway	46	39·9	46
	Fredericton.....	22	59·0	68
	Edmundston.....	160	197·8	228
	Rivière du Loup, Témiscouata Road. Projected railway	80	267·2	308
	Quebec.....Intercolonial Railway	128	376·5	431
	Three Rivers.....North Shore Railway	77	443·3	511
	St. Martin Junction, 12 miles from Montreal.....	82	514·5	593
	Ottawa.....Canadian Pacific Railway	108	608·2	701
	Sudbury Junction.....	324	889·2	1,025
	Port Arthur.....	547	1,363·7	1,572
	Winnipeg.....	429	1,736·0	2,001
	Portage la Prairie.....	56	1,784·6	2,057
	Brandon.....	77	1,851·4	2,134
	Qu' Appelle.....	191	2,017·1	2,325
	Regina.....	33	2,045·7	2,358
	Calgary.....	483	2,483·8	2,840
	Stephen.....	123	2,570·6	2,963
	Savona Ferry.....	268	2,803·1	2,231
	Port Moody.....	215	2,989·6	3,446
Port Moody.....	Yokohama.....Pacific Ocean		4,374·0	5,042
Total—Liverpool	Yokohama, via St. John, Fredericton, Quebec, North Shore and Canadian Pacific Railways..... F. 2.		10,964·0	11,600
Liverpool... ..	St. John.....Atlantic Ocean		2,700·0	3,112
St. John.....	Moncton.....Intercolonial Railway		77·2	89
Moncton.....	Quebec.....		433·8	500
Total—Liverpool	Quebec, via St. John, Moncton. Intercolonial Railway.....		3,211·0	3,701
	Ottawa, via St. John, Moncton. Intercolonial, North Shore and Canadian Pacific Railways		3,442·0	3,968
	Winnipeg.....		4,570·0	5,268
	Port Moody.....		5,824·0	6,713
	Yokohama.....Pacific Ocean. F. 1.		10,198·0	11,755
St. John.....	Halifax via Moncton and Truro..... Intercolonial Railway		239·4	276
	Fredericton via Fredericton Junction.....		59·0	68
	St. Andrew's via Grand Southern Railway.....		73·7	85

N.B.—For comparative statements of distances on the various routes, see Nos. 17, 18, 19.

For subsidy, Edmundston to Rivière du Loup, see No. 22.

ROUTE F 3.

Distances from Liverpool, England, to Yokohama, Japan.

No. 9.—ST. JOHN, MATTAWAMKEAG, SHERBROOKE, MONTREAL AND PORT MOODY ROUTE.

From	To	Geo- graphical Miles.	Statute Miles.
Liverpool.....	St John.....Atlantic Ocean	2,700	3,112
St. John.....	Mattawamkeag Junction..St. John and Maine and European and North American Railways...	128	147
Mattawamkeag Junction	St. Martin Junction—For details, see Route D 2.....	275	317
St. Martin Junction..	Port Moody—For details, see Route D 1.	2,475	2,853
Total—St. John.....	Port Moody..... Railway	2,878	3,317
Port Moody.....	Yokohama.....Pacific Ocean	4,374	5,042
Total—Liverpool.....	Yokohama, <i>via</i> St. John, Mattawamkeag, Sherbrooke, Mon- treal and Port Moody.....	9,952	11,471

N.B.—For comparative statements of distances on the various routes, see Nos. 17, 18, 19.

For Subsidy see No. 23.

St. John to Vanceboro'.....New Brunswick Railway, 91.5 Statute Miles.

Vanceboro' to Mattawamkeag.....Maine Central Railway, 56.0 do

ROUTE G 1.

Distances from Liverpool, England, to Yokohama, Japan.

No. 10.—ST. ANDREW'S, NEW BRUNSWICK AND QUEBEC ROUTE WITH BRANCH LINE TO ST. JOHN.
By Woodstock and Edmundston, Intercolonial, North Shore and Canadian Pacific Railways.

From	To	Intermediate Mileage. Statute Miles.	Geo- graphical Miles.	Statute Miles.
Liverpool.....	St. Andrew's..... Atlantic Ocean		2,680·0	3,089
St. Andrews.	McAdam Junction...New Brunswick Railway	43	37·3	43
	Woodstock.....	51	81·5	94
	Edmundston.....	113	179·6	207
	Rivière du Loup..... Témiscouata Road	80	249·0	287
	Quebec Intercolonial Railway	126	358·3	413
	Three Rivers..... North Shore Railway	77	425·1	490
	St. Martin Junction, 12 miles from Montreal...	82	496·2	572
	Ottawa..... Canadian Pacific Railway	108	589·9	680
	Sudbury Junction.....	324	871·0	1,004
	Port Arthur.....	547	1,345·6	1,551
	Winnipeg.....	429	1,717·8	1,980
	Portage la Prairie.....	56	1,766·3	2,036
	Brandon.....	77	1,838·1	2,113
	Qu'Appelle.....	191	1,998·8	2,304
	Regina.....	33	2,027·5	2,337
	Calgary.....	482	2,445·6	2,819
	Stephen.....	123	2,552·3	2,942
	Savona Ferry.....	268	2,784·8	3,210
	Port Moody.....	215	2,971·3	3,425
Port Moody.	Yokohama..... Pacific Ocean		4,374·0	5,042
Total—Liverpool ...	Yokohama <i>via</i> St. Andrew's, Woodstock, Que- bec, North Shore and Canadian Pacific Railways.....		10,025·0	11,556
Liverpool.....	St. Andrew's..... Atlantic Ocean		2,680·0	3,089
St. Andrew's.	McAdam Junction..... Railway	43	37·3	43
McAdam Junction ...	Fredericton Junction	40	34·7	40
Fredericton Junction	Fredericton	22	19·1	22
Fredericton.....	Edmundston.....	160	138·8	160
Edmundston.....	Rivière du Loup, Témiscouata Road. Projected Railway.....	80	69·4	80
Rivière du Loup.....	Quebec..... Intercolonial Railway	126	109·3	126
		471		
Total—Liverpool.....	Quebec <i>via</i> St. Andrew's, McAdam Junction, Fredericton, Edmundston and Rivière du Loup.....		3,088·5	3,560
Fredericton.....	St. John <i>via</i> Fredericton Junction..... Railway	68	59·0	68
St. Andrew's.....	St. John <i>via</i> Grand Southern Railway.....	85	73·7	85

N. B.—For comparative statements on the various routes, see Nos. 17, 18, 19. For subsidy from Edmundston to Rivière du Loup, see No. 22.

ROUTE G 2.

Distances from Liverpool, England to Yokohama, Japan.

No. 11.—ST. ANDREW'S MATTAWAMKEAG, SHERBROOKE, MONTREAL AND PORT MOODY ROUTE.

From	To	Geo- graphical Miles.	Statute Miles.
Liverpool	St. Andrew's.....Atlantic Ocean	2,680	2,082
St. Andrew's	Mattawamkeag Junction, New Brunswick and European and North American Railways.....	91	105
Mattawamkeag Junc- tion	St. Martin Junction—For details, see Route D 2.....	275	317
St. Martin Junction.	Port Moody—For details, see Route D 1.....	2,475	2,853
Total—St. Andrew's	Port Moody .....Railway	2,841	3,275
Port Moody	Yokohama Pacific Ocean	4,374	5,042
Total—Liverpool	Yokohama, <i>via</i> St. Andrew's, Mattawamkeag, Sherbrooke, Montreal and Port Moody	9,895	11,406

N.B.—For comparative statements of distances on the various routes, see Nos. 17, 18 and 19.

For subsidy, see No. 23.

St. Andrew's to Vanceboro'.....New Brunswick Railway, 49 statute miles.

Vanceboro' to Mattawamkeag Junction.....Maine Centra Railway, 56 do

ROUTE H.

Distances from Liverpool, England, to Yokohama, Japan.

No. 12.—CHATHAM, NEW BRUNSWICK, EDMUNDSTON AND QUEBEC ROUTE.
By Projected Railway.

From	To	Intermediate Mileage. Statute Miles.	Geo- graphical Miles.	Statute Miles.
Liverpool.....	Chatham, R. Miramichi. Atlantic Ocean, <i>via</i> Cape Race.....		2,558·0	2,919
Chatham.....	Chatham Junction.....	9	7·8	9
	Edmundston.....	165	143·0	165
	Quebec.....	170	290·6	335
	Montreal, St. Martin Junction...North Shore Rail- way.....	159	428·5	494
	Ottawa.....	103	522·3	602
	Winnipeg.....	1,300	1,650·1	1,902
	Port Moody.....	1,445	2,903·7	3,347
Port Moody.....	Yokohama.....		4,374·0	5,042
Total—Liverpool.....	Yokohama, <i>via</i> Projected Railway, Chatham, Ed- mundston and Quebec.....		9,836·0	11,338

N.B.—For comparative statements of distances on the various routes, see Nos. 17, 18 and 19.

DETAILS—ROUTE A.—Continued.

CANADIAN PACIFIC RAILWAY.

No. 14.—Main Trunk, Branch and Subsidiary Lines, 1884.

Statute Miles from Montreal.	From	To	Statute Miles.	Total.
MAIN TRUNK LINE, Montreal to Port Moody, 1,952 miles operated. About 913 miles remaining to be completed. (See note below)...			2,865	2,865
BRANCH LINES.				
19	Ste. Thérèse.....	St. Eustache.....	8	
19	Ste. Thérèse.....	St. Jérôme.....	14	
21	St. Lin Junction.....	St. Lin.....	13	
118	Hull.....	Aylmer.....	7	
120	Ottawa <i>via</i> St. Lawrence & Ottawa Railway....	Prescott.....	54	
149	Carleton Place Junction.....	Brockville.....	46	
167	Smith's Falls.....	Perth.....	12	
444	Sudbury Junction.....	Algoma Mills.....	93	
1,399	East Selkirk.....	Colville Landing.....	2	
1,419	St. Boniface, 1 mile from Winnipeg Junction....	Emerson.....	64	
1,420	Winnipeg.....	Gretna.....	70	
1,476	Pembina Junction, Rosenfield.....	Manitou.....	46	
1,478	do do.....	Emerson.....	15	
1,420	Winnipeg.....	West Selkirk.....	22	
1,421	Air Line Junction, 1 mile from Winnipeg.....	Stonewall.....	19	
1,420	Winnipeg <i>via</i> Manitoba South-Western Colonization Railway.....	End of track.....	51	
Total—Branch Lines.....			536	536
SUBSIDIARY LINES ACQUIRED BY LEASE OR PURCHASE.				
<i>Ontario and Quebec Railway.</i>				
179	Perth.....	Toronto Junction.....	199	
<i>Credit Valley Railway.</i>				
382½	Toronto, Union Station.....	St. Thomas.....	121	
	Streetsville Junction.....	Orangeville.....	35	
	Church Falls.....	Elora.....	27	
			183	
<i>Toronto, Grey and Bruce Railway.</i>				
382½	Toronto.....	Owen Sound.....	122	
	Orangeville Junction.....	Teeswater.....	70	
			192	
Total—Subsidiary Lines.....			574	574
Total—Main Trunk, Branch Lines and Subsidiary Lines, under Canadian Pacific Railway Company, up to October, 1884 ..				3,975

N.B.—On 20th July, 1884, the above Railways were completed and operated, excepting 430 miles, north of Lakes Huron and Superior, also 268 miles west from summit of Rocky Mountains to Savona Ferry, and 215 miles thence to Port Moody, the whole in progress and to be completed, part in 1885 and the remainder in 1886. The Branch to Algoma Mills, not fully completed, to be operated in 1885—see Nos. 1 and 13.

DETAILS—ROUTE B.

No. 15.—COMPARATIVE STATEMENT.

Distances from Montreal and Ottawa to Toronto *via* Canadian Pacific and Grand Trunk Railways.

From	To	Geo-graphical Miles,	Statute Miles.
Montreal	Ottawa..... <i>via</i> C. P. R.	104	120
Ottawa.....	Perth do	51½	59
Perth.....	Toronto (Union Station) do	176½	203½
Montreal.....	Toronto <i>via</i> C. P. R.	331½	382½
Montreal.....	Prescott..... <i>via</i> G. T. R.	97	112
Prescott	Brockville..... do	11½	13
Brockville.....	Kingston do	40½	47
Kingston.....	Toronto (Union Station). do	139½	161
Montreal.....	Toronto..... <i>via</i> G. T. R.	288½	333
Ottawa.....	Toronto (Union Station) <i>via</i> C. P. R.....	227½	262½
do	do <i>via</i> P. St. L. & O. and G. T. R.	238½	275
do	do <i>via</i> Brockville, C. P. R. and G.	245½	283

N.B.—See table of distances No. 2.

DETAILS—ROUTE C.

No. 16.—COMPARATIVE TABLE OF DISTANCES—Statute Miles.

From Quebec and other places to Port Moody, *vid* North Shore, Grand Trunk, United States and Canadian Pacific Railways.

Present Summer and Winter Route.

Canadian and United States Territories.

From	To	Intermediate.	Quebec.	Montreal.	Toronto.	Detroit.	Chicago.	St. Paul.	Winnipeg.
	Quebec.....	.....	0	171	504	735	1,003	1,413	1,870
Quebec	Montreal.....	171	171	0	333	564	832	1,242	1,699
Montreal	Toronto	333	504	333	0	231	499	909	1,368
Toronto	Detroit	231	735	564	231	0	268	678	1,135
Detroit	Chicago	268	1,003	832	499	268	0	410	867
Chicago	St. Paul, W.....	410	1,413	1,242	909	678	410	0	457
St. Paul	Minneapolis.....	10	1,423	1,352	919	688	420	10	447
Minneapolis	St. Vincent.....	319	1,802	1,631	1,298	1,067	799	389	68
St. Vincent.....	Emerson	2	1,804	1,633	1,300	1,069	801	391	68
Emerson	Winnipeg.....	66	1,870	1,699	1,368	1,135	867	457	0
Winnipeg	Portage la Prairie.....	66	1,926	1,755	1,422	1,191	923	513	56
Portage la Prairie.....	Brandon	77	2,003	1,832	1,499	1,268	1,000	590	133
Brandon	Qu'Appelle.....	191	2,194	2,023	1,690	1,459	1,191	781	324
Qu'Appelle.....	Regina.....	33	2,227	2,056	1,723	1,492	1,224	814	357
Regina.....	Swift Current.....	164	2,381	2,210	1,877	1,646	1,378	968	511
Swift Current.....	Medicine Hat.....	149	2,530	2,359	2,028	1,795	1,527	1,117	660
Medicine Hat.....	Gleichen.....	135	2,655	2,484	2,151	1,920	1,652	1,242	785
Gleichen.....	Galgary.....	64	2,709	2,538	2,205	1,974	1,706	1,296	839
Galgary.....	Canmore.....	67	2,776	2,605	2,272	2,041	1,773	1,363	906
Canmore	Silver City.....	32	2,808	2,637	2,304	2,073	1,805	1,395	938
Silver City.....	Stephen, summit of Rocky Mountains.....	24	2,832	2,661	2,328	2,097	1,829	1,419	962
Stephen	Savona Ferry.....	128	3,100	2,929	2,596	2,365	2,097	1,687	1,230
Savona Ferry.....	Emory's Bar.....	129	3,229	3,058	2,725	2,494	2,226	1,816	1,359
Emory's Bar.....	Port Moody.....	66	3,315	3,144	2,811	2,580	2,312	1,902	1,445

N.B.—† Estimated.—In progress.

‡ Nearly completed.

See table of distances No. 3.

ROUTES A, B, C, *via*

No. 17.—COMPARATIVE STATEMENT of Distances in Geographical and Statute Miles and Inland Ports of Canada, etc., and to

For Details—See Route.	Quebec.		Montreal.		Toronto.		Ottawa.		Winnipeg.		Port Moody, Strait of Georgia, B.C.	
	Geographical Miles.	Statute Miles.	Geographical Miles.	Statute Miles.	Geographical Miles.	Statute Miles.	Geographical Miles.	Statute Miles.	Geographical Miles.	Statute Miles.	Geographical Miles.	Statute Miles.
...	2,819	3,249	City. 2,958	City. 3,409	3,247	3,742	3,061	3,529	.....	.....	.....	.....
A 1	2,819	3,249	St. Martin Junction. 2,957	St. Martin Junction. 3,408	.....	.....	3,051	3,516	4,178	4,816	5,432	6,261
A 2	2,661	3,067	City. 2,967	City. 3,420	.....	.....	2,893	3,334	4,020	4,634	5,274	6,079
B.	2,819	3,249	St. Martin Junction. 2,957	St. Martin Junction. 3,408	Junction. 3,274	Junction. 3,774	3,051	3,516	4,208	4,850	5,462	6,295
C.	2,819	3,249	City. 2,967	City. 3,420	City. 3,277	City. 3,778	.....	.....	4,441	5,119	5,695	6,564

N.B.—For routes D, E, F, G, H—See Comparative Statement No. 18.
 For details of routes A 1 to H—through Canada *via* Port Moody—See Nos. 1 to 25.
 For routes I 1 to O—through United States *via* San Francisco—See Nos. 26 to 43.
 For summary of routes A 1 to H—through Canada—See No. 19.
 For summary of routes I 1 to O—through United States—See No. 43.

SEAPORT OF QUEBEC.

on the various Routes indicated from Liverpool, England, to the principal Seaports Yokohama on the Eastern Coast of Japan.

Victoria, B.C., <i>via</i> Nanaimo (Projected Rail- way.)		Yokohama, East Coast of Japan.		Route.
Geographical Miles.	Statute Miles.	Geographical Miles.	Statute Miles.	
.....	.....	.....	.....	Atlantic Ocean <i>via</i> Malin Head, North of Ireland, Cape Race, Newfoundland, Gulf and River St. Lawrence, etc. Water route throughout.
5,534	6,379	9,806	11,303	Atlantic <i>via</i> Cape Race to Quebec, North Shore and Canadian Pacific Railways to Port Moody, and Pacific Ocean to Yokohama, Japan.
5,376	6,197	9,648	11,121	Atlantic <i>via</i> Strait of Belle-Ile. Remainder the same as preceding route. The Cape Race route is 158 geographical miles = 182 statute miles longer than <i>via</i> Belle-Ile.
5,564	6,413	9,835	11,337	Atlantic <i>via</i> Cape Race to Quebec; thence North Shore and Canadian Pacific Railways <i>via</i> Montreal, Ottawa, Perth, Toronto, and Orangeville to Owen Sound; thence across Lake Huron to Sault Ste. Marie Canal; thence across Lake Superior to Port Arthur; thence Canadian Pacific Railway to Winnipeg and Port Moody; thence across Pacific Ocean to Yokohama, Japan. This is the present summer route through Canada. For same route <i>via</i> Strait of Belle-Ile, deduct 158 geographical miles = 182 statute miles.
5,797	6,682	10,069	11,606	Atlantic <i>via</i> Cape Race, North Shore Railway to Montreal; thence Grand Trunk Railway to Detroit; thence <i>via</i> United States Railways to Chicago and Emerson; thence Canadian Pacific Railway to Winnipeg. This is the present winter route through Canada and the United States, pending the completion of the Canadian Pacific Railway, north of Lakes Huron and Superior, between Sudbury Junction and Port Arthur, and on the Rocky Mountains, between the summit and Savona Ferry. On 20th July, 1884, the unfinished portions, then in progress, may be estimated at 430 miles north of Lakes Huron and Superior, and at 268 miles on the Rocky Mountains.

ROUTES D, E, F, G, H, VIA SEAPORTS OF NOVA SCOTIA AND NEW BRUNSWICK.

No. 18.—COMPARATIVE STATEMENT of Distances in Geographical and Statute Miles, on the various Routes indicated, from Liverpool, England, to the principal Seaports and Inland Ports of Canada, and to Yokohama, on the Eastern coast of Japan—Continued.

For Details. See Route.	LOUISBOURG.		HALIFAX.		ST. JOHN.		ST. ANDREW'S.		CHATHAM.		QUEBEC.		MONTREAL.		OTTAWA.		WINNIPEG.		PORT MOODY.		YOKOHAMA.		DESCRIPTION OF ROUTES.
	Geographical Miles.	Statute Miles.	Geographical Miles.	Statute Miles.	Geographical Miles.	Statute Miles.	Geographical Miles.	Statute Miles.	Geographical Miles.	Statute Miles.	Geographical Miles.	Statute Miles.	Geographical Miles.	Statute Miles.	Geographical Miles.	Statute Miles.	Geographical Miles.	Statute Miles.	Geographical Miles.	Statute Miles.	Geographical Miles.	Statute Miles.	
D 1...	2,350	2,709							Junction.	Junction.			St. Martin Junction.	St. Martin Junction.									Louisbourg Route <i>via</i> projected railway about 80 miles long to Port Mulgrave, Strait of Canso; thence <i>via</i> New Glasgow and Truro, Intercolonial, North Shore and Canadian Pacific Railways. The distances by this route to Halifax, St. John and St. Andrew's are shown on table of details No. 4.
D 2...	2,350	2,709			2,712	3,126																	Louisbourg Route <i>via</i> Intercolonial R. to St. John, 417 M.; thence <i>via</i> Mattawamkeag, Lake Megantic and Sherbrooke to Montreal, 452 M. by St. John and Maine, International and Grand Trunk Railways. See table No. 5. For further details, see Halifax Route <i>via</i> St. John, Mattawamkeag and Sherbrooke to Montreal, below.
E 1...			2,500	2,881					Junction.	Junction.			St. Martin Junction.	St. Martin Junction.									Halifax Route <i>via</i> Intercolonial, North Shore, and Canadian Pacific Railways. Halifax to St. John, 278 M. by Intercolonial R., and thence 85 M. by Grand Southern Railway to St. Andrew's. For details respecting this route, see table No. 6.
E 2...			2,500	2,881	2,739	3,157																	Halifax Route <i>via</i> Truro and Moncton to St. John by Intercolonial, 276 M.; thence to Mattawamkeag Junction, 147 M. by St. John and Maine Railway; thence to Lake Megantic by International Railway projected extension of about 135 M.; thence to Sherbrooke by the latter Railway, 69 M.; thence by Grand Trunk Railway, 101 M. to City of Montreal; thence 2,865 M. to Port Moody. The distance by this route to Quebec, <i>via</i> International Railway to Sherbrooke, and thence by Grand Trunk Railway, is 21 M. greater than to Montreal, or 3,630 M. from Liverpool. See table No. 7.
F 1...					2,700	3,112			Junction.	Junction.			St. Martin Junction.	St. Martin Junction.									St. John, New Brunswick, Route <i>via</i> Intercolonial R. to Moncton and Quebec; thence <i>via</i> North Shore R. to Montreal; thence by Canadian Pacific Railway to Port Moody. For details respecting this route, see table No. 8.
F 2...					2,700	3,112							St. Martin Junction.	St. Martin Junction.									St. John, N.B., Route <i>via</i> Fredericton and New Brunswick Railways to Edmundston, 228 M.; thence 80 M. projected railway to Rivière du Loup; thence 126 M. by Intercolonial Railway to Quebec; thence <i>via</i> North Shore Railway, 171 M. to Montreal; thence Canadian Pacific Railway, 2,865 M. to Port Moody. See table No. 8.
F 3...					2,700	3,112							St. Martin Junction.	St. Martin Junction.									St. John, N.B., Route <i>via</i> Sherbrooke to Montreal, 452 M. by the St. John and Maine, the International and Grand Trunk Railways—St. John <i>via</i> Sherbrooke to Quebec, 473 M. St. John to Louisbourg, by Intercolonial Railway, 417 M. See table No. 9.
G 1...							2,680	3,089					St. Martin Junction.	St. Martin Junction.									St. Andrew's, New Brunswick Route <i>via</i> Canada and New Brunswick Railways to Woodstock, 94 M.; thence 113 M. to Edmundston; thence to Rivière du Loup, 80 M. by projected Railway; thence 126 M. by Intercolonial R. to Quebec; thence <i>via</i> North Shore R. and C. P. R. to Port Moody, 3,012 M. See table No. 10.
G 2...							2,680	3,089					St. Martin Junction.	St. Martin Junction.									St. Andrew's, N.B., Route <i>via</i> Mattawamkeag and Sherbrooke, 410 M. to Montreal, by St. John and Maine Railway, International and Grand Trunk Railways. See Halifax Route by these lines of Railway, or table No. 11. St. Andrew's to St. John, by Grand Southern Railway, 85 M. St. Andrew's to Chatham, by Grand Southern and Intercolonial R., 246 M.
H									Town.	Town.			St. Martin Junction.	St. Martin Junction.									Chatham Route, New Brunswick, <i>via</i> Cape Race, 2,949 statute miles from Liverpool, Atlantic Ocean. Chatham to Edmundston, 165 M., and thence to Quebec, 170 M. <i>via</i> projected "Quebec and Chatham Railway," thence North Shore Railway, 159 miles to St. Martin Junction; thence 2,853 M. to Port Moody, by the Canadian Pacific Railway; thence 5,042 S.M. across Pacific Ocean to Yokohama on East coast of Japan. See table No. 12. Chatham to St. John, by Intercolonial Railway, 161 M., and thence 85 M. by Grand Southern Railway to St. Andrew's. For Chatham route <i>via</i> Strait of Belle-Ile, deduct 158 geographical or 182 statute miles from each of the distances on this route from Liverpool.

N.B.—For Routes A 1, A 2, B and C, see Comparative Statement No. 17.
For Details of Routes A 1 to H, through Canada *via* Port Moody, see Nos. 1 to 25.
For Routes I 1 to O, through United States *via* San Francisco, see Nos. 26 to 43.
For Summary of Routes A 1 to H, through Canada, see No. 19.
For Summary of Routes I 1 to O, through United States, see No. 43.

SUMMARY.

No. 19.—ROUTES A, B, C, D, E, F, G, H.

COMPARATIVE STATEMENT of Distances between Liverpool, England and Yokohama, Japan, on the respective Routes indicated, through Canada *via* Port Moody.

For Details see	Routes.	Geo-graphical Miles.	Statute Miles.
A 1.	Quebec, Ottawa and Port Moody <i>via</i> Strait of Belle-Ile.....	9,648	11,121
A 2.	Quebec, Ottawa and Port Moody <i>via</i> Cape Race.....	9,806	11,303
B.	Quebec, Ottawa, Owen Sound, Lakes Huron and Superior, and Port Moody <i>via</i> Cape Race	9,835	11,337
H.	Chatham, Quebec, Ottawa and Port Moody <i>via</i> Cape Race.....	9,836	11,338
G 2.	St. Andrew's, Mattawamkeag, Sherbrooke, Montreal, Ottawa and Port Moody.....	9,895	11,406
F 3.	St. John, Mattawamkeag, Sherbrooke, Montreal, Ottawa and Port Moody.....	9,952	11,471
D 2.	Louisbourg, St. John, Mattawamkeag, Sherbrooke, Montreal, Ottawa and Port Moody.....	9,964	11,485
E 2.	Halifax, St. John, Mattawamkeag, Sherbrooke, Montreal, Ottawa and Port Moody.....	9,991	11,516
G 1.	St. Andrew's, Edmundston, Rivière du Loup, Quebec, Ottawa and Port Moody.....	10,025	11,556
D 1.	Louisbourg, Quebec, Montreal, Ottawa and Port Moody.....	10,055	11,591
F 2.	St. John, Edmundston, Rivière du Loup, Quebec, Ottawa and Port Moody.....	10,064	11,600
C.	Quebec, Montreal, Toronto, Detroit, Chicago, St. Paul, Emerson, Winnipeg and Port Moody <i>via</i> Cape Race.....	10,065	11,606
E 1.	Halifax, Quebec, Montreal, Ottawa and Port Moody.....	10,083	11,622
F 1.	St. John, Moncton, Quebec, Montreal, Ottawa and Port Moody.....	10,198	11,753

N.B.—See comparative statements, Nos. 17 and 18—Routes through Canada.
See Summary, No. 43—Routes through the United States *via* San Francisco.

No. 20.—NOTE—ROUTES A 1, A 2.

SUBSIDIES GRANTED

To North Shore Railway from Quebec to Montreal, 159 miles.

Canadian Pacific Railway from Montreal to Ottawa, 120 miles.

Year.	Act.	Nature of Grant and by whom Granted.	Money Subsidies.
1884.		<i>By Federal Government.</i>	\$
April 19	47 Vic., cap. 8...	To the Government of the Province of Quebec, in consideration of their having constructed the railway from Quebec to Ottawa, forming a connecting line between the Atlantic and Pacific coasts, <i>via</i> the Intercolonial and Canadian Pacific Railways, and being as such, a work of national and not merely Provincial utility, a subsidy not exceeding \$6,000 per mile for the portion between Quebec and Montreal, 159 miles, nor exceeding in the whole.....	954,000
		And for the portion between Montreal and Ottawa, 120 miles, \$12,000 per mile, nor exceeding in the whole.....	1,440,000
		For the extension of the Canadian Pacific Railway, from its terminus to St. Martin's Junction near Montreal, or some other point on the Canadian Pacific Railway, to the harbour of Quebec, in such manner as may be approved by the Governor in Council, a subsidy not exceeding \$6,000 per mile, nor exceeding in the whole.....	960,000

N.B.—See tables of distances, &c., Nos. 1, 13.

For cash and land subsidies granted by Federal Government to Canadian Pacific Railway between Ottawa and Port Moody, see No. 13.

No. 21.—NOTE—ROUTES D 1, D 2.

SUBSIDIES GRANTED

For the Construction of a Railway from Oxford Station, on the Intercolonial Railway, to Louisbourg or Sydney, in the Province of Nova Scotia.

Year.	Act.	Nature of Grant and by whom Granted.	Money Subsidies.
		<i>By Federal Government.</i>	\$
1882.....	45 Vic., cap. 14..	For a railway from Oxford to New Glasgow, both in the Province of Nova Scotia, a subsidy not exceeding \$3,200 per mile, nor exceeding in the whole (70 miles).....	224,000
1883.....	46 Vic., cap. 25..	The railway from Canso to Louisbourg or Sydney, in the Province of Nova Scotia, a subsidy not exceeding \$3,200 per mile, nor exceeding in the whole (80 miles).	256,000
1884.	47 Vic., cap. 8...	For the construction of a line of railway from Oxford Station, on the Intercolonial Railway, to Sydney or Louisbourg, a subsidy not exceeding \$30,000 per annum, for fifteen years, or a guarantee of a like sum for a like period as interest on the bonds of the company undertaking the work, in addition to the subsidies previously granted, and also a lease or transfer to such company of the Eastern Extension Railway, from New Glasgow to Canso, with its present equipment...	450,000
		Total..	930,000

REMARKS.

The subsidy of \$224,000 is for the construction of a shorter and more direct line, estimated at about 70 miles in length.

The distance from New Glasgow to Port Mulgrave, on Gut of Canso, by the existing railway, is 79½ miles.

The existing railway from Oxford to New Glasgow is 90 miles in length, *via* Truro.

The distance from Oxford to Truro, 47 miles, and thence to New Glasgow, 43 miles.

For tables of distances on Louisbourg routes, see Nos. 4 and 5.

No. 22.—NOTE.—ROUTES F 2, G 1.

SUBSIDY GRANTED

For the Construction of a Railway from Edmundston or Little Falls, New Brunswick, to Intercolonial Railway at Rivière du Loup, in the Province of Quebec.

Year.	Act.	Nature of Grant and by whom Granted.	Money Subsidy.
		<i>By Federal Government.</i>	\$
1882.....	45 Vic., cap. 14.	For a railway from Rivière du Loup, in the Province of Quebec, to Edmundston, in the Province of New Brunswick, a subsidy not exceeding \$3,200 per mile, nor exceeding in the whole (for 75 miles).....	240,000

N B —The above subsidy has been granted to the New Brunswick Railway Company.
For tables of distances on routes *via* Edmundston, Rivière du Loup and Quebec, see Nos. 8 and 10.

No. 23.—NOTE.—ROUTES D 2, E 2, F 3, G 2.

SUBSIDY GRANTED

To the International Railway Company, for 49 miles of railway, from Sherbrooke, in the Province of Quebec, to the International Boundary Line.

Year.	Act.	Nature of Grant and by whom Granted.	Money Subsidy.
		<i>By Federal Government.</i>	\$
1883.....	46 Vic., cap. 25.	To the International Railway Company, for 49 miles of their railway, from Sherbrooke, in the Province of Quebec, to the International Boundary Line, a subsidy not exceeding \$3,200 per mile, nor exceeding in the whole..... In connection with the extension of this road through Maine, to connect with New Brunswick, [at or near Vanceboro', or south of that point.	156,800

N.B.—For tables of distances on routes *via* International Railway, State of Maine and Canada see Nos. 5, 7, 9 and 11.

No. 24.—NOTE.—ROUTES E 1, E 2, F 2, F 3.

SUBSIDY GRANTED

For the construction of a line of Railway, connecting Montreal with the Harbours of St. John and Halifax, by the shortest and best practicable route.

Year.	Act.	Nature of Grant and by whom Granted.	Money Subsidy.
1884.....	47 Vic., cap. 8...	<p style="text-align: center;"><i>By Federal Government.</i></p> <p>For the construction of a line of railway, connecting Montreal with the harbours of St. John and Halifax, by the shortest and best practicable route, after the report of competent engineers, a subsidy not exceeding \$170,000 per annum for fifteen years, or a guarantee of a like sum for a like period as interest on bonds of the company undertaking the work.</p>	<p style="text-align: center;">\$</p> <p style="text-align: right;">2,550,000</p>

N.B.—For tables of distances on shortest route connecting the harbours of St. John, N.B., and Halifax, N.S., with Montreal, P.Q., see Nos. 6, 7, 8 and 9.

No. 25.—NOTE.—EXTENSION OF ROUTES A 1, A 2.

SUBSIDY GRANTED

For the construction of a Railway and Telegraph Line from Esquimalt to Nanaimo, on Vancouver Island, British Columbia (about 70 miles.)

Year.	Act.	Nature of Grant and by whom Granted.	Money Subsidy.
1884.....	47 Vic., cap. 6...	<p style="text-align: center;"><i>By Federal Government.</i></p> <p>“ The Government of British Columbia shall obtain the authority of the Legislature to convey to the Government of Canada, three and one-half millions of acres of land in the Peace River district of British Columbia, in one rectangular block, east of the Rocky Mountains, and adjoining the North-West Territory of Canada.</p> <p>“ The Government of Canada shall, upon the adoption by the Legislature of British Columbia of the terms of this agreement, seek the sanction of Parliament to enable them to contribute to the construction of a railway from Esquimalt to Nanaimo the sum of \$750,000, and they agree to hand over to the contractors who may build such railway, the lands which are or may be placed in their hands for that purpose by British Columbia; and they agree to take security, to the satisfaction of the Government of that Province, for the construction and completion of such railway on or before the 10th day of June, 1887; such construction to commence forthwith.”</p> <p>According to agreement, dated 20th Aug., 1883, with contractors, the Federal Government granted to them a subsidy in money of \$750,000 (seven hundred and fifty thousand dollars) and in land, all the land situated on Vancouver Island (except such parts thereof as may have, at any time heretofore, been reserved for naval or military purposes)...</p>	<p style="text-align: center;">\$</p> <p style="text-align: right;">750,000</p>

N.B.—For table of distances, see No. 1.

I 1 TO O.

ROUTES THROUGH THE UNITED STATES

Viâ

SAN FRANCISCO.

FOR DETAILS, SEE Nos. 26 TO 43.

FOR SUMMARY OF UNITED STATES ROUTES, SEE No. 43.

FOR ROUTES THROUGH CANADA *viâ* PORT MOODY,
SEE Nos. 1 TO 25.

FOR SUMMARY OF CANADIAN ROUTES, SEE No. 19.

ROUTE I 1.

Distances from Liverpool, England, to Yokohama, Japan.

No. 26.—PORTLAND, *MONTREAL*, CHICAGO AND SAN FRANCISCO ROUTE.

From	To	Geo- graphical Miles.	Statute Miles.
Liverpool.....	Portland..... Atlantic Ocean	2,856	3,292
Portland.....	Montreal..... Grand Trunk Railway	258	297
Montreal.....	Chicago..... do	726	837
Chicago.....	San Francisco. For details, see K 1	2,106	2,428
Total—Portland.....	San Francisco..... Railway	3,090	3,562
San Francisco.....	Yokohama..... Pacific Ocean	4,470	5,152
Total—Liverpool....	Yokohama, <i>via</i> Portland, Montreal, Chicago and San Fran- cisco.....	10,416	12,006

ROUTE I 2.

Distances from Liverpool, England, to Yokohama, Japan.

No. 27.—PORTLAND, *NIAGARA FALLS*, CHICAGO AND SAN FRANCISCO ROUTE.

From	To	Geo- graphical Miles.	Statute Miles.
Liverpool.....	Portland..... Atlantic Ocean	2,856	3,292
Portland.....	Boston..... Boston and Maine Railway	101	116
Boston.....	Chicago..... Chicago, Detroit and Niagara Falls Short Line	871	1,004
Chicago.....	San Francisco. For details, see K 1	2,106	2,428
Total—Portland.....	San Francisco..... Railway	3,078	3,548
San Francisco.....	Yokohama..... Pacific Ocean	4,470	5,152
Total—Liverpool....	Yokohama, <i>via</i> Portland, Niagara Falls, Chicago and San Fran- cisco.....	10,404	11,992

ROUTE J 1.

Distances from Liverpool, England, to Yokohama, Japan.

No. 28.—BOSTON, CHICAGO AND SAN FRANCISCO ROUTE.

From	To	Geo- graphical Miles.	Statute Miles.
Liverpool	Boston..... Atlantic Ocean	2,895	3,337
Boston	Chicago—Chicago, Detroit and Niagara Falls Short Line...	871	1,004
Chicago.....	San Francisco—For details, see K 1	2,166	2,428
Total—Boston	San Francisco..... Railway	2,977	3,432
San Francisco	Yokohama..... Pacific Ocean	4,470	5,152
Total—Liverpool..	Yokohama, <i>via</i> Boston, Chicago and San Francisco.....	10,342	11,921

ROUTE J 2.

Distances from Liverpool, England, to Yokohama, Japan.

No. 29.—BOSTON, ST. LOUIS AND SAN FRANCISCO ROUTE.

From	To	Geo- graphical Miles.	Statute Miles.
Liverpool.....	Boston..... Atlantic Ocean	2,895	3,337
Boston.....	New York—New York, New Haven and Hartford Railway..	203	234
New York.....	Philadelphia..... Pennsylvania Railway	78	90
Philadelphia.....	St. Louis—Cincinnati, Washington and Baltimore Railway	883	1,018
St. Louis.....	San Francisco..... St. Louis and San Francisco Railway	2,112	2,435
Total—Boston.....	San Francisco..... Railway	3,276	3,777
San Francisco.....	Yokohama..... Pacific Ocean	4,470	5,152
Total—Liverpool..	Yokohama, <i>via</i> Boston, St. Louis and San Francisco.....	10,641	12,266

ROUTE K 1.

Distances from Liverpool, England, to Yokohama, Japan.
No. 30.—NEW YORK, CHICAGO AND SAN FRANCISCO ROUTE.

From	To	Geo- graphical Miles.	Statute Miles.
Liverpool	New York..... Atlantic Ocean	3,094	3,567
New York.....	Chicago..... Chicago, Detroit and Niagara Falls short line	823	948
Chicago.....	Omaha..... Chicago, Rock Island and Pacific Railway	434	500
Omaha.....	Ogden..... Union Pacific Railway	896	1,033
Ogden	San Francisco..... Central Pacific Railway	776	895
Total—New York.	San Francisco..... Railway	2,929	3,376
San Francisco	Yokohama..... Pacific Ocean	4,470	5,152
Total—Liverpool..	Yokohama <i>via</i> New York, Chicago and San Francisco.....	10,493	12,095

ROUTE K 2.

Distances from Liverpool, England, to Yokohama, Japan.
No. 31.—NEW YORK, CINCINNATI, ST. LOUIS AND SAN FRANCISCO ROUTE.

From	To	Geo- graphical Miles.	Statute Miles.
Liverpool.....	New York..... Atlantic Ocean	3,094	3,567
New York.....	St. Louis... Cincinnati, Washington and Baltimore Railway	961	1,108
St. Louis.....	San Francisco..... St. Louis and San Francisco Railway	2,112	2,435
Total—New York.	San Francisco..... Railway	3,073	3,543
San Francisco	Yokohama..... Pacific Ocean	4,470	5,152
Total—Liverpool..	Yokohama <i>via</i> New York, Cincinnati, St. Louis and San Francisco.....	10,637	12,262

ROUTE K 3.

Distances from Liverpool, England, to Yokohama, Japan.

No. 32.—NEW YORK, *INDIANAPOLIS*, ST. LOUIS AND SAN FRANCISCO ROUTE.

From	To	Geo- graphical Miles.	Statute Miles.
Liverpool	New York..... Atlantic Ocean.	3,094	3,567
New York.....	St. Louis— <i>via</i> Vandalia Line :— New York, Philadelphia, Washington, Baltimore, Indian- apolis and St. Louis Railway.....	924	1,085
St. Louis.....	San Francisco..... St. Louis and San Francisco Railway.	2,112	2,435
Total—New York....	San Francisco Railway.	3,036	3,500
San Francisco.....	Yokohama..... Pacific Ocean.	4,470	5,152
Total—Liverpool	Yokohama <i>via</i> New York, Indianapolis, St. Louis and San Francisco	10,600	12,219

ROUTE L 1.

Distances from Liverpool, England, to Yokohama, Japan.

No. 33.—PHILADELPHIA, CHICAGO AND SAN FRANCISCO ROUTE.

From	To	Geo- graphical Miles.	Statute Miles.
Liverpool	Philadelphia..... Atlantic Ocean.	3,275	3,775
Philadelphia.....	Bethlehem Junction..... Philadelphia and Reading Railway	49	56
Bethlehem Junction.	Chicago..... Chicago, Detroit and Niagara Falls Short Line.	783	903
Chicago	San Francisco..... See Route K 1.	2,106	2,428
Total—Philadelphia.	San Francisco..... Railway.	2,933	3,387
San Francisco.....	Yokohama..... Pacific Ocean.	4,470	5,152
Total—Liverpool	Yokohama <i>via</i> Philadelphia, Chicago and San Francisco...	10,683	12,314

ROUTE L 2.

Distances from Liverpool, England, to Yokohama, Japan.

No. 34.—PHILADELPHIA, CINCINNATI, ST. LOUIS AND SAN FRANCISCO ROUTE.

From	To	Geo- graphical Miles.	Statute Miles.
Liverpool	Philadelphia..... Atlantic Ocean	3,275	3,775
Philadelphia.....	St. Louis... Cincinnati, Washington and Baltimore Railway	883	1,018
St. Louis	San Francisco..... St. Louis and San Francisco Railway	2,112	2,435
Total—Philadelphia.	San Francisco..... Railway	2,995	3,453
San Francisco	Yokohama..... Pacific Ocean	4,470	5,152
Total—Liverpool....	Yokohama, via Philadelphia, Cincinnati, St. Louis and San Francisco.....	10,740	12,380

ROUTE L 3.

Distances from Liverpool, England, to Yokohama, Japan.

No. 35.—PHILADELPHIA, INDIANAPOLIS, ST. LOUIS AND SAN FRANCISCO ROUTE.

From	To	Geo- graphical Miles.	Statute Miles.
Liverpool.....	Philadelphia..... Atlantic Ocean	3,275	3,775
Philadelphia.....	St. Louis—Vandalia Line:—New York, Philadelphia, Wash- ington, Baltimore, Indianapolis and St. Louis Railway	846	975
St. Louis	San Francisco..... St. Louis and San Francisco Railway	2,112	2,435
Total—Philadelphia.	San Francisco..... Railway	2,958	3,410
San Francisco	Yokohama..... Pacific Ocean	4,470	5,152
Total—Liverpool....	Yokohama, via Philadelphia, Indianapolis, St. Louis and San Francisco.....	10,703	12,337

ROUTE M 1.

Distances from Liverpool, England, to Yokohama, Japan.
No. 36.—BALTIMORE, CHICAGO AND SAN FRANCISCO ROUTE.

From	To	Geo- graphical Miles.	Statute Miles.
Liverpool	Baltimore..... Atlantic Ocean.	3,450	3,977
Baltimore	Chicago..... Baltimore and Ohio Railway.	740	853
Chicago.....	San Francisco..... See Route K 1	2,108	2,428
Total—Baltimore	San Francisco..... Railway.	2,846	3,281
San Francisco.....	Yokohama..... Pacific Ocean.	4,470	5,152
Total—Liverpool	Yokohama <i>via</i> Baltimore, Chicago and San Francisco.....	10,766	12,410

ROUTE M 2.

Distances from Liverpool, England, to Yokohama, Japan.
No. 37.—BALTIMORE, CINCINNATI, ST. LOUIS AND SAN FRANCISCO ROUTE.

From	To	Geo- graphical Miles.	Statute Miles.
Liverpool	Baltimore..... Atlantic Ocean.	3,450	3,977
Baltimore	St. Louis..... Cincinnati, Washington and Baltimore Ry.	798	920
St. Louis	San Francisco..... St. Louis and St. Francisco Railway.	2,112	2,435
Total—Baltimore	San Francisco..... Railway.	2,910	3,355
San Francisco	Yokohama .. Pacific Ocean.	4,470	5,152
Total—Liverpool....	Yokohama <i>via</i> Baltimore, Cincinnati, St. Louis and San Francisco.....	10,830	12,484

ROUTE M 3.

Distances from Liverpool, England, to Yokohama, Japan.

No. 38.—BALTIMORE, *INDIANAPOLIS*, ST. LOUIS AND SAN FRANCISCO ROUTE.

From	To	Geo- graphical Miles.	Statute Miles.
Liverpool.....	Baltimore..... Atlantic Ocean	3,450	3,977
Baltimore	St. Louis... <i>Vandalia Line</i> :—		
Baltimore	Harrisburg Junction	74	85
Harrisburg Junct'n	St. Louis... New York, Philadelphia, Washington, Baltimore, Indianapolis and St. Louis Railway	755	870
St. Louis.....	San Francisco..... St. Louis and San Francisco Railway	2,113	2,435
Total—Baltimore	San Francisco..... Railway	2,941	3,390
San Francisco	Yokohama..... Pacific Ocean	4,470	5,152
Total—Liverpool	Yokohama, <i>via</i> Baltimore, Indianapolis, St. Louis and San Francisco	10,861	12,519

ROUTE N 1.

Distances from Liverpool, England, to Yokohama, Japan.

No. 39.—RICHMOND, *LOUISVILLE*, ST. LOUIS AND SAN FRANCISCO ROUTE.

From	To	Geo- graphical Miles.	Statute Miles.
Liverpool	Richmond..... Atlantic Ocean	3,380	3,895
Richmond	Huntingdon..... Richmond and Ohio Railway	364	419
Huntingdon	Lexington..... Richmond and Ohio Railway	121	139
Lexington	Louisville..... Louisville and Nashville Railway	82	94
Louisville	Mount Vernon... Louisville, Evansville and St. Louis Railway	163	187
Mount Vernon	St. Louis..... Louisville and Nashville Railway	66	76
St. Louis	San Francisco..... St. Louis and San Francisco Railway	2,112	2,435
Total—Richmond....	San Francisco..... Railway	2,907	3,350
San Francisco	Yokohama..... Pacific Ocean	4,470	5,152
Total—Liverpool	Yokohama, <i>via</i> Richmond, Louisville, St. Louis and San Francisco	10,757	12,397

ROUTE N 2.

Distances from Liverpool, England, to Yokohama, Japan.

No. 40.—RICHMOND, CINCINNATI, St. LOUIS AND SAN FRANCISCO ROUTE.

From	To	Geo- graphical Miles.	Statute Miles.
Liverpool.....	Richmond Atlantic Ocean	3,380	3,895
Richmond	Washington...Richmond, Fredericksburg and Potomac Ry.	101	116
Washington.....	St. Louis..... Cincinnati, Washington and Baltimore Ry.	763	880
St. Louis	San Francisco..... St. Louis and San Francisco Railway	2,112	2,435
Total—Richmond....	San Francisco Railway	2,976	3,431
San Francisco.....	Yokohama..... Pacific Ocean	4,470	5,152
Total—Liverpool	Yokohama, <i>via</i> Richmond, Cincinnati, St. Louis and San Francisco.....	10,826	12,478

ROUTE N 3.

Distances from Liverpool, England, to Yokohama, Japan.

No. 41.—RICHMOND, NEW ORLEANS AND SAN FRANCISCO ROUTE.

From	To	Geo- graphical Miles.	Statute Miles.
Liverpool	Richmond..... Atlantic Ocean	3,380	3,895
Richmond	Atlanta..... Richmond and Danville Railway	476	549
Atlanta	Montgomery..... Western Railway of Alabama	152	175
Montgomery.....	New Orleans..... Louisville and Nashville Railway	278	321
New Orleans.....	El Paso... Galveston, Harrisburg and San Antonio Railway System.....	1,049	1,209
El Paso.....	Tulare..... Southern Pacific Railway	822	947
Tulare.....	San Francisco..... Central Pacific Railway	218	251
Total—Richmond....	San Francisco Railway	2,995	3,452
San Francisco.....	Yokohama..... Pacific Ocean	4,470	5,152
Total—Liverpool	Yokohama, <i>via</i> Richmond, New Orleans and San Francisco	10,845	12,499

 ROUTE O.

Distances from Liverpool, England, to Yokohama, Japan.
 No. 42.—NEW ORLEANS AND SAN FRANCISCO ROUTE.

From	To	Geo- graphical Miles.	Statute Miles.
Liverpool.....	New Orleans..... Atlantic Ocean	4,780	5,510
New Orleans.....	El Paso..... Galveston, Harrisburg and San Antonio Rail- way System.....	1,049	1,209
El Paso.....	Tulare..... Southern Pacific Railway	822	947
Tulare.....	San Francisco..... Central Pacific Railway	218	251
Total—New Orleans.	San Francisco..... Railway	2,089	2,407
San Francisco.....	Yokohama..... Pacific Ocean	4,470	5,152
Total—Liverpool.....	Yokohama, <i>via</i> New Orleans and San Francisco.....	11,339	13,069

SUMMARY.

No. 43.—ROUTES I 1 to O—BOTH INCLUSIVE.

COMPARATIVE STATEMENT of Distances between Liverpool, England, and Yokohama, Japan, on the respective Routes indicated, through the United States, *via* San Francisco.

For Details See	Routes.	Geo-graphical Miles.	Statute Miles.
J. 1	Boston, Chicago and San Francisco.....	10,342	11,921
I. 2	Portland, Niagara Falls, Chicago and San Francisco.....	10,404	11,992
I. 1	Portland, Montreal, Chicago and San Francisco.....	10,416	12,006
K. 1	New York, Chicago and San Francisco.....	10,493	12,095
K. 3	New York, Indianapolis, St. Louis and San Francisco.....	10,600	12,219
K. 2	New York, Cincinnati, St. Louis and San Francisco.....	10,637	12,262
J. 2	Boston, St. Louis and San Francisco.....	10,641	12,266
L. 1	Philadelphia, Chicago and San Francisco.....	10,683	12,314
L. 3	Philadelphia, Indianapolis, St. Louis and San Francisco.....	10,703	12,337
L. 2	Philadelphia, Cincinnati, St. Louis and San Francisco.....	10,740	12,380
N. 1	Richmond, Louisville, St. Louis and San Francisco.....	10,757	12,397
M. 1	Baltimore, Chicago and San Francisco.....	10,766	12,410
N. 2	Richmond, Cincinnati, St. Louis and San Francisco.....	10,826	12,478
M. 2	Baltimore, Cincinnati, St. Louis and San Francisco.....	10,830	12,484
N. 3	Richmond, New Orleans and San Francisco.....	10,845	12,499
M. 3	Baltimore, Indianapolis, St. Louis and San Francisco.....	10,861	12,519
O	New Orleans and San Francisco.....	11,339	13,069

N.B.—See Summary No. 19.—Routes through Canada, *via* Port Moody.

APPENDIX No. 27.

—
National Art Gallery.
—

CURATOR'S REPORT.

APPENDIX No. 27.

NATIONAL ART GALLERY.—CURATOR'S REPORT.

Ref. No. 53,484.

NATIONAL ART GALLERY,
OTTAWA, 12th November, 1884.

SIR,—I have the honour to report the following additions to the National Art Gallery received during the fiscal year ended 30th June, 1884.

OIL PAINTINGS.

1. Landscape—by O. R. Jacobi, R.C.A.—Presented by O. R. Jacobi, Esq., through the Royal Canadian Academy.
2. Portrait—by H. R. H. Princess Louise—Presented by H. R. H. Princess Louise.
3. Death of Wolfe—by Tomlinson, after the original of Benjamin West—Presented by H. R. H. Princess Louise.

WATER COLOURS.

4. Rainy day in the White Mountains, by M. Matthews, R.C.A. Diploma picture received from the Royal Canadian Academy.
5. Le Perron—by C. J. Way, R.C.A.—Presented by C. J. Way, Esq., through the Royal Canadian Academy.
6. Series of seven Water Colours—by S. Thompson—Purchased by the Government.
7. Statuette of Sir George Etienne Cartier—by L. P. Hebert—Presented by L. P. Hebert, Esq.
8. Two specimens of 16th century carving. Presented by H. E. the Marquis of Lorne.
9. Marble bust of Child. Presented by H. E. the Marquis of Lorne.
10. Architectural drawing by A. C. Hutchison, R.C.A. Diploma Design received from the Royal Canadian Academy.

The above making a total of fifty works of art now in the Gallery. Through the kind intervention of H. E. the Marquis of Lorne, Mr. J. E. Millais, R.A., has painted a portrait for presentation to the Gallery, which is expected to arrive before the close of the year. Other well known artists have promised to contribute.

Art students continue to avail themselves of the opportunity to copy many of the pictures. During the fiscal year, 9,928 visitors have registered their names, showing an increased attendance of 2,122 as compared with last year.

I have the honour to be, Sir,
Your obedient servant,

JOHN W. H. WATTS,
Curator.

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

APPENDIX No. 28.

STATEMENT OF EXPENDITURE ON PUBLIC WORKS

OF THE

DOMINION OF CANADA

FROM

1ST JULY, 1867, TO 30TH JUNE, 1884.

ALSO:

Statement of Expenditure

PRIOR TO AND SINCE CONFEDERATION.

BY

O. DIONNE,

Accountant.

APPENDIX

No. 1.—COMPARATIVE STATEMENT of Expenditure on the Public

Number.	Works.	From 1st July, 1867, to 30th June, 1882.	
		\$	cts.
1	Railways—Construction.....	55,491,071	82
2	do Subsidies (exclusive of subsidy paid to C. P. Railway Co.)		
3	do Working Expenses.....	20,709,640	19
4	Canals—Construction.....	23,447,564	27
5	do Staff and Repairs.....	5,239,257	67
	Totals, Railways and Canals	104,887,533	95
6	Public Buildings—Construction	7,296,365	45
7	do Repairs (including heating Ottawa Buildings)	3,045,892	05
8	do Heating		
9	do Salaries of Engineers, Firemen, etc.....		
10	Harbours and Breakwaters	3,737,167	54
11	Rivers—Improvement	686,009	03
12	do Maintenance of Buoys	2,433	76
13	Dredges—Construction	309,929	28
14	do Repairs, etc.....	49,289	21
15	Dredging (not apportioned to any service)	86,531	95
16	Slides and Booms—Construction.....	305,110	26
17	do Staff and Repairs.....	1,019,702	15
18	Roads and Bridges—Construction and Improvement	1,144,436	55
19	do Maintenance	601,479	75
20	Telegraph Lines—Construction	360,050	38
21	do Working Expenses.....	386,322	18
22	Lighthouses—Construction	1,186,212	65
23	Dominion Steamers—Construction	186,250	66
	Miscellaneous—		
24	Surveys	399,623	47
25	Arbitrations.....	91,055	60
26	Tug service between Montreal and Kingston.....	96,302	84
27	Monument to late Sir George Et. Cartier, Bart.....		
28	do Joseph Brant		
29	Agent and Contingencies, British Columbia	16,944	19
30	Sundries.....	6,649	46
	Totals, Public Works	21,013,758	41
	Grand Totals.....	*125,901,293	36

* N.B.—For explanation respecting discrepancy between above statement and that published

DEPARTMENT OF PUBLIC WORKS,
OTTAWA, 19th January, 1885.

No. 28.

Works of Canada, from 1st July, 1867, to 30th June, 1884.

Year ended 30th June,		Total, up to 30th June, 1884.	Number.	Remarks.	
1883.	1881.				
\$ cts.	\$ cts.	\$ cts.			
11,726,321 69	14,159,473 30	a 81,376,866 81	1	a. Including \$14,787,284.87 subsidy paid to the Canadian Pacific Railway Co.	
.....	258,000 00	258,000 00	2		
2,636,551 70	2,644,284 53	25,990,476 42	3		
1,857,545 56	1,666,985 62	26,972,095 45	4		
484,128 10	564,234 77	6,287,620 54	5		
16,704,547 05	19,292,978 22	140,885,059 22			
675,260 08	1,292,494 83	b 9,764,120 36	6	b. Including \$10,461.33 contributed by City Corporations, etc.	
312,289 87	348,314 85	3,705,496 77	7		
10,739 68	28,112 39	38,852 07	8		
14,787 02	22,347 68	37,134 70	9	c. Including \$125,239.44 contributed by Municipalities, etc.	
586,633 72	852,307 34	c 5,176,168 60	10		
125,355 42	178,855 60	d 990,220 05	11	d. Including \$7,400 contributed by Municipalities, etc.	
457 50	.....	2,891 26	12	
13,081 34	115,552 44	438,563 06	13	e. Including \$1,600 contributed by the Canada Pulp Co.	
16,480 43	24,714 71	90,484 35	14		
9,510 70	9,760 25	105,802 90	15		
3,516 38	30,905 28	e 339,531 92	16		
81,842 98	82,074 14	1,183,619 27	17		
4,066 83	33,985 79	f 1,131,489 17	18	f. Including \$12,864.62 contributed by the Local Government of Ontario.	
.....	.....	601,479 75	19	
88,149 74	49,304 16	497,504 28	20		
53,844 30	80,006 71	520,173 19	21	g. This sum was expended as follows:— Through the Pub. Works Dept. \$ 75,588 51 do Marine Departm't. 1,192,560 61	
32,902 32	49,033 55	g 1,268,148 52	22		
.....	56,164 71	h 242,415 37	23	h. Expended through the Department of Marine and Fisheries.	
29,829 98	28,982 61	458,436 06	24		
3,338 90	2,818 00	97,212 50	25		
.....	.....	96,302 84	26	
1,319 13	733 45	2,052 58	27		
.....	50 00	50 00	28		
2,811 32	2,796 49	22,552 00	29		
2,000 00	1,650 00	10,299 46	30		
2,068,217 64	3,290,964 98	26,372,941 03			i. Charged to capital..... \$109,379,644 84 do income..... 57,878,355 41
18,772,764 69	22,583,943 20	i 167,258,000 25			

in Public Works Report, 1867-82, Appendix No. 1, pages 141 and 143, see Statement No. 2, page 441.

O. DIONNE,
Accountant.

No. 2.—ABSTRACT Statement of Expenditure on Public Works of the Dominion

Number.	Works.	Nova Scotia.	Prince Edward Island.	New Bruns- wick.
		\$ cts.	\$ cts.	\$ cts.
1	Intercolonial Railway—Construction.....	8,439,183 98	.....	12,299,970 27
2	do Working Expenses.....	6,207,234 81	.....	9,225,862 48
3	Prince Edward Island Railway—Construction.....	.....	352,255 49	.....
4	do do Working Expenses.....	.....	1,539,556 31	.....
5	Coteau Landing Railway Bridge.....	.....	.....	.....
6	Pacific Railway—Construction.....	.....	.....	.....
7	do Working Expenses.....	.....	.....	.....
8	Canals—Construction.....	496,797 80	.....	44,387 53
9	do Staff and Repairs.....	23,771 21	.....	.....
	Totals, Railways and Canals.....	15,166,987 80	1,891,811 80	21,570,220 28
10	Public Buildings—Construction.....	164,110 00	75,253 68	1,248,672 00
11	do Repairs.....	64,817 31	19,879 55	46,825 90
12	Harbours and Breakwaters.....	902,491 69	229,246 72	588,938 80
13	Rivers—Improvements of.....	79,869 38	36,704 18	119,769 06
14	do Maintenance of Buoys.....	.....	.....	.....
15	Dredges—Construction.....	120,044 65	23,582 07	105,044 66
16	do Repairs.....	11,193 29	3 878 06	9,568 94
17	Dredging (not apportionable to any service).....	.....	.....	.....
18	Slides and Booms—Construction.....	.....	.....	.....
19	do Staff and Repairs.....	.....	.....	.....
20	Roads and Bridges—Construction and Improvement.....	.....	.....	2,368 34
21	do Maintenance.....	.....	.....	.....
22	Telegraph Lines—Construction.....	66,945 88	.....	14,940 00
23	do Working Expenses.....	2,163 79	16,546 61	2,163 78
24	Lighthouses—Construction.....	397,359 30	50,780 50	157,965 70
25	Dominion Steamers—Construction.....	46,562 66	46,562 66	46,562 67
26	Surveys.....	42,987 35	12,005 34	48,478 37
27	Arbitrations.....	.....	.....	.....
28	Tug service between Montreal and Kingston.....	.....	.....	.....
29	Agent and Contingencies, British Columbia.....	.....	.....	.....
30	Sundries.....	.....	.....	.....
	Totals, Public Works.....	1,898,545 30	514,439 37	2,391,298 23
	Grand Totals.....	17,065,533 10	2,406,251 17	23,961,518 50

- a. Including \$2,210,000.00—Subsidy paid to the Canadian Pacific Railway Company.
b. do 395,826.28—Expenditure on dredging in Maritime Provinces and British Columbia,
c. do 160,120.72 do do now apportioned to
d. Exclusive of 670,620.84 do incurred through the Department of Railways and Canals

MEMO:—Expenditure as per Public Works Report, 1867–1882, Appendix No. 1, page 143.....
Less—Expenditure on works transferred to Local Governments, viz:—

ADD—Expenditure incurred through the Department of Marine and

Total, as above.....

of Canada, from 1st July, 1867 (date of Confederation), to 30th June, 1882.

Quebec.	Ontario.	Manitoba.	North-West Territories.	British Columbia.	Miscellaneous.	Total.	Number.
\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	
8,351,014 34						29,090,168 59	1
3,418,578 72						18,851,676 01	2
						352,255 49	3
						1,539,556 31	4
522 00						522 00	5
	13,116,950 42	5,641,181 85	2,715,811 86	4,574,181 61	a	26,048,125 74	6
		318,407 87				318,407 87	7
9,353,593 94	13,510,223 68		32,675 65		9,885 67	23,447,584 27	8
2,095,077 47	3,061,657 83				55,751 16	5,239,257 67	9
23,218,786 47	29,691,831 93	5,952,589 72	2,748,487 51	4,574,181 61	65,636 83	104,887,533 95	
1,736,335 42	3,152,504 17	326,247 47	228,135 40	260,473 98	104,633 33	7,296,365 45	10
342,881 26	2,496,766 96	53,194 16	6,808 65	14,051 21	667 05	3,045,892 05	11
318,505 82	1,607,183 00	223 39		84,494 77	6,083 35	3,737,167 54	12
293,472 67	105,612 77	17,364 96	714 48	33,501 53		686,009 03	13
2,433 76						2,433 76	14
15,501 57	38,058 37			7,697 96		309,929 28	15
9,385 07	6,216 48			9,047 37		49,289 21	16
39,603 17	46,928 78					86,531 95	17
260,810 99	44,299 27					305,110 26	18
644,003 97	375,649 66				48 52	1,019,702 15	19
84,238 35	691,525 33	366,304 53				1,144,426 55	20
	526,496 64	74,983 11				601,479 75	21
180,958 74		72 00		89,879 49	7,254 27	360,050 38	22
4,327 58				361,120 42		366,322 18	23
357,414 36	172,300 27	1,590 86		44,167 04	4,634 62	1,186,212 65	24
48,562 67						186,250 66	25
96,909 71	173,781 51	4,056 84	681 99	1,452 02	19,270 34	393,623 47	26
					91,055 60	91,055 60	27
48,151 42	48,151 42					96,302 84	28
				16,914 19		16,914 19	29
437 24					6,212 22	6,649 46	30
4,481,933 77	9,485,474 63	844,037 32	236,340 52	931,829 98	239,859 30	21,013,758 41	
27,700,720 24	39,177,306 56	6,803,627 04	2,984,828 03	5,496,011 59	305,496 13	125,901,292 36	

now apportioned to these works.
 these works.
 and included in cost of the Pacific Railway.

Public Buildings—Construction.....	\$16,408 17	\$124,656,743 32
do Repairs.....	10,718 24	
Roads and Bridges.....	25,199 35	
		52,325 76
		\$124,604,417 56
Fisheries on Lighthouses—Construction	\$1,110,624 14	
Dominion Steamers—Construction.....	186,250 66	
		1,296,874 80
		\$125,901,292 36

O. DIONNE,
 Accountant,

No. 3.—STATEMENT of Expenditure on Public Works of the

Number.	Works.	Nova Scotia.		Entered Confederation 1st July, 1873.		New Brunswick.	
		P. E. Island.					
		\$	cts.	\$	cts.	\$	cts.
1	Intercolonial Railway—Construction	411,908	07			474,866	52
2	do Working Expenses	547,913	79			963,819	09
3	do (Windsor Branch) Working Expenses	23,103	93				
4	Pacific Railway—Construction						
5	do Working Expenses						
6	Prince Edward Island—Construction			57,186	02		
7	do Working Expenses			252,808	41		
8	Canals—Construction						
9	do Staff, Repairs, &c	2,321	61				
	Totals, Railways and Canals	985,277	40	309,991	43	1,438,685	61
10	Public Buildings—Construction	16,702	24	963	32	72,625	60
11	do Repairs	2,848	31	1,932	11	4,323	75
12	do Heating	229	34	202	72	1,905	86
13	do Salaries, Engineers, Firemen, &c	871	20	553	06	3,217	29
14	Harbours and Breakwaters	105,972	64	29,881	44	70,037	23
15	Improvements of Rivers	13,135	33	8,429	36	5,641	11
16	do Maintenance						
17	Dredges—Construction	496	25	936	00	6,104	24
18	do Repairs	6,388	01	1,765	61	2,346	38
19	Dredging (not apportioned to any service)	132	44				
20	Slides and Booms—Construction						
21	do Staff, Repairs, &c						
22	Roads and Bridges						
23	Telegraph Lines—Construction	2,521	25				
24	do Working Expenses	1,941	56	1,946	66	2,616	80
25	Lighthouses—Construction	9,422	75	1,934	49	1,022	57
	<i>Miscellaneous</i> :—						
26	Surveys	1,173	33	227	09	681	28
27	Arbitrations						
28	Monument to late Sir G. E. Cartier, Bart.						
29	Agent and Contingencies, British Columbia						
30	Sundries						
	Totals, Public Works	161,834	65	48,781	86	170,522	11
	Grand Totals	1,147,112	05	358,776	29	1,609,207	72

a. Including \$5,323,076.60, subsidy paid to the Canadian Pacific Railway Co.

b. do 15,766.39, amount contributed by municipalities, &c.

c. do 1,600.00 do Canada Pulp Co.

DEPARTMENT OF PUBLIC WORKS,
OTTAWA, 19th January, 1885.

Dominion of Canada, for Fiscal Year ended 30th June, 1883.

Quebec.	Ontario.	Entered Confederation.			Miscellaneous, not apportioned to any Province.	Total for 1883.	Number.
		15th July, 1870.		20th July, 1871.			
		Manitoba.	North-West Territories.	British Columbia.			
\$ cts	\$ cts	\$ cts.	\$ cts	\$ cts.	\$ cts.	\$ cts.	
729,858 37						1,616,632 96	1
848,610 39						2,360,373 27	2
						23,103 93	3
	2,076,142 07	17,196 50	4,138,461 63	3,820,702 51		10,052,502 71	4
		266 09				266 09	5
						57,186 02	6
						252,808 41	7
1,086,868 56	751,917 19				18,759 81	1,857,545 56	8
183,964 46	293,766 88				4,075 15	484,128 10	9
2,849,301 78	3,121,826 14	17,462 59	4,138,461 63	3,820,702 51	22,834 96	16,704,547 05	
140,613 50	282,327 17	106,584 27	18,665 67	26,523 30	10,255 01	675,260 08	10
16,274 85	278,487 23	7,059 63	205 85	1,138 04	20 10	312,289 87	11
4,676 69	2,753 07	880 00		92 00		10,739 68	12
3,515 92	6,629 55					14,787 02	13
124,924 67	243,004 23	42 00		7,349 08	5,422 43	546,633 72	14
56,638 81	19,043 77	13,612 07	5,823 23	3,021 74		125,355 42	15
457 50						457 50	16
1,850 00	499 20			3,195 65		13,081 34	17
2,237 20	1,284 43			2,458 80		16,480 43	18
3,728 29	3,895 70				1,754 27	9,510 70	19
2,763 28	753 10					3,516 38	20
48,735 15	33,107 83					81,842 98	21
3,149 04	917 79					4,066 83	22
36,179 44	22,000 00		27,449 05			88,149 74	23
12,530 25			4,292 64	30,516 39		53,844 30	24
9,672 50	9,782 27			1,005 26	62 48	32,902 32	25
17,383 60	1,829 37	135 44	416 00	609 50	7,374 07	29,829 93	26
					3,338 90	3,338 90	27
					1,319 13	1,319 13	28
					2,811 32	2,811 32	29
					2,000 00	2,000 00	30
485,330 99	906,314 71	128,313 41	56,852 44	78,721 08	31,546 39	2,068,217 64	
3,334,632 77	4,028,140 85	145,776 00	4,195,314 07	3,899,423 59	54,381 35	18,772,764 69	

O. DIONNE,
Accountant.

No. 4—ABSTRACT STATEMENT of Expenditure on Public Works

Number.	Works.	Nova Scotia.	Entered Confederation 1st July, 1873.	New Brunswick.
			P. E. Island.	
		\$ cts	\$ cts.	\$ cts.
1	Intercolonial Railway—Construction.....	216,647 13		527,414 48
2	do Working Expenses.....	544,277 29		957,369 79
3	Eastern Extension, N.S.—Construction.....	1,284,311 97		
4	do Working Expenses.....	40,809 43		
5	Pacific Railway—Construction.....			
6	do Working Expenses.....			
7	Windsor Branch—Working Expenses.....	22,140 86		
8	Prince Edward Island—Construction.....		130,663 38	
9	do Working Expenses.....		236,428 13	
10	Railway Subsidies.....			
11	Railways—Generally.....			
12	Canals—Construction.....	2,471 40		
13	do Staff and Repairs.....	2,969 32		
	Totals, Railways and Canals.....	2,113,627 40	367,091 51	1,484,784 27
14	Public Buildings—Construction.....	27,105 43	2,053 03	113,076 97
15	do Repairs.....	4,597 27	3,117 05	1,839 87
16	do Heating.....	1,074 57	638 66	4,977 84
17	do Salaries of Engineers, &c.....	2,616 83	1,553 15	4,297 03
18	Harbours and Breakwaters.....	88,012 21	28,581 88	83,210 84
19	Improvements of Rivers.....	18,392 95		17,554 66
20	Dredges—Construction.....	55 00		55 00
21	do Repairs.....	10,202 59	1,714 99	3,562 27
22	Dredging (not apportioned to any work).....			
23	Slides and Booms—Construction.....			
24	do Staff and Repairs.....			
25	Roads and Bridges.....			
26	Telegraph Lines—Construction.....	2,227 16		1,329 11
27	do Working Expenses.....	2,262 38	1,946 66	1,353 11
28	Lighthouses—Construction.....	12,489 35	2,158 60	2,868 70
29	Dominion Steamers.....	14,041 17	14,041 17	14,041 18
	<i>Miscellaneous :—</i>			
30	Surveys.....	1,500 26	2,292 86	424 60
31	Arbitrations.....			
32	Monument to late Sir G. E. Cartier, Bart.....			
33	do Joseph Brant.....			
34	Agent and Contingencies, B. C.....			
35	Sundries.....			
	Totals, Public Works.....	181,577 17	58,098 05	248,591 18
	Grand Totals.....	2,298,204 57	425,189 56	1,733,375 45

a Including \$7,254,208 27 subsidy paid to Canadian Pacific Railway Co.
b do 41,999 33 High Commissioner's house, London, England.
c do 531 00 amount forfeited by contractor.
d do 25,447 30 do contributed by Municipalities, &c.
e do 7,364 62 do do Ontario Local Government.

of the Dominion of Canada, for Year ended 30th June, 1884.

Quebec.	Ontario.	Entered Confederation.			Miscellaneous, not apportioned to any of the Provinces.	Total for 1884.	Number.
		15th July, 1870.		20th July, 1871			
		Manitoba.	North-West Territories.	British Columbia.			
\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.		
770,917 49						1,514,979 10	1
842,932 01						2,344,579 09	2
						1,284,311 97	3
						40,809 43	4
	4,930,267 58	9,864 49	785 21	6,276,344 99		11,217,262 27	5
		327 02				327 02	6
						22,140 86	7
						130,663 38	8
						236,428 13	9
176,000 00	32,000 00	10,000 00				258,000 00	10
788,656 90	861,927 68				12,256 58	12,256 58	11
187,780 66	369,120 81				13,929 64	1,666,985 62	12
					4,363 98	564,234 77	13
2,766,287 06	6,193,316 07	60,191 51	785 21	6,276,344 99	30,550 20	19,292,978 22	
310,673 66	c 467,714 64	233,076 18	51,943 04	33,967 22	d 52,884 65	1,292,494 83	14
15,245 18	313,936 16	6,376 55	404 00	2,118 77	680 00	348,314 85	15
9,687 99	8,245 90	2,832 50	96 00	273 74	285 19	28,112 39	16
4,964 48	8,441 19			475 00		21,347 68	17
151,566 23	d 473,555 89	52 40		20,714 83	6,143 06	852,307 34	18
75 987 40	26,481 72	14,127 91	14,000 00	12,310 96		178,855 60	19
15,664 88	35,747 24	46,910 81		17,119 51		115,552 44	20
3,274 76	989 99			4,970 11		24,714 71	21
1,092 85	4,851 69				3,815 71	9,760 25	22
16,677 88	14,227 40					30,905 28	23
51,462 36	30,611 78					82,074 14	24
5,323 35	e 26,892 91		1,769 53			33,985 79	25
22,963 40			11,926 38	9,057 08	1,801 03	49,304 16	26
7,629 87			23,145 67	36,358 27	7,310 75	80,006 71	27
3,168 48	18,447 34			9,830 38	70 70	49,033 55	28
14,041 19						56,164 71	29
13,165 33	4,913 83		16 00	831 75	5,837 98	28,982 61	30
					2,818 00	2,818 00	31
					733 45	733 45	32
					50 00	50 00	33
				2,795 49		2,796 49	34
					1,650 00	1,650 00	35
722,589 29	1,435,057 68	303,846 35	103,300 62	150,824 11	84,080 53	3,290,964 98	
3,488,876 35	7,628,373 75	364,037 86	104,085 83	6,427,169 10	114,630 73	22,583,943 20	

O. DIONNE,
Accountant.

No. 5.—ABSTRACT Statement of Expenditure on Public Works of the Dominion

Number.	Works.	Nova Scotia.		Entered Confederation, 1st July, 1873. — Prince Edward Island.		New Brunswick.	
		\$	cts.	\$	cts.	\$	cts.
1	Intercolonial Railway—Construction	9,067,739	18			13,302,251	27
2	do Working Expenses.....	7,263,491	75			11,147,051	36
3	do do (Windsor Branch)	81,208	93				
4	Eastern Extension Railway—Construction	1,284,311	97				
5	do Working Expenses.....	40,809	43				
6	Prince Edward Island Railway—Construction			540,104	89		
7	do Working Expenses			2,023,792	85		
8	Pacific Railway—Construction						
9	do Working Expenses						
10	Coteau Railway Bridge						
11	Railway Subsidies						
12	General on Railways.....						
13	Canals—Construction	499,269	20			44,387	53
14	do Staff and Repairs	29,062	14				
	Totals, "Railways" and Canals.....	18,265,892	60	2,568,897	74	24,493,690	16
15	Public Buildings—Construction	207,917	67	78,270	03	1,434,374	57
16	do Repairs (including heating Ottawa Public Buildings)	72,262	89	24,928	71	52,989	52
17	do Heating	1,303	91	841	38	6,883	70
18	do Salaries of Engineers, Firemen, etc	3,488	03	2,106	21	7,514	32
19	Harbours and Breakwaters	1,096,476	54	287,710	04	742,186	87
20	Rivers—Improvement of.....	111,397	66	45,143	54	142,964	83
21	do Maintenance of Buoys.....						
22	Dredges—Construction	120,595	90	24,518	07	111,203	90
23	do Repairs, etc.....	27,783	89	7,558	66	15,477	59
24	Dredging (not apportioned to any service).....	13	44				
25	Slides and Booms—Construction						
26	do Staff and Repairs						
27	Roads and Bridges—Construction and Improvement					2,368	34
28	do Maintenance						
29	Telegraph Lines—Construction	71,694	29			16,269	11
30	do Working Expenses	6,367	73	20,439	93	6,133	69
31	Lighthouses—Construction.....	419,271	40	54,873	59	161,856	97
32	Dominion Steamers.....	60,603	83	60,603	83	60,603	85
	Miscellaneous:—						
33	Surveys	45,660	91	14,525	29	49,584	25
34	Sundries						
	Totals, Public Works	2,244,957	12	621,319	28	2,810,411	51
	Grand Totals.....	20,510,849	72	3,190,217	02	27,304,101	67

N.B.—For amounts contributed by Municipalities, etc., see Statement No. 6, page 448.

a Including \$14,787,284.87 subsidy paid to the Canadian Pacific Railway Co.

b do 14,999.33 High Commissioner's house, London, England.

c do 1,192,560.01 expended through the Department of Marine and Fisheries.

d Expended through the Department of Marine and Fisheries.

DEPARTMENT OF PUBLIC WORKS,
OTTAWA, 19th January, 1885.

of Canada, from 1st July, 1867 (date of Confederation), to 30th June, 1884.

Quebec.	Ontario.	Entered Confederation.			Miscellaneous, not apportioned to any of the Provinces.	Total, to 30th June, 1884.	Number.
		15th July, 1870.		20th July, 1871.			
		Manitoba.	North-West Territories.	British Columbia.			
\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.		
9,851,790 20						32,221,780 65	1
5,110,121 12						23,520,664 23	2
						81,208 93	3
						1,284,311 97	4
						40,809 43	5
						540,104 89	6
						2,028,792 85	7
	20,123,360 07	5,668,242 84	6,855,058 70	14,671,229 11		447,317,890 72	8
		319,000 98				319,000 98	9
522 00						822 00	10
176,000 00	32,000 00	50,000 00				258,000 00	11
					12,256 58	12,256 58	12
11,229,119 40	15,124,068 55		32,675 65		42,575 12	26,972,095 45	13
2,466,822 59	3,727,545 52				64,190 29	6,287,620 51	14
28,831,375 31	39,006,974 14	6,037,243 82	6,887,734 35	14,671,229 11	119,021 99	140,885,050 22	
2,187,622 58	3,902,545 98	665,907 92	298,744 11	320,964 50	b 167,773 00	9,264,120 36	15
374,401 29	3,089,190 35	66,630 31	7,418 50	17,308 02	1,367 15	3,706,496 77	16
14,364 68	10,998 97	3,712 50	96 00	365 74	285 19	38,852 07	17
8,480 40	15,070 74			475 00		37,134 79	18
594,893 72	2,323,743 12	787 79		112,558 68	17,643 84	5,176,108 60	19
426,098 88	151,138 26	45,104 94	20,537 71	47,834 23		990,220 05	20
2,891 26						2,891 26	21
33,016 45	74,304 81	46,910 81		28,013 12		438,563 06	22
14,897 03	8,490 90			16,476 28		90,484 35	23
44,424 31	55,676 17				5,569 93	105,802 90	24
280,252 15	69,279 77					339,531 92	25
744,201 48	439,369 27				48 52	1,183,619 27	26
92,710 74	719,336 03	366,304 53	1,769 53			1,182,489 17	27
	526,496 64	74,983 11				601,479 75	28
240,101 58	22,000 00	72 00	39,375 43	93,936 57	9,055 30	497,504 28	29
24,487 70			27,438 31	427,935 08	7,310 75	520,173 19	30
370,255 34	200,529 88	1,590 86		55,002 68	4,767 80	c 1,268,148 52	31
60,603 86						d 242,415 37	32
127,458 94	180,524 71	4,192 28	1,113 99	2,893 27	32,482 39	458,436 06	33
48,588 66	48,151 42			22,552 00	109,177 30	228,469 38	34
5,689,854 05	11,826,847 02	1,276,197 08	396,493 58	1,151,375 17	355,466 22	26,372,911 03	
24,524,229 36	50,633,821 16	7,313,440 90	7,284,227 93	15,833,604 28	474,508 21	167,258,000 25	

O. DIONNE,
Accountant.

No. 6.—STATEMENT showing amounts contributed by Municipalities &c., towards the construction of the undermentioned works, and included in Statements of Expenditure, from 1st July, 1867, to 30th June, 1884, pages 442, 444 and 446.

Works.	From 1st July, 1867, to 30th June, 1882.	Year ended 30th June.				Total to 30th June, 1884.
		1883.		1884.		
	\$ cts.	II.	\$ cts.	II.	\$ cts.	\$ cts.
Public Buildings—						
Quebec Citadel "Cliff".....	2,500 00	.....	.....	.....	.....	2,500 00
do Fortifications.....	<i>a</i> 2,433 33	.....	.....	.....	.....	2,433 33
Ottawa Drill Shed.....	5,000 00	.....	.....	.....	.....	5,000 00
Sarnia Immigrant Shed.....	.....	.....	.....	345 <i>b</i>	117 00	117 00
Winnipeg Post Office.....	.....	.....	.....	301 <i>b</i>	414 00	414 00
Totals, Public Buildings	9,933 33	.....	.....	.....	531 00	10,464 33
Harbours—						
Bayfield	10,000 00	.....	.....	.....	.....	10,000 00
Cobourg	25,507 49	.....	.....	318 <i>b</i>	450 00	25,957 49
Collingwood.....	28,268 26	.....	.....	.....	.....	28,268 26
Goderich.....	10,000 00	.....	.....	.....	.....	10,000 00
L'Orignal Wharf.....	.....	.....	.....	322	1,000 00	1,000 00
Meaford	10,000 00	.....	.....	.....	.....	10,000 00
Morpeth .....	.....	.....	.....	321	1,768 03	1,768 03
Newcastle.....	.....	.....	.....	321	917 44	917 44
Owen Sound .....	.....	{ xxxi 294	13,000 00	.....	.....	13,000 00
Port Elgin .....	.....	.....	.....	319	736 80	736 80
Rondeau	300 00	.....	.....	.....	.....	300 00
Thornbury .....	.....	316	2,766 39	323	4,233 61	7,000 00
Warton.....	.....	.....	.....	319	16,341 42	16,341 42
Totals, Harbours	84,075 75	.....	15,766 39	.....	25,447 30	125,289 44
Rivers—						
Napanee.....	5,000 00	.....	.....	.....	.....	5,000 00
Thames.....	2,400 00	.....	.....	.....	.....	2,400 00
Totals, Rivers	7,400 00	.....	.....	.....	.....	7,400 00
Slides and Booms—						
St. Maurice.....	.....	311	1,600 00	.....	.....	1,600 00
Roads and Bridges—						
Des Joachims Bridge .....	.....	.....	.....	343	7,364 62	7,364 62
Portage-du-Fort Bridge.....	5,500 00	.....	.....	.....	.....	5,500 00
Totals, Bridges	5,500 00	.....	.....	.....	7,364 62	12,864 62
Grand Totals	106,909 08	.....	17,366 39	.....	33,342-92	157,618 39

a. Her Majesty the Queen's gift. *b.* Security deposits forfeited by contractor.

DEPARTMENT OF PUBLIC WORKS,
OTTAWA, 19th January, 1885.

O. DIONNE,
Accountant.

No. 7.—EXPENDITURE on account of Works authorized by Special Acts of Parliament, from 1st July, 1867, to 30th June, 1884.

Number.	Name of Work.	Amount Authorized.	Expenditure from 1st July, 1867, to 30th June, 1882.		Year ended 30th June—		Total Expenditure to 30th June, 1884.	
			\$	cts.	\$	cts.		
1	St. Lawrence River—Deepening between Quebec and Montreal, 36 Vic., cap. 60.....	\$1,500,000						
	do 44.....	280,000						
	do 38.....	900,000						
2	Quebec Harbour Improvement.....36	1,200,000						
	do 43	250,000						
	do 45	375,000						
	do 47	300,000						
3	Lévis Graving Dock.....38	500,000						
	do 46	100,000						
	do 47	150,000						
4	*Esquimaux Graving Dock.....37	250,000						
	do 43	250,000						
	do 47	250,000						
	Totals.....	6,055,000 00						
			\$	cts.	\$	cts.	\$	cts.
		2,680,000 00	1,500,000 00	xiii.	280,000 00	110,000 00	1,890,000 00	
		2,125,000 00	1,405,000 00	xiii.	668,540 00	200,529 00	1,672,069 00	
		750,000 00	350,000 00	xiii.	75,000 00	137,000 00	562,000 00	
		500,000 00	47,680 22	.....	.....	394,288 26	*441,948 48
		6,055,000 00	3,302,860 22	.....	421,540 00	841,817 26	4,566,017 48

* Under authority of 47 Vic., cap. 6, sec. 10: also of O. C. (No. 47-350), dated 19th May, 1884, this work was assumed by the Dominion Government, who paid the amount stated to the Local Government of British Columbia—\$250,000 being for the "purchase price of dock, lands, approaches and plant belonging to same," and balance for amount expended on above work, by the said Local Government of British Columbia.

O. DIONNE,
Accountant.

DEPARTMENT OF PUBLIC WORKS
OTTAWA, 19th January, 1885.

OTTAWA PARLIAMENT AND DEPARTMENTAL BUILDINGS.

No. 9.—DETAILED Statement of Expenditure for Construction, since the commencement of above Buildings (1859), to 30th June, 1884.

	Prior to Confederation.	Since Confederation.	Total.	Grand Total.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.
PARLIAMENT BUILDING.....	1,419,355 68	91,183 89	1,510,544 57	
Library.....		301,812 45	301,812 45	
Main Tower (completion).....		24,500 25	(a) 24,500 25	
Fire and water service, $\frac{1}{2}$ cost.....		36,206 55	36,206 55	
Exit from galleries.....		4,999 99	4,999 99	
Pump house.....		1,600 99	1,600 99	
Telephonic service, $\frac{1}{2}$ cost.....		1,849 53	1,849 53	
Ventilation.....		5,214 72	5,214 72	
P. O alterations, House of Commons ..		1,361 00	1,361 00	
Electric light.....		7,887 39	7,887 39	
Totals.....	1,419,355 68	476,621 76		1,895,977 44
EASTERN BLOCK.....	641,036 37	17,470 07	658,506 44	
Attics.....		10,516 60	10,516 60	
Fire and water service, $\frac{1}{2}$ of cost.....		18,104 85	18,104 85	
Alterations and additions.....		10,997 59	10,997 59	
Vault (completion of).....		8,822 98	8,822 98	
Telephonic service, $\frac{1}{2}$ cost.....		924 76	924 76	
Totals.....	641,036 37	66,836 85		707,873 22
WESTERN BLOCK.....	641,036 38	17,470 07	658,506 45	
Extension.....		462,247 11	462,247 11	
Fire & water service, proportion of cost.....		17,721 23	17,721 23	
Alterations and additions.....		11,381 22	11,381 22	
Telephonic service, $\frac{1}{2}$ cost.....		924 76	924 76	
Totals.....	641,036 38	509,744 39		1,150,780 77
WELLINGTON STREET BLOCK.....		115,604 17	115,604 17	115,604 17
GROUNDS, viz. :—				
Clearing do, making roads, &c.....	22,565 50		22,565 50	
Fence walls.....		89,955 71	89,955 71	
Excavating grounds.....		70,800 99	70,800 99	
Terrace walls.....		38,192 67	38,192 67	
Laying out grounds, lamp posts, &c.....		150,826 60	150,826 60	
Footpaths.....		10,313 54	10,313 54	
Conservatory, laboratory, &c.....		2,360 00	2,360 00	
Marshall Wood's claim.....		13,615 50	13,615 50	
Totals.....	22,565 50	375,965 01		398,530 51
WORKSHOPS (now Supreme Court).....		50,232 69	50,232 69	(b) 50,232 69
Sheds, drying house, &c.....		1,657 45	1,657 45	1,657 45
Grand Totals.....	2,723,993 93	1,596,662 32		4,320,656 25

(a). Including \$752.63, being cost of the tower ball.

(b). Apart from this amount, a sum of \$13,979.70 (see App. 43, page 1192 of General Report on Public Works, 1867 to 1882), was expended for the conversion of the workshops into Supreme Court, making a total outlay of \$64,212.39 on that building.

N. B.—The above expenditure is charged as follows, viz. :—

Against "Capital".....	\$ 4,203,915 86
do "Consolidated Fund".....	116,740 39
	<u>\$ 4,320,656 25</u>

O. DIONNE, Accountant.

APPENDIX No. 29.

LIST OF OFFICERS OF THE DEPARTMENT.

APPENDIX

Ref. No. 36,031.

List of the Members, Commissioners and Assistant Commissioners of the Board Chief Architects of the Department

Chairman, Commissioners and Ministers.			Assistant Commissioners and Deputy Ministers.	
Names.	From	To	Names.	Date of Appointment.
<i>Under Statute 4-5 Vic., Cap. 38, Corporation of Board of Works.</i>				
Hon. H. H. Killaly, Chairman				
D. Daly	Dec. 29, 1841	Oct. 3, 1844	} Members...	
S. B. Harrison ...				
J. Davidson, Esq }				
<i>New Board of Works.</i>				
Hon. H. H. Killaly, Chairman.....	Oct. 5, 1844	June 8, 1846	} Members..	
D. Daly				
W. H. Draper ..				
W. Morris.....				
D. B. Fapineau.)				
<i>Under Statute 4 Vic., Cap. 37, etc.</i>				
Hon. W. B. Robinson, Chief Commissioner...	July 4, 1846	Mar. 10, 1848	Hon. Chas. Eus. Casgrain, Asst. Commissioner	Aug. 1, 1846
E. P. Tache do ...	Mar. 11, 1848	Nov. 26, 1849	Hon. M. Cameron, Asst. Commissioner	Mar. 11, 1848
J. Unanue do ...	Dec. 15, 1849	Mar. 31, 1850	Jno. Wetenhall, Asst. Commissioner.	Feb. 2, 1850
W. H. Marriott do ...	April 20, 1850	Feb. 11, 1851	Hon. Jos. Bourret, Asst. Commissioner	April 20, 1850
J. Bourret do ...	Feb. 15, 1851	Oct. 27, 1851	Hon. H. H. Killaly, Asst. Commissioner	Feb. 15, 1851
John Young do ...	Oct. 28, 1851	Sept. 22, 1852		
J. Unanue do ...	Sept. 23, 1852	Jan. 26, 1855		
F. Lemieux do ...	Jan. 27, 1855	Nov. 25, 1857		
O. Allevu do ...	Nov. 28, 1857	Aug. 1, 1858		
L. J. Linton do ...	Aug. 2, 1858	do 6, 1858		
L. V. Sicotte do ...	do 6, 1858	Jan. 10, 1859	Samuel Kefer, Asst. Commissioner.	May 6, 1859
John Rose do ...	Jan. 15, 1859	June 12, 1861		
Jos. Cauchon, Commissioner.	June 15, 1861	May 23, 1862		
U. J. Tessier do ...	May 24, 1862	do 27, 1863		
L. T. Drummond do ...	do 28, 1863	July 23, 1863		
M. Lait-moise do ...	July 23, 1863	Mar. 29, 1864	Toussaint Trudeau, Asst. Commissioner	Mar. 15, 1864
J. O. Unanue do ...	Mar. 30, 1864	June 30, 1867		
<i>Under Statute 31 Vic., Cap. 12.</i>				
Hon. Wm. McDougall, Minister.....	July 1, 1867	Oct. —, 1869	Toussaint Trudeau, Deputy Minister.	May —, 1868
Hon. H. H. Langevin, C.B., Minister	Dec. 8, 1869	Nov. 5, 1873		
Hon. Alexander Mackenzie do	Nov. 7, 1873	Oct. 16, 1878		
Sir Chas. Tupper, C.B., K.C.M.G., Minister.....	Oct. 17, 1878	May 20, 1879		
Sir Hector L. Langevin, C.B., K.C.M.G., minister.....	May 20, 1879		G. F. Baillairgé, Deputy Minister.	Oct. 4, 1879

No. 29.

of Works, and of the Ministers, Deputy Ministers, Secretaries, Chief Engineers and of Public Works, from 1841 to 1884.

Secretaries.		Chief Engineers.		Chief Architects.	
Names.	Date of Appointment.	Names.	Date of Appointment.	Names.	Date of Appointment.
Thomas A. Begly.	Aug. 17, 1841	Samuel Keefer.....	Aug. 17, 1841	F. P. Rubidge, Architect and Asst. Engineer	Dec. 15, 1841.
Thomas A. Begly, under Act estab- lishing Dept. of Public Works.	Sept. 25, 1847				
.....		John Page.....	Oct. 31, 1853		
Toussaint Trudeau	Dec. 13, 1859				
Frederick Braun...	Mar. 8, 1864				
.....		G. F. Baillaigé, Asst. Chief En- gineer.	July 5, 1871	Thos. S. Scott..	Feb. 7, 1872.
{ S. Chapleau F. H. Ennis.....	Oct. 4, 1879 Nov. 4, 1880	H. F. Perley.....	Nov. 25, 1880	Thos. Fuller.....	Oct. 31, 1881.

APPENDIX No. 30.

OFFICIAL CORRESPONDENCE

From 1st July, 1867, to 31st December, 1884.

APPENDIX No. 30.

[Ref. No. 55,297.]

OFFICIAL CORRESPONDENCE

LIST of Letters Received and Sent from 1st July, 1867 to 31st Dec., 1884.

Years.	Received.	Sent.
1867—From 1st July to 31st December.....	2,075	1,511
1868 do 1st January to 31st December.....	3,498	2,317
1869 do do do	3,448	2,171
1870 do do do	4,961	3,185
1871 do do do	6,268	3,983
1872 do do do	8,333	4,428
1873 do do do	10,072	5,707
1874 do do do	9,800	5,043
1875 do do do	9,006	5,006
1876 do do do	7,971	4,773
1877 do do do	7,517	4,425
1878 do do do	6,886	4,021
1879 do do to 6th October.....	7,186	4,547
1879* do 7th October to 31st December.....	2,033	810
1880 do 1st January do	8,451	4,410
1881 do do do	9,599	5,529
1882 do do do	10,505	5,699
1883 do do do	11,633	6,227
1884 do do do	13,114	6,903

* By an Order in Council, approved on 19th May, 1879, published at page 1496 of the *Canada Gazette*, the 20th May of that year was fixed as the day for separating the Department of Railways and Canals from the Department of Public Works, in accordance with Act 42 Vic., chap. 7. The staff of officers and clerks of the Department of Public Works continued to manage in common the business of the two Departments until the 1st October, when an Order in Council was approved dividing the staff between the two Departments. The first letter of the new Department of Public Works was written on 7th October.

The above list does not include the correspondence of the chief officers of the Department with their assistants and the public, which averages over 8,000 letters per year.

DOMINION OF CANADA.

ANNUAL REPORT

OF THE

MINISTER

OF

RAILWAYS AND CANALS

FOR THE PAST

FISCAL YEAR FROM 1ST JULY, 1883, TO 30TH JUNE,

1884

ON THE WORKS UNDER HIS CONTROL.

SUBMITTED IN ACCORDANCE WITH THE PROVISIONS OF THE ACT THIRTY-FIRST VICTORIA, CHAPTER TWELVE, SECTION NINETEEN, AS AMENDED BY THE ACT FORTY-SECOND VICTORIA, CHAPTER SEVEN.

PRINTED BY ORDER OF THE HOUSE OF COMMONS.



OTTAWA:

PRINTED BY MACLEAN, ROGER & CO., WELLINGTON STREET,
1885.

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REPORT.

1883—84.

*To His Excellency the Most Honourable the Marquess of Lansdowne,
Governor General of Canada, &c., &c., &c.*

MAY IT PLEASE YOUR EXCELLENCY :

I have the honour to submit the Annual Report of the Department of Railways and Canals for the fiscal year ended 30th of June, 1884.

This report is submitted in accordance with the provisions of the Act 31 Vic. Cap. 12 (1867), as amended by the Act 42 Vic., Cap. 7, Sections 4 and 5 (1879).

The Annual Reports of the Chief Engineers, together with general and special Reports from Superintendents, both of Railways and Canals, and from other Officers of the Department, are given in Appendices.

Attached hereto (appendix 1, page 1) will be found a statement showing the amounts expended during the past fiscal year in construction, repairs and maintenance of the several works under the Department.

RAILWAYS.

The present Report deals with the undermentioned Railways of the Dominion, either directly controlled by the Federal Government, or towards the construction of which subsidies have been authorized.

CANADIAN PACIFIC RAILWAY.

By the Act 44 Vic., ch. 1 (1881), a contract made with the Canadian Pacific Railway Company, under date the 21st of October, 1880, for the building of a line of railway between Callander, Lake Nipissing, and Port Moody, British Columbia, was approved and ratified.

NOTE — It should be observed that while the reports furnished by the Superintending Officers deal with the fiscal year only, the General Report of the Minister contains information on points of interest relating to the Canadian Pacific Railway and other subsidized lines up to the end of December, 1884. A map showing the route of the Canadian Pacific and Intercolonial railways accompanies this report.

By this contract the company undertook to construct the portions between Callander and Port Arthur, and between Red River and Savona's Ferry (Kamloops), British Columbia, the Government undertaking the building of the portions between Port Arthur and Red River, and between Savona's Ferry and Port Moody.

Under the terms of the contract, the whole line was to be completed and equipped by the 1st of May, 1891:

The subsidy granted to the company by the Act of 1881 was as follows: Money, \$25,000,000 ; land, 25,000,000 acres.

Under an Act passed last session, 47 Vic., chap. 1, in order to secure the completion of the entire road, in accordance with the terms of their contract, by the month of May, 1886, a loan of \$22,500,000, bearing interest at 5 per cent., and payable in May, 1891, has been made to them, security, being taken therefor by a mortgage on their entire property. Of this sum, \$7,500,000 was paid over to the company, to extinguish their then floating debt, and the remainder is in course of payment as the work proceeds.

During the past season the Government Chief Engineer has made a tour of inspection of the works in progress over the entire line. His reports, dated the 1st of October and 31st of December, 1884, show that he is convinced that the funds at the company's command are fully adequate to the completion of the contract; and, also that, if the work proceeds with the same vigor as heretofore, connection from ocean to ocean will be made by the autumn of 1885. (See Appendix No. 3, p. 7; also Appendix No. 14, p. 162)

The total distance between the terminal points named, by the route finally adopted (*vid* Winnipeg and the Kicking Horse Pass), is 2,550 miles, of which the portions to be built by the company are as follows, according to the latest location:—

	Miles.	Miles.
Callander to Port Arthur.....	657	
Red River to Savona's Ferry.....	1,252	
	————	1,909

The portions to be built by the Government are as follows:—

Port Arthur to Red River.....	428	
Savona's Ferry to Port Moody.....	213	
	————	641
		2,550

The whole line upon completion, together with the Pembina Branch from Winnipeg to Emerson, sixty-four and a-half miles, is to be the property of the company, to be operated and maintained by them, thenceforward.

In conformity with the terms of the contract, and an arrangement made with the company in May, 1883, for the completion of certain unfinished work, the whole of the road between Port Arthur and Red River (opposite Winnipeg), together with the Pembina Branch, has been handed over to the company.

PROGRESS OF WORKS UNDER THE GOVERNMENT.

The portion of the road remaining to be constructed by the Government, at the beginning of the fiscal year 1883-84, was that between Savona's Ferry and Port Moody, 213 miles.

As to this portion, the work is far advanced towards completion, and at the date of the present report, the 31st of December, 1884, the track has been laid for the distance of 210 miles, leaving three miles only yet to be laid. Certain ballasting and other minor work is required before the section can be accepted from the contractors as finished, but it is confidently believed that all will be completed by the time fixed in their contract, the 30th of June, 1885.

The River Fraser has been spanned near Lytton by a combined iron and steel Cantilever bridge, two spans being of 100 feet each, with a centre span 300 feet, carrying the track at an elevation of 125 feet above the river.

PROGRESS OF WORKS UNDER THE COMPANY.

Callander to Port Arthur—657 miles.—Upon this portion by the 31st December, 1884, the track was laid for a total distance of 403 miles. On a further distance of 193 miles the grading was completed, while on the remainder, sixty-one miles, no grading had been done. The Government Chief Engineer foresees no difficulty in making rail connection between Callander and Port Arthur by May or June next. The heavy work on this section has, practically, been finished. Good progress has been made in the erection of stations, water tanks, &c. The road between Callander and Sudbury, ninety-eight miles, has been under traffic for some time. Wharf and station accommodation has been provided at Port Arthur, and the Company have erected there an elevator of 300,000 bushels capacity.

Port Arthur to Red River, opposite Winnipeg—428 miles.—This section having been transferred to the company prior to full completion, they have been engaged, under an agreement to that effect, in the work of ballasting and filling in valleys crossed by temporary bridges. This work will shortly be finished.

The company have under construction an elevator at Fort William, the capacity of which is to be 1,000,000 bushels.

Red River to Savona's Ferry—1,252 miles.—Up to the 31st of December, 1884, on this section, 1,029 miles of track have been laid, 966 miles of which, namely, to a point a short distance beyond the summit of the Kicking Horse Pass, are completed and in

operation, stations, water service and all necessary buildings having been erected. The grading is completed for a total further distance of twenty-eight miles, leaving 195 miles yet to be graded by the company. A force of about 5,000 men is engaged in the work on this section.

Reference was made in the report of last year to the fact that the company were endeavouring to take their line through the Rocky Mountain and Selkirk Ranges *via* Kicking Horse Pass. A location has now been adopted by which this end will be attained.

On a portion of this location some heavy tunnelling and rock work will be required, the immediate execution of which would have considerably retarded the progress of the work of construction beyond that point, the transport of material and supplies being seriously impeded, if not stopped.

The company have therefore been permitted, under authority of an Order in Council, to construct a temporary but substantial line over a distance of some nine miles, which will be used until the work on their permanent location is completed. This temporary line is not included in the figures given above.

For a short distance on this temporary line the grades are heavy, but when the temporary line is replaced by that of the permanent location, the maximum grade for the whole distance between the Rocky Mountains and Savona's Ferry will not exceed 116 feet to the mile.

Of the total distance between Callander and Port Moody, 2,550 miles, up to the 31st of December, 1884, the road has been graded for a total distance of 2,294 miles, upon which the rails have been laid for a total distance of 2,070 miles, leaving 256 miles of grading and 480 miles of track laying still to be executed (of this, three miles are Government work.) The total distance ballasted is 1,880 miles, leaving 670 miles yet to be done.

Payments.—

Amount of subsidy under the contract.....	\$25,000,000 00	
Amount paid up to the end of the fiscal year 1882-83 (30th of June, '83)	\$ 7,533,076 60	
Amount paid during fiscal year 1883-84	7,254,208 27	
	<u>14,787,284 87</u>	
Amount paid from end of fiscal year 1883-84, to 31st Dec., 1884.....	4,985,753 00	
	<u>19,773,037 87</u>	
Balance on the 31st December, 1884.....	\$ 5,226,962 13	

Loan Account.

The payments made on account of the loan granted last Session are as follows:—

Amount of loan.....	\$22,500,000 00
Amount paid to end of fiscal year 1883-84—the 30th June, 1884, in- cluding the sum of \$7,500,000 paid to extinguish the floating debt....	\$10,953,462 00
Amount paid from the end of the fiscal year 1883-84, to the 31st of December, 1884.....	7,017,268 00
	17,970,730 00
Balance on the 31st December, 1884.....	\$ 4,529,270 00

Out of the land subsidy, 25,000,000 acres, there had been earned by the company, up to the 31st of December, 1883, 13,755,763 acres, of which one-fifth, or 2,751,152 acres, was retained by the Government, under the contract, pending the completion of the road, making a total of 11,004,611 acres. There has since that date been earned by the company, a further extent of land. This, however, is part of the security retained by the Government in consideration of the loan made to the company last Session, and will be dealt with hereafter.

Location.—Plans and profiles of portions of the road have, from time to time, been submitted by the company, and after report thereon by the Chief Engineer, have been approved by successive Orders in Council. Up to the 31st December, 1884, the whole of the location between Callander and Port Arthur has been approved; also the location of the western portion of the road up the 1,054th mile west from Winnipeg, or to the summit of Roger's Pass in the Selkirk Range; together with a distance of 42 miles eastwards from Savona's Ferry.

BRANCH LINES.

In addition to the subsidy for their main line, the company have, under their contract, the right to receive a grant, in so far as it is vested in the Government, of the land required for road bed, stations, &c., in the construction of branch lines.

Algoma Branch, formerly known as the Sault St. Marie Branch—94½ miles.—This branch extends from Sudbury Junction (98 miles west of Callander) to Algoma, on Georgian Bay.

Emerson Branch—15 miles.—This branch is intended to connect the town of Emerson with the company's Pembina Mountain branch, at Pembina Mountain

Junction, and so with Winnipeg and the main line. The track is laid, but the line is not yet open for traffic.

A list will be found in Appendix 3, page 8, showing the several branches built or acquired by the company, all of which are completed and under traffic, with the exception of the two lines above named. The list also gives the lengths of the several portions of the trunk line mentioned in the preceding pages, the following being a summary of such list:—

Trunkline from Montreal to Callander.....	345	
do Callander to Port Moody.....	2,550	
		2,895
Branches acquired or built.....		432 $\frac{1}{4}$
		<u>3,327$\frac{1}{4}$</u>
Total miles		<u>3,327$\frac{1}{4}$</u>

In addition to the 102 $\frac{1}{2}$ miles now constituting the Pembina Mountain branch, a further distance of 60 miles is located in readiness for construction.

GOVERNMENT RAILWAYS IN OPERATION.

The several lines operated and maintained by the Government during the past fiscal year ended the 30th June, 1884, were:—

	Miles.
The Intercolonial and its extensions.....	847
Eastern Extension Railway.....	80
Prince Edward Island.....	199
Windsor Branch (maintained only).....	32
	<u>1,158</u>
Total mileage.....	<u>1,158</u>

The through ocean mail line from Point Lévis, Quebec, to Halifax, is 688 miles in length.

For details respecting these roads, see Appendix No. 4, pp. 14 to 85.

The General Revenue Accounts for 1883-84 show the following as the financial position of these roads for the past fiscal year :—

	Expenditure.	Earnings.	Profit.	Loss.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Intercolonial *.....	2,344,579 09	2,353,647 26	9,068 17	
Eastern Extension (operated for 5 months and 23 days)	32,854 53	30,767 66		2,086 87
Prince Edward Island	236,428 13	144,504 12		91,924 01
Windsor Branch (earnings, one-third of entire receipts)	22,140 86	23,018 93	878 07	
	2,603,148 08	2,521,160 31	9,946 24	94,010 88
				9,946 24
Total loss on working.....				84,064 64
Less disbursements in connection with the accident on the Prince Edward Island Railway in 1880				16,073 45
Net loss.....				67,991 19

* The Dalhousie branch, seven miles, was only operated for seven days of the fiscal year.

INTERCOLONIAL RAILWAY.

LENGTH OF LINE.

Ocean Mail Line.

	Miles.
Point Lévis to Rivière du Loup.....	126
Rivière du Loup to Moncton.....	374
Moncton to Painsec.....	8
Painsec to Truro.....	118
Truro to Halifax.....	62
	<u>688</u>

Extensions.

Moncton to St. John.....	89
Painsec to Shediac.....	11
Truro to Pictou.....	52
Dalhousie Junction to Dalhousie.....	7
	<u>159</u>
	<u>847</u>

Wharf Branches.

Rimouski to Wharf.....	2
Newcastle, N. B., to Deep Water Wharf.....	2
Dorchester to Shipping Wharf.....	1
Sackville to Shipping Wharf.....	0·5
Stewiacke to Wharf.....	1
	<hr/>
	6·5
	<hr/> <hr/>

Capital Account.—The total cost of the road and equipment chargeable to capital account at the close of the fiscal year, 1882-83, according to last year's report, was..... \$41,176,654 19

From which is to be deducted, (owners of lands taken for the St. Charles Branch and other works having refused amounts offered, and for which cheques had issued, such cheques being thereupon cancelled)..... 109,401 58

\$41,067,252 61

The expenditure charged to capital account for the year ended 30th June, 1884, is as follows:—

Halifax Extension.....	\$ 47,671 45
Increased Accommodation, St. John.....	139,432 00
Repairs and Improvements, Rivière du Loup Line.....	835 13
Settlement of claims connected with the original construction of the Intercolonial Railway.....	388,740 34
For rolling stock.....	586,386 84
The St. Charles Branch.....	259,054 96
Dartmouth Branch.....	14,470 77
Dalhousie Branch.....	67,157 76
Rivière du Loup Town Branch.....	10,748 35
Indian-Town Branch.....	384 00
Miscellaneous works.....	97 50
	<hr/>
	1,514,979 10
	<hr/> <hr/>
Making the total cost up to 30th June, 1884.....	\$42,582,231 71
	<hr/> <hr/>

Revenue Account.—

The gross earnings for the year were.....	\$2,353,647 26
The working expenses were.....	2,344,579 09
	<hr/>
Net earnings.....	\$ 9,068 17
	<hr/> <hr/>
The gross earnings, compared with those of the previous year, show a decrease of.....	\$17,273 84
	<hr/> <hr/>

The traffic, however, both of passengers and freight, exceeds that of any previous year.

Though the gross tonnage carried shows an increase of 30,202 tons, and the passenger traffic an increase of 42,270 persons, as compared with that of last year, the working expenses show a decrease of \$15,794.18.

The total net earnings for the past four years amount to...	\$29,763 83
The value of the stores in hand, including steel rails and fuel, at the end of the year, 1883 84, was.....	\$837,520 91
	<hr/> <hr/>

The engine mileage, compared with that of last year, was:—

	Miles.
1883-84.....	4,407,655
1882-83.....	4,406,189
	<hr/>
Increase.....	1,466

The car mileage, compared with that of last year, was:—

1883-84.....	41,741,080
1882-83.....	41,526,553
	<hr/>
Increase.....	214,527

The train mileage, compared with that of last year, was:—

1883-84.....	3,653,961
1882-83.....	3,615,192
	<hr/>
Increase.....	38,769

The working expenses per mile run by engines were:—

	Cents.
1882-83.....	53·57
1883-84.....	53·19
	<hr/>
Decrease.....	·38

The working expenses per mile run by trains were :—

1882-83	65 29
1883-84.....	64 17
	—
Decrease.....	1 12

The gross tonnage carried was :—

	Tons.
1883-84.....	1,001,163
1882-83.....	970,961
	—
Increase.....	30,202

The total number of passengers carried was :—

1883-84.....	920,870
1882-83.....	878,600
	—
Increase.....	42,270

The whole road has been maintained in a state of thorough efficiency.

The work of relaying the road with steel rails, heavier than those now in use, has been continued. The new rails, in place of fifty six, weigh sixty-seven pounds to the lineal yard.

The expenditure of the year has received an exceptional increase, owing to the fact that the general offices at Moncton, destroyed by fire in February, 1883, have been rebuilt. The cost, up to the end of the fiscal year, was \$63,098.25. This has been charged to the working expenses of the road.

Amongst the repairs and improvements of the year is included the erection of seven new stations and freight houses.

An unusually heavy freshet occurred in New Brunswick and Nova Scotia in April last, causing great damage, washing away culverts and destroying embankments. Temporary measures were at once adopted, so that traffic was delayed a few hours only. The damage done has since been substantially made good.

Work at the Deep Water Terminus at Halifax has been continued, including dredging and the removal of boulders. The operations for the conduct of ocean-bound traffic at this point last winter proved very successful.

At St. John the improvements affording the increased accommodation needed have made good progress. They include the erection of a new station, a warehouse, and freight and flour sheds.

The increase of traffic rendered necessary a considerable addition to the rolling stock of the road. For this purpose, under special Parliamentary provision, twenty-eight additional engines were purchased, making the total of 163 locomotives in stock on the 30th June, 1884.

WINDSOR BRANCH.

The Windsor and Annapolis Railway Company are permitted to continue the operation of this line, the arrangement being that the company pay all charges in connection with the working, two-thirds of the gross receipts being allowed them for such purpose, the Government taking the remaining one-third and assuming all cost of maintenance.

The earnings and expenditure for the year ended the 30th June, 1884, were as follows:—

Gross earnings accruing to the Government.....	\$23,018 93
Expenditure for maintenance of way and works.....	22,140 86
Balance.....	\$ 878 07

Government earnings, one-third of gross receipts, in comparison with those of the previous year:—

1882-1883	\$24,113 89
1883-1884	23,018 93
Decrease	\$ 1,094 96

Expenditure in comparison with that of the previous year:—

1882-1883.....	\$ 23,103 93
1883-1884.....	22,140 86
Decrease.....	\$ 963 07

The road has been maintained in good working order.

DALHOUSIE BRANCH.

This branch, 7 miles long, connecting the Intercolonial Railway with the town of Dalhousie, at the head of the Baie des Chaleurs, was sufficiently completed to enable it to be opened for traffic on the 23rd of June. A wharf property has been acquired at Dalhousie, and by an addition made to the existing wharf, good accommodation is afforded to vessels and steamers drawing 16 feet of water.

EASTERN EXTENSION RAILWAY.

This line of railway is eighty miles long, extending from the Pictou Branch of the Intercolonial Railway, at New Glasgow to Port Mulgrave on the Strait of Canso, thence connecting with Cape Breton by means of a ferry.

Under arrangements, subject to sanction by Parliament, this line with its equipment, was, on the 9th January, 1884, purchased by the Dominion Government from the Government of the Province of Nova Scotia, together with rights possessed by that Government, in the Pictou Branch, between Truro and Pictou; also, the ferry built for the passage of the Strait of Canso. The purchase was duly sanctioned by Parliament last Session.

During the five months and twenty-three days of its operation by this Government the financial results were as follows:—

Expenses.....	\$32,854 53
Earnings.....	30,767 66
	2,086 87
Loss.....	2,086 87

The history of the transfer of this road is as follows:—

By a resolution of the House of Commons of the 19th of May, 1874, the Government was empowered to transfer the Branch of the Intercolonial between Truro and Pictou to some company undertaking to extend the line eastwards from New Glasgow or Pictou to the Gut of Canso or some place in Cape Breton.

By the Statute 42 Vic., cap. 12, 1879, amending the original Statute, 40 Vic., cap. 46, it was enacted that the Pictou Branch of the Intercolonial Railway should be transferred to the Halifax and Cape Breton Railway and Coal Company, so soon as the contract for the construction and equipment of the extension line of railway from New Glasgow to the Strait of Canso, and for the establishment of a steam ferry at the strait, then existing between the company and the Provincial Government of Nova Scotia, should have been performed to the satisfaction of the said Government.

Under agreement made between the Nova Scotian Government and the Halifax and Cape Breton Railway Company, the said Government had the right to take over all the railways of the company, known as the Eastern Extension, and all the property of the company, including their rights in the Pictou Branch, and all privileges connected therewith, on paying the actual outlay of the company, exclusive of the Government subsidies and subventions granted to them.

The Nova Scotian Government decided to assume the railways of the company, and certain differences between themselves and the company, as to the performance of the contract, having been adjusted, the Provincial Government made propositions

for the purchase and acquisition by the Dominion Government of the said Eastern Extension, the result of which was the passage, last Session, of the following Act, 47 Vic., cap. 5:—

“The Government of Canada may, under an Order of the Governor in Council, purchase and acquire for the Dominion, from the Government of Nova Scotia, the Eastern Extension Railway from New Glasgow to the Gut of Canso, and the steam ferry in connection therewith, together with the rights of the said Province in the Truro and Pictou Branch Railway, for the sum of one million two hundred thousand dollars, and the new rolling stock and equipments of the said railway for a sum equal to the cost thereof and charges, the said sums, with interest thereon at six and one-half per cent. per annum from the first day of October, one thousand eight hundred and eighty-three, to be payable out of the Consolidated Revenue Fund of Canada: Provided, that the necessary legislative provisions shall have been made by Nova Scotia for giving effect to the said purchase and acquisition, according to the agreement between the two Governments to that effect, laid before Parliament on the sixth day of February, one thousand eight hundred and eighty-four, and that the accounts between the two Governments in connection with the said purchase shall have been previously settled to the satisfaction of the Government of Canada.”

By a deed, dated the 23rd of May, 1884, the road has been transferred to the Dominion Government in conformity with the aforesaid Act.

DARTMOUTH BRANCH.

By this branch, four miles in length, connection is afforded between the Intercolonial Railway at Richmond and Dartmouth, on the north side of Halifax Harbour. This work involves the spanning of the “Narrows,” a channel 500 feet wide. The work is all under contract, and in progress.

RIVIÈRE DU LOUP TOWN BRANCH.

This branch, about four miles long, is under contract. By it the Intercolonial Railway will be connected with the Rivière du Loup wharf.

ST. CHARLES BRANCH.

This branch, which extends from St. Charles Station, on the Intercolonial Railway, to Levis—fifteen miles—was sufficiently advanced in July last to admit of its being opened for traffic.

INDIAN-TOWN BRANCH.

This branch, for the construction of which, by the Government, as a branch of the Intercolonial, a special appropriation was voted last Session, extends from Derby Station, on that road, up the South-West Miramichi River to Indian-Town, a distance of fourteen miles.

Under date the 29th June, 1884, plans of the location of the proposed road, prepared by the Government Chief Engineer, were approved by an Order in Council. The contract for the work was signed on the 18th of September last, and construction is in progress.

PRINCE EDWARD ISLAND RAILWAY.

LENGTH OF LINE.

	Miles.
Tignish to Royalty Junction.....	113½
Royalty Junction to Mount Stewart.....	20
Mount Stewart to Georgetown.....	21
	— 154½

EXTENSIONS.

Royalty Junction to Charlottetown.....	5
Mount Stewart to Souris.....	39
	— 44
	— 198½

Capital Account.—The total cost of the road and equipment chargeable to capital account at the close of fiscal year 1882-83 was.....\$3,523,692 62

The expenditure charged to this account for the year ended the 30th of June, 1884, including the sum \$120,745.94 expended on the Cape Traverse Branch, was..... 130,663 38

Total expenditure on capital account to the 30th of June, 1884.....\$3,654,356 00

Revenue Account.—The working expenses and receipts for the year ended 30th of June, 1884, were:—

Gross expenses.....	\$ 236,428 13
Gross earnings.....	144,504 12
	—
Excess of expenditure over earnings.....	\$ 91,924 01

The gross earnings, compared with those of the previous year, were:—

1882-1883.....	\$146,170 42
1883-1884.....	144,504 12
	—
Decrease.....	\$ 1,666 30

The gross expenditure, compared with that of the previous year, was:—

1882-1883.....	\$252,808 41
1883-1884.....	236,428 13
	Decrease.....
	\$16,380 28

The engine mileage was:—

	Miles.
1882-1883.....	313,760
1883-1884.....	291,760
	Decrease.....
	22,000

The train mileage was:—

1882-83.....	248,819
1883-84.....	238,130
	Decrease
	10,689

The car mileage was:—

1882-1883.....	1,237,103
1883-1884.....	1,208,423
	Decrease
	28,680

The road and its equipments have been well maintained throughout the year.

CAPE TRAVERSE BRANCH.

This line is being constructed in order to facilitate communication between the Prince Edward Island Railway and the Intercolonial. The branch leaves the island railway at County Line station and runs to Cape Traverse, a distance of thirteen miles. Across the strait to Cape Tormentine, on the mainland, the distance is nine miles. A private company, the New Brunswick and Prince Edward Island Railway Company, are constructing a line forty miles in length, to connect Cape Tormentine with the Intercolonial Railway at Sackville. Of this distance one-half, to Baie Verte, is completed and under traffic, and on the remaining twenty miles the grading is nearly completed. Cape Traverse is a landing place for ice-boats in winter.

The Cape Traverse Branch is now completed and ready to be opened for traffic purposes.

SUBSIDIZED LINES.

By the Acts of Parliament below specified, authority has been placed in the hands of the Governor in Council to grant, upon certain conditions, pecuniary aid

towards the construction of various lines of railway throughout the Dominion, as follows, namely :—

By the Act 45 Vic, cap. 14 (1882).

No. 1. For a railway from Gravenhurst to Callander, both in the Province of Ontario, a subsidy not exceeding \$6,000 per mile, nor exceeding in the whole.....	\$ 660,000
2. For a railway from St. Raymond to Lake St. John, both in the Province of Quebec, a subsidy not exceeding \$3,200 per mile, nor exceeding in the whole.....	384,000
3. For a railway from a point on the Intercolonial Railway at Rivière du Loup or Rivière Ouelle, in the Province of Quebec, or between them, to Edmundston, in the Province of New Brunswick, a subsidy not exceeding \$3,200 per mile, nor exceeding in the whole.....	240,000
4. For a railway from Oxford to New Glasgow, both in the Province of Nova Scotia, a subsidy not exceeding \$3,200 per mile, nor exceeding in the whole.....	224,000
	Total.....
	\$1,508,000

The said subsidies to be granted to such companies as shall be approved by the Governor in Council, as having established, to his satisfaction, their ability to complete the said railways respectively, within a reasonable time, to be fixed by Order in Council, and according to descriptions and specifications to be approved by the Governor in Council on the report of the Minister of Railways and Canals, and specified in a agreement to be made by the company with the Government, and which the Government is empowered to make, and to be payable out of the Consolidated Revenue Fund of Canada, by instalments on the completion of each ten miles of railway, proportionate to the value of the portion so completed in comparison with the whole work undertaken, such proportion to be established by the report of the said Minister; provided always, that the granting of such bonuses or subsidies, shall be subject to such conditions for securing such running powers or traffic arrangements and other rights, as will afford all reasonable facilities and equal mileage rates to all railways connecting therewith, as the Governor in Council may determine.

By the Act 46 Vic. cap. 25, (1883) :—

- No. 5. To the Baie des Chaleurs Railway Company, for 100 miles of their railway, from Matapedia, on the Intercolonial Railway, to Paspebiac, in the Province of Quebec, a subsidy not exceeding \$3,200 per mile, nor exceeding in the whole..... \$320,000

- 6. To the Caraquet Railway Company for 36 miles of their railway, from a point near Bathurst to Caraquet, in the Province of New Brunswick, a subsidy not exceeding \$3,200 per mile, nor exceeding in the whole..... 115,200

- 7. To the Gatineau Valley Railway Company, for the first 50 mile section of their railway, from Hull Station, in the Province of Quebec, a subsidy not exceeding \$3,200 per mile, nor exceeding in the whole..... 160,000

- 8. To the Great American and European Short Line Railway Company, for 80 miles of their railway from Canso to Louisburg or Sydney, in the Province of Nova Scotia, a subsidy not exceeding \$3,200 per mile, nor exceeding in the whole.* 256,000

- 9. To the International Railway Company, for 49 miles of their railway from Sherbrooke, in the Province of Quebec, to the International boundary line, a subsidy not exceeding \$3,200 per mile, nor exceeding in the whole..... 156,800

In connection with the extension of this road through Maine to connect with New Brunswick, at or near Vanceborough or south of that point.

- 10. To the Northern and Western Railway Company, for 32 miles of their railway, from the Intercolonial Railway, near the Miramichi, to Moran's, near Demphy Village, in the Province of New Brunswick, a subsidy not exceeding \$3,200 per mile, nor exceeding in the whole..... 102,400

*This was amended by the Act 47 Vic., cap. 8, sec. 2, the words "To the Great American and European Short Line Railway Company" being struck out, and the word "the" being inserted for the word "their."

11. To the Montreal and Western Railway Company, for the first 50 mile section of their railway, out of St. Jerome, in the Province of Quebec, a subsidy not exceeding \$3,200 per mile, nor exceeding in the whole.....	160,000
12. To the Napanee, Tamworth and Quebec Railway Company, for 28 miles of their railway, from Napanee to Tamworth, in the Province of Ontario, a subsidy not exceeding \$3,200 per mile, nor exceeding in the whole.....	89,600
13. To the Quebec and Lake St. John Railway Company, for 25 miles of their railway, from St. Raymond to Lake St. John, in the Province of Quebec, a subsidy not exceeding \$3,200 per mile, nor exceeding in the whole.....	80,000
In addition to the subsidy granted by the Act forty-fifth Victoria, chapter fourteen.....	
14. For a railway from the Intercolonial Railway at Petitcodiac to Havelock Corner, in the Province of New Brunswick, 12 miles, a subsidy not exceeding \$3,200 per mile, nor exceeding in the whole.....	38,400
15. For a railway from Gravenhurst to Callander, 110 miles, a subsidy not exceeding \$6,000 per mile, nor exceeding in the whole.....	660,000
In addition to the subsidy granted by the Act forty-fifth Victoria, chapter fourteen.	
Total.....	\$2,138,400

“The nine subsidies first mentioned to be granted to the companies hereinbefore named respectively; and the two subsidies last mentioned to be granted to such companies as shall be approved by the Governor in Council as having established to his satisfaction their ability to complete the said railways, respectively; and all the eleven lines above mentioned, and also all the lines of railway in respect of which it is provided by the Act forty-fifth Victoria, chapter fourteen, that subsidies may be granted, shall be commenced within two years from the first day of July next, and completed within a reasonable time, not to exceed four years from and after the passing of this Act, to be fixed by Order in Council, and according to descriptions and specifications to be approved by the Governor in Council, on the report of the Minister of Railways and Canals, and specified in an agreement to be made by each company with the

Government, and which the Government is empowered to make; and all the said subsidies authorized by this Act, respectively, to be paid out of the Consolidated Revenue Fund of Canada by instalments, on the completion of each section of no less than ten miles of railway, proportionate to the value of the portion so completed in comparison with the whole work undertaken, to be established by the report of the said Minister: Provided always, that the granting of such subsidies shall be subject to such conditions for securing such running powers or traffic arrangements, and other rights, as will afford all reasonable facilities and equal mileage rate, all railways connecting with those so subsidized, as the Governor in Council may so determine."

By the Act 47 Vic., cap. 8 (1884),

16. To the Government of the Province of Quebec, in consideration of their having constructed the railway from Quebec to Ottawa, forming a connecting line between the Atlantic and Pacific coasts *vid* the Intercolonial and Canadian Pacific Railway, and being as such a work of national and not merely Provincial utility, a subsidy not exceeding \$6,000 per mile for the portion between Quebec and Montreal, 150 miles, nor exceeding in the whole.....\$ 954,000

And for the portion between Montreal and Ottawa, 120 miles, \$12,000 per mile, nor exceeding in the whole..... 1,440,000

17. For the construction of a line of railway connecting Montreal with the harbours of St. John and Halifax by the shortest and best practicable route, after the report of competent engineers, a subsidy not exceeding \$170,000 per annum for fifteen years, or a guarantee of a like sum for a like period as interest on bonds of the company undertaking the work.

18. For the construction of a line of railway from Oxford Station, on the Intercolonial Railway, to Sydney or Louisburg, a subsidy not exceeding \$30,000 per annum for fifteen years, or a guarantee of a like sum for a like period as interest on the bonds of the company undertaking the work, in addition to the subsidies previously

granted, and also a lease or transfer to such company of the Eastern Extension Railway, from New Glasgow to Canso, with its present equipment.

19. To the Quebec Central Railway Company, for a line of railway from Beauce Junction to the International boundary line, a subsidy not exceeding \$3,200 per mile, nor exceeding in the whole..... 211,200
20. For the extension for the Canadian Pacific Railway, from its terminus at St. Martin's Junction, near Montreal, or some other point on the Canadian Pacific Railway, to the harbour of Quebec, in such manner as may be approved by the Governor in Council, a subsidy not exceeding \$6,000 per mile, nor exceeding in the whole..... 960,000
21. To the Irondale, Bancroft and Ottawa Railway Company, for a line of railway from the Victoria branch of the Midland Railway, to the village of Bancroft, in the township of Dunganon, county of Hastings, a subsidy not exceeding \$3,200 per mile, nor exceeding in the whole. 160,000
22. To the Pontiac Pacific Junction Railway for a line of railway from Hull or Aylmer to Pembroke, provided the Ottawa river is crossed at some point not east of Lapasse, a subsidy not exceeding \$3,200 per mile, nor exceeding in the whole..... 272,000
23. To the Gatineau Railway Company, for a line of railway from Kazuabazua to Le Desert, a subsidy not exceeding \$3,200 per mile, nor exceeding in the whole..... 160,000
24. To the Napanee, Tamworth and Quebec Railway Company, for a line of railway from Tamworth to Bogart and Bridgewater, a subsidy not exceeding \$3,200 per mile, nor exceeding in the whole..... 70,400

25. The Montreal and Western Railway Company, for a line of railway from the end of the line subsidized in the now last Session of Parliament, towards Le Desert, a subsidy not exceeding \$3,200 per mile, nor exceeding in the whole....	160,000
26. To the Northern and Western Railway Company, for a line of railway from Fredericton to the Miramichi River, a subsidy not exceeding \$3,200 per mile, nor exceeding in the whole (instead of the subsidy proposed in 1883).....	128,000
27. To the Erie and Huron Railway Company, for a line of railway from Wallaceburg to Sarnia, a subsidy not exceeding \$3,200 per mile, nor exceeding in the whole.....	96,000
28. To the Ontario and Pacific Railway Company, for a line of railway from Cornwall to Perth, a subsidy not exceeding \$3,200 per mile, nor exceeding in the whole.....	262,400
29. To the Kingston and Pembroke Railway Company, for a line of railway from Mississippi to Renfrew, a subsidy not exceeding \$3,200 per mile, nor exceeding in the whole.....	48,000
30. To the Great Northern Railway Company, for that portion of their railway between St. Jerome and New Glasgow, in the county of Terrebonne, a subsidy not exceeding \$3,200 per mile, nor exceeding in the whole.....	32,000
31. For a line of railway and bridge between the Jacques Cartier Union Railway Junction with the Canadian Pacific Railway and St. Martin's Junction, connecting the Jacques Cartier Union Railway with the North Shore Railway proper, a subsidy not exceeding in the whole..	200,000
32. For a line of railway from Richibucto to St. Louis, a subsidy not exceeding \$3,200 per mile, nor exceeding in the whole.....	22,400
33. For a line of railway from Hopewell to Alma, in the Province of New Brunswick, a subsidy not exceeding \$3,200 per mile, nor exceeding in the whole.....	51,200

- 34. For a line of railway from St. Andrews to Lachute, in the county of Argenteuil, a subsidy not exceeding \$3,200 per mile, nor exceeding in the whole..... 22,400
- 35. For a line of railway from the Grand Piles, on the River St. Maurice, to Lake Edward, a subsidy not exceeding \$3,200 per mile, nor exceeding in the whole..... 217,600
- 36. For a line of railway from Annapolis to Digby, in the Province of Nova Scotia, a subsidy not exceeding \$3,200 per mile, nor exceeding in the whole..... 64,000
- 37. For a line of the Central Railway, from the head of Grand Lake to the Intercolonial Railway, between Sussex and St. John, a subsidy not exceeding \$3,200 per mile, nor exceeding in the whole..... 128,000
- 38. To the Caraquet Railway Company, for the extension of their line of railway from Caraquet to Shippigan Harbour, in the Province of New Brunswick, a subsidy not exceeding \$3,200 per mile, nor exceeding in the whole... 76,800
- 39. For a branch of the Intercolonial Railway, from Metapediac eastward, towards Paspediac, twenty miles, in the Province of Quebec, a sum not exceeding in the whole..... 300,000
- 40. For a branch of the Intercolonial Railway, from Derby Station to Indian-Town, fourteen miles a sum not exceeding in the whole..... 140,000

“The subsidies hereinbefore mentioned as to be granted to companies named for that purpose, shall be granted to such companies, respectively: the other subsidies shall be granted to such companies as shall be approved by the Governor in Council as having established, to his satisfaction, their ability to construct and complete the said railways, respectively. All the lines for the construction of which subsidies are granted shall be commenced within two years from the first day of July next and completed within a reasonable time, not to exceed four years, to be fixed by Order in Council, except the line mentioned in the fourth section of this Act, which shall be commenced within one year, and shall also be constructed according to descriptions and specifications and upon conditions to be approved

by the Governor in Council, on the report of the Minister of Railways and Canals, and specified in an agreement to be made in each case by the company with the Government, and which the Government is hereby empowered to make; the location also of every such line of railway shall be subject to the approval of the Governor in Council: and all the said subsidies respectively shall be payable out of the Consolidated Revenue Fund of Canada, by instalments on the completion of each section of the railway of not less than ten miles, proportionate to the value of the portion so completed, in comparison with that of the whole work undertaken, to be established by the report of the said Minister. The subsidies to the Province of Quebec shall be capitalized and the interest shall be payable at such time and in such manner as the Government of Canada shall agree upon with the Government of the said Province. The two subsidies last mentioned in the list are for works to be constructed by the Government of Canada.

“ Provided always, that the granting of such subsidies to the companies mentioned, respectively, shall be subject to such conditions for securing such running powers or traffic arrangements and other rights, as will afford all reasonable facilities and equal mileage rates to all railways connecting with those so subsidized, as the Governor in Council may determine.”

With regard to the above enumerated lines of railway, the following represents the action taken and the progress made in so far as the Dominion Government has cognizance or concern, only those lines and companies being mentioned as to which definite steps, other than merely preliminary, have been taken towards securing the subsidy. Information has been brought down to the 31st of December, 1884.

Gravenhurst to Callander. (See Nos. 1 and 15, p. 24, 26.)—This line is subsidized by the Acts of 1882-83, to the extent of \$12,000 a mile, for a distance of 110 miles, or a total of \$1,320,000. It extends from the Canadian Pacific Railway at Callander, south, to the village of Gravenhurst, connecting with the railway system of Ontario. Under the authority of an Order in Council, dated the 10th of April, 1884, a contract was entered into on the 12th of April, 1884, with the Northern and Pacific Junction Railway Company (formerly the Northern and North-Western and Sault Ste. Marie Railway Company) for the construction of this line, the same to be completed by the 1st of May, 1886. The works are in progress.

Quebec and Lake St. John Railway Company. (Nos. 2 and 13, p. 24, 26.)—An agreement was duly entered into on the 4th of September, 1883, under which this line is to be completed by the 25th of May, 1887.

Up to the 31st of December, 1883, the subsidy had been paid for the first 10-mile section, north of St. Raymond, namely \$32,000.

No further payment has been made during the year which has elapsed since that date.

Up to the 24th of September, 1884, the company have submitted for approval plans, &c., of location, covering a distance of 54½ miles. Of this distance the location has been approved by the Governor in Council for the first ten miles.

Rivière du Loup or Rivière Ouelle to Edmundston. (See No. 3, p. 24).—Stretching northwards from the ports of St. Andrews and St. John, N.B., run the existing lines of the New Brunswick Railway Company and, after skirting the River St. John, terminate at Edmundston. Towards the construction of a line connecting this point with the Intercolónial at Rivière du Loup or Rivière Ouelle, or some point between them, Parliament, in 1882, voted a subsidy of \$240,000, and on the 28th of May, 1883, an Order in Council was passed, approving of entry into agreement with the company. Such agreement has not, however, yet been executed.

Montreal and European Short Line Railway Company (formerly the "Great American and European Short Line Railway Company.")—(See No. 4, p. 24).—In 1882 a subsidy was voted by Parliament to the extent of \$224,000, for the construction of a line about seventy miles long, between Oxford, about thirty miles east of Amherst, and New Glasgow, N. S.

Under date the 28th July, 1882, a contract was entered into with the above named company for the building of this road, the work to be completed by the 1st of January, 1884.

The company commenced work and continued operations until the autumn of 1883, when work was suspended, and has not since been resumed. The contract, accordingly, became null and void. As the subsidy was to be paid upon the completion of each ten-mile section, and as no one section was completed, no portion of the subsidy has been paid.

Baie des Chaleurs Railway Company. (See Nos. 5 and 39, p. 25, 30).—In 1883 Parliament voted a subsidy of \$320,000 to this company, in aid of the construction of one hundred miles of their line from Metapediac Station, on the Intercolonial Railway to Paspebiac; and, in 1884, voted \$300,000 for the construction of twenty miles of this distance, from Metapediac eastwards, as a branch of the Intercolonial. No final action has been taken by the Department for the construction of this road.

The Caraquet Railway Company. (See Nos. 6 and 38, p. 25, 30).—Under an Order in Council, dated the 6th of May, 1884, the subsidies authorized by Parliament in 1883 and 1884, for the road of this company between Bathurst, on the Intercolonial Railway, and Shippegan Harbour, amounting to \$192,000, have been granted to them. No contract has yet been made.

International Railway Company. (See No. 9, p. 25).—In 1883 Parliament granted a subsidy of \$156,800 to this company for forty-nine miles of their railway,

between Sherbrooke and the international boundary line, the object being to enable them to complete their road with steel rails. They entered into contract on the 20th of July, 1883, and under successive Orders in Council, the last of which was dated the 21st of December, 1883, they have been paid a total sum of \$144,000 upon a distance of forty-five miles.

Northern and Western Railway Company. (See Nos. 10 and 26, p. 25, 29.)—In 1883 Parliament authorized the grant of a subsidy to this company of \$102,400, towards the construction of thirty-two miles of their railway, from the Intercolonial Railway, near the Miramichi, to Moran's, near Demphy Village, N.B. This action was suggested to the House, in view of an application made for aid for a line extending from the Intercolonial Railway at the crossing of the Miramichi River, and running down the Valley of the Nashwack, thence to Fredericton, as to which the Government engineer had reported that a portion only, up to Boiestown, sixty miles, would be a feeder to the Intercolonial. In 1884, no work having meantime been commenced, Parliament voted money for the construction, by the Government, of fourteen miles of this distance, extending from Derby Station, on the Intercolonial Railway, to Indian-Town, and authorized the grant to this company of a subsidy of \$128,000 in aid of their railway, from Fredericton to the Miramichi, "instead of the subsidy proposed in 1883."

The contract for the construction of this subsidized line from Fredericton to the Miramichi, forty miles in length, was signed on the 24th of December, 1884, an Order in Council of the 16th of that month having given approval to the draft of such contract. The date fixed for completion is the 1st of July, 1888. The location of the first twenty miles of the road, starting from Fredericton, has been approved.

Napanee, Tamworth and Quebec Railway Company. (See Nos. 12, and 24, p. 26, 28.)—In 1883 Parliament authorized a subsidy of \$89,600 to this company, for twenty-eight miles of their road, from Napanee to Tamworth.

Under authority of an Order in Council, of the 21st of December, 1883, an agreement was made with the company on the 31st of the same month. The location for this distance was approved by an Order of the 1st of January, 1884. The whole work has been duly inspected and approved, and under Orders in Council, the last dated the 28th of July, 1884, the whole of the subsidy, \$89,600, has been paid.

In 1884 a further subsidy of \$70,400, to this company, was authorized for twenty-two miles of their railway, from Tamworth to Bogart and Bridgewater.

Quebec Central Railway Company. (See No. 19, p. 28.)—This company was subsidized last Session to the extent of \$211,200, in aid of the construction of sixty-six miles of their railway, from Beauce Junction to the International boundary.

Under the authority of an Order in Council, dated the 2nd of August, 1884, a contract was made with the company on that date. The work is in progress.

Pontiac Pacific Junction Railway Company. (See No. 22, p. 28.)—This line was subsidized by Parliament in 1884, to the extent of \$3,200 a mile, not exceeding \$272,000.

This line will start from Aylmer or Hull, Que., running to Pembroke, and crossing the River Ottawa west of Lapasse.

Under authority of an Order in Council, dated the 12th of December, 1884, a contract, dated the 22nd of that month, was made with this company, for the building of the subsidized line, the first twenty-seven miles to be completed by the 1st September, 1885, the second twenty-seven miles by the 1st of July, 1886, and the whole road by the 1st of July, 1887.

Kingston and Pembroke Railway Company. (See No. 29, p. 29.)—The subsidy granted to this company in 1884 was for the fifteen miles of their road between Mississippi and Renfrew, the amount not exceeding \$48,000.

The company completed the whole road between Kingston and Renfrew before the close of the year 1884, and upon their application the line has been duly inspected, with a view to its being opened for traffic, as required by the Consolidated Railway Act. No contract has, however, been made with the company by the Government, and no portion of the subsidy has yet been paid.

Surveys.—The advisability of obtaining more direct railway connection between Montreal and the Canadian Atlantic winter ports, is a matter the importance of which has been urged upon the Government and recognized by Parliament in the vote of subsidies to be given in aid of lines having these ports in view as ocean termini.

In submitting this subject to the House last Session, the Minister of Railways, Sir Charles Tupper, defined the object of the Government as being to obtain the shortest and best practicable route that can be found after careful examination and report by competent engineers, no particular line being decided on—"in the absence of such surveys and explorations and examinations as may be found necessary."

In accordance with this understanding, and under the authority of an Order in Council of the 21st of June, 1884, instrumental surveys have been conducted during the past season. The surveys made are as follows:—(See Appendix No. 5, p. 86.)

A. From Montreal to Lennoxville.

B. "Moose River, (on the International Railway north of Moose Head Lake) to Harvey, on the St. John and Maine Railway.

- C. "Moose River (south or across Moose Head Lake) towards Matawamkeag, on the European and North American Railway.
- D. "Chaudière Junction, on the Intercolonial Railway, to Hartland and Woodstock.
- E. "Rivière Ouelle, on the Intercolonial Railway, to Edmundston, on the New Brunswick Railway.
- F. "Rivière du Loup, on the Intercolonial Railway, to Edmundston, on the New Brunswick Railway.
- G. Following the valley of the River Etchemin to the head waters of the River Alligash.

St. John Bridge and Railway Extension Company.—By an Act passed in 1883, 46 Vic., cap. 26, authority was given for the advance to the above named company of a sum not exceeding \$500,000, to aid them in the construction of their proposed bridge over the St. John River, security being taken for the said advance in the shape of a mortgage on the company's property.

The plans and specifications of the bridge having been approved of by an Order in Council, a mortgage was executed on the 10th of December, 1883, and the company, up to the 31st of December, 1884, have received the sum of \$251,700, representing 80 per cent. of the expenditure already made in connection with the work.

Emerson Bridge.—This work, a combined railway and passenger bridge, crossing the Red River at Emerson, built by the corporation of that town, was subsidized by the Dominion Government to the extent of \$50,000. During the past year it has been completed, and an inspection showed that its construction is satisfactory. The balance of the subsidy remaining due was accordingly paid in June last.

Esquimalt and Nanaimo Railway Company.—Under the authority of Orders in Council passed in June, 1883, the Honorable Sir Alexander Campbell, during the summer of that year, visited British Columbia, with a view to the settlement of matters in abeyance between the Provincial and Dominion Governments, and arrangements were provisionally entered into by him in respect of the building of a line of railway between Esquimalt and Nanaimo by a company, to be subsidized by the Dominion Government.

The arrangements in question were conditional upon approval being accorded by the Legislature of the Province of British Columbia, and by the Parliament of Canada. Subject to such approval, their adoption was sanctioned by an Order in Council of the 27th September, 1883.

By an Act of the Provincial Legislature, sanctioned on the 19th December, 1883, but known as Act "47 Vic., cap. 14," and by an Act of the Dominion Parliament, 47 Vic., cap. 6, such approval has been accorded.

These arrangements were expressed in articles of agreement dated the 20th of August, 1883. They comprised the grant of a subsidy in money of \$750,000, together with the land in Vancouver Island granted by the Province to the Crown for the purposes of railway construction, materials for construction of the railway and telegraph to be admitted free of duty. The whole line between Esquimalt and Nanaimo is to be completed by the 10th of June, 1887.

The company, duly constituted under the provisions of the Act, have furnished plans, &c., of the location of the first forty miles of their line, starting from Nanaimo, and the same have been approved by Orders in Council of the 21st of October and 4th of December, 1884.

CANALS.

The canal systems of the Dominion, under Government control, in connection with lakes and navigable rivers, are as follows:—

1. The River, St. Lawrence and Lakes.
2. The River Ottawa.
3. The Rideau Navigation, from Ottawa to Kingston.
4. The Trent Navigation.
5. The River Richelieu, from the St. Lawrence to Lake Champlain.
6. St. Peter's Canal, Bras d'Or Lake, Nova Scotia.

The collection of the revenue derivable from the canals of the Dominion being in the hands of the Department of Inland Revenue, reference must be had to the annual report of that Department for all information in relation to the subject. The report in question further deals with general matters relating to the movement of freight on these canals.

The following statement, showing the amount accrued on each canal, for canal revenue proper and hydraulic rents, etc., during the fiscal year ended the 30th of June, 1884, has been furnished by the Department of Inland Revenue.

Name of Canal.	Tolls.	Wharfage and Storage.	Fines and Damages.	Other Receipts.	Hydraulic Rents.	Total.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Welland	176,164 98	.....	3,477 20	.....	5,833 89	185,478 07
St. Lawrence.....	69,281 46	7,526 00	811 00	7,628 52	18,521 00	103,767 98
Chambly.....	21,371 35	5 82	10 00	.....	130 00	21,517 17
Ottawa	60,733 95	.....	25 00	60 00	20 00	60,838 95
Rideau.....	4,920 86	110 41	.....	260 00	1,167 20	6,458 47
Burlington Bay.....	1,661 99	.....	.....	.....	.....	1,661 99
Newcastle District.....	201 18	.....	.....	.....	.....	201 18
St. Peters.....	2,193 12	.....	.....	.....	.....	2,193 12
	336,528 89	7,642 23	4,323 20	7,948 52	25,672 09	382,114 93

RIVER ST. LAWRENCE AND LAKES.

The River St. Lawrence, with the system of canals established on its course above Montreal, and the Lakes Ontario, Erie, St. Clair, Huron and Superior, with connecting canal, afford a course of water communication extending from the Straits of Belle-Ile to Port Arthur, at the head of Lake Superior, a distance of 2,260 statute miles, the distance to Duluth is 2,384 miles.—(See Appendix No. 13, p. 161).

The importance of the completion of the proposed enlarged system of water communication between Port Arthur, at the head of Lake Superior, the central gathering point of the western part of the Dominion for water traffic, and the summer ocean ports of Montreal and Quebec, cannot be too strongly realized. By such a water way cheap freighting would be secured for the unlimited cereal products and the fast developing agricultural industries of the prairie lands, while the cattle trade of the Rocky Mountain base, now in its infancy, if thus enabled to reach the markets of the eastern continent at low rates, would attract such attention and interest as would effectually utilize the exceptional but now dormant capabilities of the country in this direction.

To bring about these ends it is necessary that our existing artificial water systems should be so enlarged as to afford, throughout, at least that navigable depth of 14 feet which, at present, is confined to the Lachine and Welland Canals.

The difference in level between Lake Superior and the point on the St. Lawrence, near to Three Rivers, where tidal influence ceases, is about 600 feet.

The Dominion canals, constructed between Montreal and Lake Erie, are the Lachine, Beauharnois, Cornwall, Farran's Point, Rapide Plat, Galops and Welland. Their aggregate length is 70½ miles; total lockage (or height directly overcome by locks) is 533½ feet; number of locks, 53.

Communication between Lakes Huron and Superior is obtained by means of the Sault Ste. Marie Canal, situated on the United States side of the river.

The canal is a little over a mile in length, and has one lock 515 feet long, 80 feet wide, with 16 feet of water on the sills, and a lift of about 18 feet.

ST. LAWRENCE CANALS.

In 1841, as was observed in the report presented last year, at the time when the system of canals between Montreal and Lake Ontario was designed, it was in contemplation to afford a depth, at all stages of the St. Lawrence waters, of 9 feet, a depth seemingly, from the data then possessed, secured through the works proposed. The River St. Lawrence is, however, from various causes, subject to fluctuations, the extent of which it was impossible, at the time when these canals were originally constructed, to arrive at with precision, and the continued observations and experience of subsequent years have shown that while the intermediate river reaches, at all times, afford ample depth for vessels of 9 feet draught, in the canals themselves, at certain periods of low water, this depth cannot be maintained, the bottom not having been sunk to a sufficiently low level.

The following list shows the least depth of water on the sills of the locks of the St. Lawrence Canals at a time of exceptionally low water, in the year 1872 (*vide* report of Chief Engineer, 1880):—

	Feet.	Inches.
Williamsburgh Canals—		
Rapide Plat, guard lock.....	6	7
“ “ lower entrance.....	7	0
Galops, guard lock.....	8	1
Iroquois, lower entrance.....	9	3
Farran's Point.....	7	9
Cornwall, guard	8	3
“ lower entrance.....	9	0
Beauharnois.....	10	10
“ lower entrance.....	9	3

In the year 1871 it was decided to enlarge the canals on the St. Lawrence route so as to afford a navigable depth of 12 feet throughout. Subsequently, however, it

was decided that the depth should ultimately be increased so as to accommodate vessels of 14 feet draught; and accordingly in the scheme of enlargement which has so far been carried out, while, at present, a channel-way in the canals is provided for vessels drawing 12 feet only, all permanent structures, locks, bridges, &c., are built of such proportions as to accommodate vessels of 14 feet draught, the locks being 270 feet long between the gates, 45 feet in width, and with a clear depth of 14 feet of water on the sills.

In pursuance of this scheme, the Lachine and the Welland Canals have been enlarged, and certain works on the Cornwall and the Rapide Plat Canals are being carried out, on the scale above mentioned. Reference to these works will be made under their proper headings.

LACHINE CANAL.

	Old Line.	New Line.
Length of canal.....	8½ statute miles.	8½ statute miles.
Number of locks.....	5	5
Dimensions of locks.....	200 feet by 45 feet.	270 feet by 45 feet.
Total rise or lockage.....	45 feet.	45 feet.
Depth of water on sills.....	{ at two locks 16 "	18 "
	{ at three locks..... 9 "	14 "
Mean width of new canal....	150 "	

The new canal having been extended for some distance above the entrance of the old canal, the total rise has been increased from 44½ to 45 feet.

This canal extends from the City of Montreal to the Village of Lachine, overcoming the St. Louis Rapids, the first series of rapids which bars the ascent of the River St. Lawrence. They are 986 miles distant from the Straits of Belle-Ile.

The canal now consists of one channel, with two distinct systems of locks, the old and the enlarged. There are two entrances at each end.

The full scheme for the enlargement of this, in common with the other canals of the St. Lawrence, contemplated the affording a navigable depth of 14 feet throughout; the improvement immediately in view, however, was only intended to furnish a navigable depth of 12 feet in the canal proper, and accordingly, on the following reaches, namely, between Lachine and Cote St. Paul, Cote St. Paul and St. Gabriel, and between St. Gabriel and Wellington Basin, the channel has been adapted to navigation by vessels of 12 feet draught only. All permanent works on the canal, such as locks, bridges and side walls, have been built to afford a navigable depth of 14 feet.

The canal was closed on the 1st of December, 1883, and opened on the 3rd of May, 1884.

No accident or interruption to navigation has occurred during the year, and the works have been maintained in a state of thorough efficiency.

The report of the Superintending Engineer gives details of the repairs executed, and shows generally the condition of the canal. (App. 6, p. 87.)

NEW WORKS.

The enlargement of the entrance channel and harbour at Lachine, the principal work remaining to be done at the beginning of the fiscal year, was practically completed at its close, a channel 200 feet wide and of the depth required for the passage of vessels of 14 feet draught being afforded at this point. These works were embraced in section No. 11, and, with this exception, all works of enlargement at present contemplated were completed at the close of the year.

Dredging in the channel leading to the Wellington Basin has been carried on and vessels drawing 18 feet of water can now pass with greater facility than heretofore from the harbour to that basin.

The works for the construction of the two new basins at St. Gabriel, Nos. 2 and 3, were commenced in July, 1883. The work is rapidly advancing.

A macadamized road is being constructed along the south-east side of the canal, from Lachine to the Cote St. Paul road.

BEAUHARNOIS CANAL.

Length of canal.....	11½ statute miles.
Number of locks.....	9
Dimensions of locks.....	200 feet by 45 feet.
Total rise or lockage.....	82½ feet.
Depth of water on sills.....	9 "
Breadth of canal on bottom.....	80 "
Breadth of canal at water surface.....	120 "

This canal commences on the south side of the St. Lawrence, 15½ miles from the head of the Lachine Canal. It connects Lakes St. Louis and St. Francis, and passes the three rapids known respectively as the Cascades, the Cedars, and the Coteau.

The canal was closed by ice on the 1st of December, 1883, and was reopened for traffic on the 26th of April, 1884.

No accident or interruption to navigation occurred during the year.

By an Order in Council, dated the 26th of December, 1884, the Canada Atlantic Railway Company have been permitted to construct a temporary bridge across the canal a short distance east of Valleyfield in order to enable them to reach Clarke's Island, and so to obtain ferry communication with Coteau. The arrangement is one

bearing no relation to any possible future crossing of the St. Lawrence by a bridge, for which purpose a different site would have to be selected. Permission for the building of this bridge has been made conditional upon the company binding themselves to erect a permanent structure whenever they may be called upon to do so.

All necessary repairs to dykes, dams, wharves and bridges were duly made.

CORNWALL CANAL.

Length of canal.....	11½ statute miles.
Number of locks.....	7
Dimensions of locks.....	200 feet by 55 feet.
Total rise or lockage.....	48 feet.
Depth of water on sills.....	9 "
Breadth of canal at bottom (except at two culverts).....	100 "
Breadth of canal at water surface.....	150 "

From the head of the Beauharnois to the foot of the Cornwall Canal, there is a navigable stretch through Lake St. Francis of 32½ miles:

The Cornwall Canal extends past the Long Sault Rapids.

This canal was closed on 8th December, 1883, and re-opened on the 29th of April, 1884.

Two accidents occurred during the year. On the 6th of August, 1883, the barge "Argo" broke the lower gates of lock No. 19, causing a delay to navigation of 78 hours. On the 10th of May, 1884, the propellor "Ocean" broke the gates at the same place, causing a delay of 72 hours.

All necessary repairs have been executed. (App. 6, p. 103.)

NEW WORKS.

As was stated last year, certain works of enlargement at the lower entrance comprising the formation of an entrance channel and the construction of two locks (taking the place of three on the old line), together with the excavation of a basin between the locks, have been completed and brought into use, leaving four locks and the prism of the canal to be hereafter dealt with. The dimensions of the new locks are those of the general enlargement scheme, namely: length, 270 feet; breadth, 45 feet; depth of water, 14 feet. The basin between these two locks is 825 feet long.

Further works, comprising the enlargement and deepening of the channel at the upper end, the construction of a lock and a large supply weir, have been placed under contract.

The proposed channel will be sunk to such depth as to admit of the passage of vessels of 14 feet draught.

WILLIAMSBURGH CANALS.

The Farran's Point, Rapide Plat and Galops Canals are collectively known as the Williamsburgh Canals.

These canals were closed on the 16th December, 1883, and re-opened on the 1st May, 1884.

Navigation was carried on throughout the season without interruption. (App. 6, p. 104.)

FARRAN'S POINT CANAL.

Length of canal.....	$\frac{3}{4}$ mile.
Number of locks.....	1
Dimensions of locks.....	200 feet by 45 feet.
Total rise, or lockage.....	4 feet.
Depth of water on sills at ordinary water level..	9 "
Breadth of canal at bottom.....	50 "
Breadth of canal on water surface.....	90 "

From the head of the Cornwall Canal to the foot of Farran's Point Canal the distance on the River St. Lawrence is 5 miles. This latter canal enables vessels ascending the river to avoid the Farran's Point Rapid. Descending vessels run the rapids with ease and safety.

The ordinary repairs were executed.

RAPIDE PLAT CANAL.

Length of canal.....	4 miles.
Number of locks.....	2
Dimensions of locks.....	200 feet by 45 feet.
Total rise, or lockage.....	11 $\frac{1}{2}$ feet.
Depth of water on sills.....	9 "
Breadth of canal at bottom... ..	50 "
Breadth of canal at surface of water.....	90 "

From the head of Farran's Point Canal to the foot of Rapide Plat Canal there is a navigable stretch of 10 $\frac{1}{2}$ miles. This canal was formed to enable vessels ascending the river to pass the rapid at that place. Descending vessels run the rapid safely.

The canal has been maintained in good repair.

NEW WORKS.

Steps have been taken towards the enlargement of this canal in conformity with the proportions of the general scheme. These works consist of the enlargement of the channel way above and for some distance below the present guard lock at the

head of the canal, the construction of a new lock, and a supply weir in connection with the old lock. The bottom of the channel, for a distance of about 1,000 feet below, and out into deep water, above the lock, about 700 feet, will be excavated to an extent sufficient to afford a navigable depth of 14 feet.

GALOPS CANAL.

Length of canal.....	7 $\frac{5}{8}$ miles.
Number of locks.....	3
Dimensions of locks.....	200 feet by 45 feet.
Total rise, or lockage.....	15 $\frac{3}{4}$ feet.
Depth of water on sills.....	9 “
Breadth of canal at bottom.....	50 “
Breadth of canal at surface of water.....	90 “

From the head of Rapide Plat Canal to Iroquois, at the foot of the Galops Canal, the St. Lawrence is navigable for 4 $\frac{1}{2}$ miles. This canal enables vessels to overcome the rapids at Pointe aux Iroquois, Pointe Cardinal and the Galops.

The repairs have been of an ordinary character.

The water level of the St. Lawrence was high during the season of navigation.

From a statement furnished by the Superintendent of these canals and attached to his report (p. 105) it appears that the minimum depth of water reached during the past fiscal year was on the Rapide Plat Canal in January, 1884, when, at the head or guard lock of the canal, there was a depth of 5 feet 6 inches. The lowest point at which the water stood on this canal during the season of navigation was in November, 1883, when the height of water at the guard lock was 9 feet 3 inches.

NEW WORKS.

The enlargement and general improvement of the upper entrance of this canal has been commenced, the object being to afford better access for vessels. The work under contract is the excavation and deepening of a channel way at the upper end leading to deep water, so as to give a depth available for vessels of 14 feet draught.

GALOPS RAPIDS IMPROVEMENT.

The Galops Rapids, the most shallow of the three passed by the Galops Canal, are being improved, for purposes of navigation, by certain works of submarine blasting and dredging.

These works, commenced in 1880, consist of the excavation of a straight channel through the rapids, 3,300 feet long, 200 feet wide, and of such depth as to afford safe passage at low water to vessels of 14 feet draught.

The principal shoals to be excavated were those known as the “Island Shoal” and the “Lower Bar.” The work of excavating the Island Shoal is now finished. Owing

to an accident, which temporarily disabled the drilling vessel, and to the necessity for repairs to the dredge, interruptions occurred in the season's work on the Lower Bar, which has otherwise been prosecuted steadily. (Appendix 6, p 130.)

WELLAND CANAL.

MAIN LINE, FROM PORT DALHOUSIE, LAKE ONTARIO, TO PORT COLBORNE, LAKE ERIE.

By the works of enlargement, passage is now afforded, at all stages of the Lake Erie level, to vessels drawing 12 feet of water, excepting at the point where the canal is carried by an aqueduct over the Chippewa River. Here the necessity of continuing to use the old work, pending the building of the enlarged aqueduct, renders care imperative, and the draught of vessels using their own motive power should not, at this point, exceed 11½ feet; the draught of vessels in tow, however, may be 12 feet. At periods of low water in Lake Erie, and especially during a continuance of strong easterly winds, the draught of all vessels, to enable them to pass freely through the present aqueduct, should not exceed 11½ feet.

	OLD LINE.	ENLARGED OR NEW LINE.
Length of canal.....	27½ miles.	26¾ miles.
Pairs of guard gates (formerly 3).....	26	2
Number of locks { lift	1	lift 25
{ guard		guard 1
Dimensions.....	1 lock 270 x 45 1 " 200 x 45 1 (tidal) 230 x 45 24 150 x 26½	270 feet x 45 feet.
Total rise or lockage.....	326¾ feet.	326¾ feet.
Depth of water on sills.....	10¼ "	12 "

WELLAND RIVER BRANCHES.

Length of Canal—Port Robinson Cut to River Welland.....	2,622 feet.
" From the Canal at Welland to the river <i>via</i> lock at aqueduct.....	300 "
" Chippewa Cut to River Niagara	1,020 "
Number of locks—One at aqueduct and one at Port Robinson.....	2
Dimensions of locks.....	150 by 26½ feet.

Total lockage from the Canal at Welland down to River Welland.....	10 feet.
Depth of water on sills.....	9 " 10 inches.

GRAND RIVER FEEDER.

Length of canal.....	21 miles.
Number of locks.....	2
Dimensions of locks.....	{ 1 of 150 by 26½ feet. 1 of 200 by 45 "
Total rise, or lockage.....	7 to 8 feet.
Depth of water on sills.....	9 feet.

PORT MAITLAND BRANCH.

Length of canal.....	1¾ miles.
Number of locks.....	1
Dimensions of lock.....	185 by 45 feet.
Total rise, or lockage.....	7½ feet.
Depth of water on sills.....	11 "

The Welland Canal has one entrance from Lake Ontario, at Port Dalhousie, serving for both the old and new canals, and two from Lake Erie, of which one is for the main line at Port Colborne, and one for the feeder route at Port Maitland; it has also an entrance from the River Niagara, at the town of Chippewa. The enlarged route lies between Port Dalhousie and Port Colborne.

From Port Dalhousie to Allanburgh, 11¾ miles, there are now two distinct lines of canal in operation, the old line and the enlarged, or new line.

From Allanburgh to Port Colborne, a distance of 15 miles, there is only one channel, the old canal having been enlarged.

The canals were closed on the 15th December, 1883, and re-opened on the 15th of May, 1884.

NEW CANAL.

The accidents of any importance of the year have been three—all on the new canal. The head gates of lock No. 5 were carried away by the propeller, "W. L. Frost." The propeller "Cuba" ran into the gates of lock No. 7, and the schooner "Prussia" displaced and injured the gates of lock No. 23.

The carrying trade are availing themselves of the enlargement of the canal, and a larger class of propellers has been placed on the route; others are being built.

The minimum depth of water at the entrance to the canal from Lake Erie, Port Colborne, during the past season of navigation was in September and November,

1883, the depth of water on the sill of the old lock being 12 feet, the depth on the sill of the new lock being 14 feet.

At Port Dalhousie, Lake Ontario, the minimum depth during the season was in November, 1883, being 13 feet 2 inches on the sill of the old lock, the depth on the sill of the new lock being 15 feet 4 inches. (See p. 122.)

Full details of the various repairs, renewals, &c., executed during the year, will be found in the report of the Superintendent. (App. 6, p. 106.)

OLD CANAL.

The necessary repairs and renewals of the year have been made, and the works, have been maintained in good condition. (App. 6, p. 115.)

A heavy spring freshet on the Grand River occurred, but no damage was done.

NEW WORKS.

The work of widening the section between Humberstone and Port Colborne, known as the "Rock Cutting," is now nearly completed.

Work at the aqueduct intended to carry the waters of the enlarged canal over the Chippewa or Welland River, has been steadily continued during the past year. The river now passes through the arches of the southern half of the work, and the cofferdams necessary in order to the construction of the northern half are well advanced.

The several contractors for the work of enlarging the canal have now all been finally settled with, except those for sections 1 and 35, and those for the work in progress, viz., sections 27 and 34, and the enlargement of old lock No. 2.

BURLINGTON BAY CANAL.

Length of canal.....	½ mile.
Average breadth between piers.....	138 feet.
Least " "	108 "

This canal is cut through the sand bar which separated Burlington Bay from Lake Ontario, and is navigable, without locks, for vessels drawing 10 feet of water. It gives access to the Port of Hamilton, and to the town of Dundas, *via* the Desjardins Canal.

The canal was closed on the 17th of December, 1883, and re-opened on the 15th of April, 1884. (See App. 6, p. 133.)

MONTREAL, OTTAWA AND KINGSTON.

This route extends from the harbour of Montreal to the Port of Kingston, passing through the Lachine Canal, the navigable sections of the lower River Ottawa and the Ottawa Canals, to the city of Ottawa, thence by the River Rideau and the Rideau Canal to Kingston, on Lake Ontario—a total distance of 245½ miles.

After leaving the Lachine Canal, the works constructed to overcome the difficulties of navigation are :—

- The St. Anne's Lock ;
- Carillon Canal ;
- Grenville Canal ;
- Rideau Canal.

The total lockage (not including that of the Lachine Canal), is 509 feet—(345 rise, 164 fall)—and the number of locks is 55.

The following table exhibits the intermediate distances from Montreal Harbour :—

Sections of Navigation.	Intermediate Distance.	Total distance from Montreal.
	miles.	miles.
The Lachine Canal.....	8½	.....
From Lachine to St. Anne's Lock.....	15	23½
St. Anne's Lock and Piers.....	½	23½
From St. Anne's Lock to Carillon Canal.....	27	50½
The Carillon Canal.....	3¼	51½
From Carillon Canal to Chute à Blondeau.....	4¾	56½
Chute à Blondeau Canal.....	1½	56½
From Chute à Blondeau Canal to Grenville Canal.....	1¾	57½
The Grenville Canal.....	4	63½
From the Grenville Canal to entrance Rideau Navigation.....	56	119½
Rideau Navigation, ending at Kingstor.....	126¼	245½

ST. ANNE'S LOCK.

	Old lock.	New lock.
Length of canal.....	¾ mile.	½ mile.
Number of locks.....	1	1
Dimensions of lock.....	190 by 45 feet.	200 by 45 feet.
Total rise, or lockage.....	3 feet.	3 feet.
Depth of water on sills.....	6 "	9 "

This work, with guide piers above and below, surmounts the St. Anne's Rapids between Ile Perrot and the head of the Island of Montreal, at the outlet of that portion of the River Ottawa which forms the Lake of Two Mountains, 23½ miles from Montreal Harbour.

This lock was closed to navigation on the 26th of November, 1883, and re-opened on the 26th of April, 1884.

Traffic throughout the season was uninterrupted.

Both the old and the new locks are available.

New piers, with booms, for the better guidance of vessels approaching the lock, have been placed at the upper entrance.

The work of straightening and deepening the channel above the new lock is in progress. It will probably be completed in the summer of 1885. The length of the improved channel will be 4,700 feet, the breadth at bottom 100 feet, and the depth, at lowest water, 10 feet. (App. 6, pp. 100-101.)

THE CARILLON CANAL.

Length of canal.....	¾ mile.
Number of locks.....	2.
Dimensions of locks.....	200 by 45 feet.
Total rise, or lockage.....	16 feet.
Depth of water on sills.....	9 "
Breadth of canal at bottom.....	100 "
Breadth of canal at water surface.....	110 "

This canal overcomes the Carillon Rapids.

From St. Anne's Lock to the foot of the Carillon Canal there is a navigable stretch of 27 miles, through the Lake of Two Mountains and the River Ottawa.

The canal was closed on the 27th of November 1883, and re-opened on the 28th April, 1884.

No interruption to traffic has taken place.

The works comprise booms above the canal for the protection and guidance of descending vessels.

The breach which occurred in the summer of 1883, in the dam constructed across the River Ottawa, at Carillon, has been substantially repaired. The excavation made by the waters of the river undermining the structure, which originally caused the mischief, was increased by the rush of water through the breach, and extended to a depth of 30 feet below the natural bed of the river, by a width of 70 feet and a length up and down stream of 170 feet. The whole of this is now filled in with stone and crib-work to the level of the natural bed. The superstructure has also been filled with stone and securely fastened down.

For the greater safety of rafts, the entrance to the slide in the dam has been extended to a considerable distance up the river, by the construction of guide piers and booms.

By the construction of the Carillon dam the water at that point has been raised 9 feet. Above this point, for a distance of nearly 7 miles, as far as the foot of Grenville Canal, the level of the river has been raised, and, consequently, the depth of water on the lower sill of the entrance lock of that canal has been so increased that

the necessity of using the Chute à Blondeau Canal, situated between these points, is obviated. During times of very high water, however, the current at the Chute is so strong that an improvement in the channel would be advantageous. (App. 6, pp. 100, 102.)

CHUTE A BLONDEAU CANAL.

Length of canal.....	$\frac{1}{2}$ of a mile.
Number of locks.....	1
Dimensions of locks.....	130 $\frac{1}{2}$ ft. x 32 $\frac{1}{2}$ ft. at upper end and 36 $\frac{1}{3}$ feet at lower end.
Depth of water on sills.....	6 "
Breadth of canal at water surface.....	30 "
Breadth of canal at bottom.....	30 "

Between the Carillon and Chute à Blondeau Canals there is a navigable stretch of 4 miles. The canal is cut through solid rock, and has only one lock.

Since the construction of the Carillon dam, this canal has seldom been used.

GRENVILLE CANAL.

Length of canal.....	5 $\frac{1}{4}$ miles.
Number of locks.....	5
Dimensions of locks.....	200 feet x 45 feet.
Total rise, or lockage.....	43 $\frac{3}{4}$ "
Depth of water on sills.....	9 "
Breadth of canal at bottom.....	40 to 50 feet.
Breadth of canal at surface of water.....	50 to 80 "

From the head of the Chute à Blondeau Canal to the foot of the Grenville Canal, there is a navigable stretch of 1 $\frac{3}{8}$ miles.

This canal, by which the Long Sault Rapids are avoided, is about 56 miles below the city of Ottawa.

The canal was closed on the 27th of November, 1883, and re-opened on the 28th of April, 1884.

All necessary repairs have been carried out.

NEW WORKS.

The works for the enlargement of the canal, commenced in 1871, and completed in time for the opening of navigation in the spring of 1884, with the exception of some work at the Greece's Point entrance and some dredging at Grenville entrance comprise the construction of five locks 200 feet long and 45 feet wide, with 9 feet of water on the sills; the main channel having a depth of 10 feet and a mean width at

bottom of 40 feet, varying at the surface from 50 to 80 feet, with crossing basins constructed at approximate intervals of half a mile.

The old locks are now entirely obliterated. (App. 6, pp. 100, 102.)

UPPER OTTAWA RIVER.

CULBUTE LOCKS AND DAMS.

Number of locks.....	2
Dimension of locks.....	200 by 45 feet.
Total rise, or lockage.....	18 to 20 "
Depth of water on sills	6 "
Aggregate length of dams.....	625 "

From the Grenville Canal to the city of Ottawa, a distance of about 56 miles the river is navigable. Beyond the city, for a distance of 107 miles, to L'Islet or Culbute, continuous navigation is rendered impracticable by the undermentioned rapids—The Chaudière, the Duchêne, the Chats, the Chenaux, the Portage du Fort and the Grand Calumet.

The Culbute works, situated at L'Islet, surmount the Culbute and L'Islet Rapids on the north channel of the Ottawa.

These works comprise two locks and three continuous dams, all built of wood. The dams reduce the rapids to smooth water, enabling the river to be navigated from the head of the locks to Des Joachims, a distance of 37 miles.

NEW WORKS.

To render the river navigable below the lock, as far as Bryson, it has been necessary to remove part of three shoals and to build two submerged dams.

All the work has been completed, opening up a navigable route of 80 miles, with a minimum depth of 7 feet at extreme low water, between Des Joachims and Bryson, making a total above and below Culbute of 117 miles. The removal of a small shoal above the locks at Culbute is in hand. (App. 6, pp. 101, 102.)

RIDEAU NAVIGATION.

The Rideau system connects the River Ottawa, at the city of Ottawa, with the eastern end of Lake Ontario, at Kingston.

Length of navigable waters.....	126½ miles.
Number of locks going from Ottawa to Kingston. {	33 ascending.
	14 descending.

Total lockage.....	446 $\frac{1}{4}$	} 282 $\frac{1}{4}$ rise, and 164 fall.	} at high water.
Dimensions of locks.....					134 by 33 feet.
Depth of water on sills, 5 feet; navigable depth through the several reaches.....			4 $\frac{1}{2}$ feet.
Breadth of canal reaches at bottom.....		} 60 " in earth. 54 feet in rock.	
Breadth at surface of water.....				80 " in earth.

For table of distances of stations between Ottawa and Kingston, see Appendix 11, p. 156.

The summit level of this system is at Upper Lake Rideau, but several of the descending reaches are also supplied by waters which have been made tributary to them. The following description gives the sources of supply :—

From the summit, the route towards Ottawa follows the River Rideau, and that towards Kingston follows the River Cataraqui. The whole duty of keeping up the water to its proper level is effected by the reserves, given in detail below.

They may be divided into three systems, viz. :—

1. The summit level, supplied by the Lake Wolf system. 2. The eastern descending level to Ottawa, supplied by the River Tay system, discharging into Lake Rideau. 3. The south-west descending level to Kingston, supplied by the Mud Lake system, formerly known as the Devil Lake system, discharging into Lake Openacon.

Lake Openacon receives the waters of Buck Lake and Rock Lake.

All these waters on the descending level, supplemented by those of Lake Loughboro', flow into Cranberry Lake, which, discharging through Round Tail outlet, forms the River Cataraqui. This river, rendered navigable by dams at various points, affords a line of navigation to Kingston.

The navigation stopped at Kingston Mills on the 28th November, 1883, and recommenced on the 5th May, 1884.

At Ottawa, navigation stopped the 27th of November, 1883, and recommenced on the 1st May, 1884.

No delay to navigation occurred during the year.

The level of the water in the several reaches was, for the first time in twelve years, maintained up to the close of navigation, in 1883, at the full height required.

The damages caused by a severe storm in May, 1883, to the canal embankment at Kingston Mills, have been repaired.

All other necessary repairs were executed, and the other works throughout the canal, with the exception of the " Barrows " lock, are in good order. (App. 6, p. 123.)

Surveys were made during the past summer to test the feasibility of connecting the Rideau Canal waters with those descending to Gananoque, so as to afford navigation to that town ; also of providing a water supply for the Rideau Canal system, by connecting a chain of lakes on the Mud Lake system, at the same time giving a navigable channel through these lakes to connect with the Rideau at Bedford Mills, Mud Lake.

TAY CANAL.

This canal, when completed, will be a branch of the Rideau Canal, affording communication between Beveridge's Bay, on Lake Rideau, and the town of Perth, a distance of about 6 miles. (App. 6, p. 125.)

The works, embracing the construction of a dam and two locks, 134 feet by 32 feet, with a depth, at the lowest stage of water, of 5 feet 6 inches, also the deepening of the channel of the River Tay, where required, are in progress.

RICHELIEU AND LAKE CHAMPLAIN.

This system, commencing at Sorel, at the confluence of the Rivers St. Lawrence and Richelieu, 46 miles below Montreal, extends along the River Richelieu through the St. Ours Lock to the Basin of Chambly, thence by the Chambly Canal to St. Johns and the River Richelieu, to Lake Champlain. The distance from Sorel to the boundary line is 81 miles.

At Whitehall, the southern end of Lake Champlain, the Champlain Canal is entered, and connection is obtained with the River Hudson, by which the city of New York is directly reached. From the boundary line to New York the distance is 330 miles.

The following table shows the distance between Sorel and New York :—

Sections of Navigation.	Intermediate distance in miles,	Total distances.
Sorel to St. Ours Lock.....	14	14
St. Ours Lock to Chambly Canal.....	32	46
Chambly Canal	12	58
Chambly Canal to Boundary Line.....	23	81
Boundary Line to Champlain Canal.....	111	192
Champlain Canal to Junction with Erie Canal.....	66	258
Erie Canal from Junction to Albany.....	7	265
Albany to New York.....	146	411

ST. OURS LOCK AND DAM.

Length of canal.....	$\frac{1}{2}$ mile.
Number of locks	1
Dimensions of lock.....	200 feet by 45 feet.
Total rise or lockage.....	5 "
Depth of water on sills.....	7 " at low water.
Length of dam in eastern channel.....	300 "
" " western channel.....	690 "

At St. Ours, fourteen miles from Sorel, the River Richelieu is divided by a small island into two channels. The St. Ours Lock is in the eastern channel.

There is a navigable depth of 7 feet between St. Ours Lock and Chambly Basin, a distance of thirty-two miles.

The lock was closed on the 29th November, 1883, and opened on the 7th April 1884.

For the adjustment of lock gates, it was found necessary to interrupt the navigation on three days, the total interruptions amounting to ten hours.

No repairs of moment were called for. (App. 6, p. 94.)

CHAMBLY CANAL.

Length of canal.....	12 miles.
Number of locks.....	9
Dimensions of locks : —	
Guard Lock, No. 1, at St. Johns.....	122 feet by $22\frac{1}{2}$ feet.
Lift " " 2.....	124 " 23 "
" " " 3, 4, 5, 6.....	118 " $22\frac{1}{2}$ to 24 feet.
" " " 7, 8, 9 combined.....	125 " $22\frac{1}{2}$ to 23 "
Total rise or lockage.....	74 "
Depth of water on sills.....	7 "
Breadth of canal at bottom.....	36 "
" " surface of water.....	60 "

Succeeding the 32 miles of navigable water between St. Ours Lock and Chambly Basin—a natural reservoir formed by the expansion of the River Richelieu—is the Chambly Canal, which overcomes the rapids between Chambly and St. Johns, a distance of 12 miles.

This canal was closed to navigation on the 30th November, 1883, and was reopened on the 5th of May, 1884.

No accident or interruption to navigation occurred during the year.

The repairs and works of improvement of the year comprised the extension of the wharf at Chambly, the raising of the pier at St. Johns, and the rebuilding of certain of the lock walls. Both the canal itself and its entrance at St. Johns have been deepened by dredging; guide lights have also been placed in positions where needed. (App. 6, p. 93.)

ST. PETER'S CANAL, CAPE BRETON.

Length of canal.....	about 2,400 feet.
Breadth at water line.....	55 feet.
Lock.....	one tidal lock, 4 pairs of gates.
Dimensions	200 feet by 48 feet.
Depth of water on sills.....	18 feet at lowest water.
Depth through canal.....	19 feet.
Extreme rise and fall of tide in St. Peter's Bay	4 feet.

This canal connects St. Peter's Bay, on the southern side of Cape Breton, Nova Scotia, with the Bras d'Or Lakes. It crosses an isthmus half a mile in width, and gives access from the Atlantic.

Navigation was closed on the 2nd of January, 1884, and re-opened on the 16th of April, 1884.

The canal was maintained in good working order. A retaining wall on the eastern side of the canal is in course of construction, and certain shoals leading to the Bras d'Or were dredged. The traffic returns show the passage of 798 vessels bound north and 592 vessels bound south. (App. 6, p. 129.)

TRENT RIVER NAVIGATION.

The term "Trent River Navigation" is applied to a series of water stretches, which do not, however, form a connected system of navigation, and which, in their present condition, are efficient only for local use.

This series is composed of a chain of lakes and rivers extending from Trenton, at the mouth of the Trent on the Bay of Quinté, Lake Ontario, to Lake Huron.

Many years ago the utilizing of these waters for the purpose of through water communication between Lakes Huron and Ontario, was projected.

The course in contemplation was as follows:—

Through the River Trent, Rice Lake, the River Otonabee and Lakes Clear, Buckhorn, Chemong, Pigeon, Sturgeon, and Cameron to Lake Balsam, the summit water, about 166 miles from Trenton; from Lake Balsam by a canal and the River Talbot to Lake Simcoe; thence by the River Severn to Georgian Bay, Lake Huron, the total distance being about 235 miles.

The execution of this scheme, commenced in 1837, was subsequently deferred. By certain works, however, below specified, sections of these waters were made practicable for navigation and for the passage of timber. A branch of the main course, extending from Sturgeon Lake south, affords communication with the town of Lindsay, and, through Lake Scugog to Port Perry, a distance of 190 miles from Trenton. Of this distance, 155 miles are navigable for vessels of light draught.

The following table gives the distance of navigable and unnavigable reaches :

	Navigable. Miles.	Unnavigable. Miles.
From Trenton, Bay of Quinté, to Nine Mile Rapids...		9
“ Nine Mile Rapids to Percy Landing.....	19½	
“ Percy Landing to Heeley’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 miles.
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 :—

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	28½
-------------------------------------	-----

Campbellford.

Guide booms.....	34½
------------------	-----

Middle Falls.

The work consists of 4 dams and 2 slides	37½
--	-----

<i>Crow Bay.</i>	
A retaining boom.....	38
<i>Heeley's Fall.</i>	
A dam and slide.....	42½
<i>Crook's Rapids, Hastings.</i>	
The works consist of 1 lock, 1 dam and slide for timber.....	34½
<i>Whitlas' Rapids.</i>	
The works, situated below Peterboro, consist of a lock, dam and canal.....	92½
<i>Little Lake.</i>	
The works consist of 3 piers and 1 boom.....	94
<i>Burleigh.</i>	
Timber slides.....	101
<i>Buckhorn Rapids.</i>	
There is a dam at this point, which is important as keeping up the level of the water of the lakes west of it, as far as Bobcaygeon, including Lakes Pigeon, Ball, Buckhorn and Chemong.....	125
<i>Bobcaygeon.</i>	
There are two dams here with canal, lock and slide. These dams retain the waters of the reach as far as Fenelon Falls and Lindsay Lock.....	140½
<i>Fenelon Falls.</i>	
A large slide and booms.....	155½
<i>Lindsay.</i>	
The old lock, having become useless, was rebuilt by the Government of the Province of Ontario in 1879. Its dimensions are 134 x 33 feet, with 5 feet of water on the sills. 161½	
The navigation is, by this work, extended to Port Perry, Lake Scugog.....	190

The dimensions of the Dominion locks are 133 feet 6 inches x 33 feet, with 5 feet depth of water on the sills.

In 1855 portions of the above named works were transferred to a committee composed of persons connected with the lumber trade. The committee was autho-

rized to collect tolls on timber passing through. The works so transferred, at this date, were the slides and booms at Chisholm's Rapids, the retaining boom at Myeraburg, the guide boom at Campbellford, the dams and slide booms at Middle Falls, the retaining boom at Crow Bay and the slide at Heeley's Falls.

These works have been re-assumed by the Government, the committee of management having failed to carry out the conditions of the transfer.

The Lindsay lock was constructed by, and is under the control of, the Province of Ontario.

Navigation ceased on the 28th November, 1883, and re-opened about the 26th of March, 1884.

At Bobcaygeon the upper dam, which is in a condition of great decay, received such repair as was necessary for its preservation. This dam retains the waters of Sturgeon Lake at navigation height, and the maintenance of a work of sound character at this point is essential. (App. 6, p. 126).

NEW WORKS.

The new works for the improvement of the Trent Valley navigation, for the construction of which appropriations have been voted by Parliament, are at the following places:—Canals at Burleigh Rapids, Buckhorn Rapids, and Fenelon Falls: also dams at Lakefield and Young's Point. Their completion will give communication between Lakefield, $9\frac{1}{2}$ miles from Peterboro', and Balsam Lake, the headwaters of the system, opening up a total of about 150 miles of direct and lateral navigation.

At Lakefield, $9\frac{1}{2}$ miles from Peterborough, the existing dam, a private one, which maintains navigation on Lake Katchewanoe up to Young's Point, has been purchased from the owners, and the dam having been seriously damaged and rendered dangerous during the prevalence of the spring freshets in 1883, a new work is in course of construction.

At Young's Point, 5 miles from Lakefield, the dam between Lake Katchewanoe and Clear Lake, assumed by the Government, being in too dilapidated a state to admit of restoration, a new dam is being constructed.

At Burleigh Rapids, 10 miles from Young's Point, a canal is being constructed about $2\frac{1}{4}$ miles in length, passing the Burleigh and Lovesick Rapids, and giving communication between Stony Lake and Deer Bay. The work, comprising the construction of three lift-locks and certain dams, is in progress.

At Buckhorn Rapids, 7 miles from Burleigh Rapids, a canal about one-fourth of a mile long is being constructed, having one lift-lock. The masonry work is completed and is of a substantial character.

At Fenelon Falls, 32 miles from Buckhorn Rapids, a canal about one-third of a mile in length, connecting Sturgeon Lake with Cameron Lake, is being constructed. This canal will have two lift-locks. Good progress has been made, and it is expected that the whole will be completed by the end of the season of 1885.

In all the above named works the locks will be of the following dimensions :—

Length.....	134 feet.
Breadth.....	33 “
Depth on sill.....	5 “

(App. 6, p. 132.)

MURRAY CANAL.

This canal will extend through the Isthmus of Murray, giving connection westward between the headwaters of the Bay of Quinté and Lake Ontario.

The works on this canal, commenced under a contract given out in August, 1882, comprise a cut through the isthmus $4\frac{1}{2}$ miles long, and improvements to the entrance channels at either end; good progress has been made.

The canal will have a depth of 11 feet below the lowest known water level of the lake, and a width at the bottom of 80 feet. There are no locks.

Its western terminus in the harbour of Presqu'île, from which point to the entrance of the Welland Canal, the distance is about 120 miles. (App. 6, p. 130.)

I have the honour to be,

Your Excellency's most obedient servant,

J. H. POPE,

Acting Minister of Railways and Canals.

31st December, 1884.

APPENDICES.

APPENDIX No. I

STATEMENT showing the amount expended by the Department of Railways and Canals, Dominion of Canada, during the Fiscal Year ending 30th June, 1884.

Name of Work.	Construction.		Repairs.		Staff and Maintenance.	
	\$	cts.	\$	cts.	\$	cts.
CANALS.						
Lachine.....	189,034	41	19,683	24	48,624	51
Beauharnois.....	3,277	98	16,232	61	19,107	38
Cornwall.....	23,018	13	9,007	73	18,475	48
Williamsburg.....	2,473	44	7,349	37	7,757	04
St. Lawrence.....	89,846	03				
Welland.....	432,952	88	90,926	97	113,276	87
do cleaning ditches.....			5,039	64		
do steam pump.....			4,307	25		
do watchmen.....					8,889	52
do damages to vessels.....			35,541	83		
Burlington Bay.....	13,131	67	122	41	100	00
Ste. Anne's.....	142,006	25	2,725	49	2,775	32
Carillon.....	231,569	83				
Grenville.....	167,697	33	7,918	42	17,393	91
Culbute.....	8,151	16			733	50
Rideau.....	4,597	50	19,245	02	26,938	95
Trent.....	120,643	91	5,264	35	2,208	64
do survey.....	6,198	57				
Murray.....	118,187	43				
St. Ours.....	5,279	87	1,494	99	2,315	37
Chambly.....	41,640	77	12,003	34	18,448	85
St. Peter's.....	2,471	40	367	85	2,601	47
Surveys.....	7,486	62				
Arbitrations.....					6,443	02
River Tay.....	50,878	12				
Dredge vessels.....			1,862	39		
Total on Canals.....	1,660,543	30	239,092	90	296,089	83
RAILWAYS.						
Pacific.....	3,963,054	00			327	02
do subsidy.....	7,254,208	27				
Surveys.....	11,313	08				
Statistics.....	943	50				
Intercolonial.....	1,514,979	10			2,344,579	09
do Windsor Branch.....					22,140	86
Prince Edward Island.....	130,663	38			236,428	13
Eastern Extension.....	1,284,311	97			10,033	77
Subsides, general.....	208,000	00				
Bridge at Emerson.....	50,000	00				
Total on Railways.....	14,417,473	30			2,613,508	87
Total on Railways and Canals.....	16,078,016	60	239,092	90	2,909,598	70
Pacific Railway Loan Account.....	10,953,462	00				
St. John Bridge and railway extension.....	143,600	00				
Total.....	11,097,062	00				

Total Amount Expended \$30,323,770.20

APPENDIX

STATEMENT showing the amount expended on the construction and the
(Repairs not

By whom Expenditure Incurred.	Year ending 30th June.	Lachine Canal.	Beauharnois Canal.
		\$ cts.	\$ cts.
Imperial Government.....	} Up to June 30, 1867, {	40,000 00	.....
Provincial Government.....		2,547,532 85	1,611,424 11
Dominion Gover	1868	1,852 70	7,008 00
do	1869	2,000 00	55 00
do	1870	.....	587 50
do	1871	12,231 40	187 00
do	1872	36,708 15	27 50
do	1873	42,982 49	5,280 90
do	1874	158,618 35	26 00
do	1875	197,420 52	36 00
do	1876	327,769 39	.....
do	1877	1,439,375 73	.....
do	1878	1,484,619 63	.....
do	1879	958,053 30	.....
do	1880	369,566 74	.....
do	1881	292,165 51	.....
do	1882	252,821 33	.....
do	1883	396,496 96	.....
do	1884	189,034 41	.....
Total.....	.....	8,749,249 46	1,624,632 01

No. 2.

enlargement of Canals of the Dominion of Canada, up to 30th June, 1884.
(included.)

Cornwall Canal.	St. Lawrence Canals. — Not Apportioned	Williamsburg Canals	St. Lawrence. — Chain Vessel and Improvement of Navigation.	Surveys, St. Lawrence and Canals.	Welland Canal.
\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
					222,220 00
1,933,152 69	116,821 31	1,320,655 54			7,416,019 83
2,786 00					12,097 84
10,692 04					43,486 36
17,780 05					24,173 72
7 50					47,869 10
10,000 21		1,077 00			59,702 76
1,011 75				35,326 44	130,158 47
				26,541 30	746,420 61
1,780 00				22,611 36	1,046,714 91
			28,500 00	21,715 47	1,570,178 19
49,211 37			28,064 67	19,312 64	2,199,962 61
145,015 45			1,623 76	3,946 70	2,138,392 99
143,092 05		4,580 00		4,685 77	1,552,697 41
109,454 95			623 52	8,591 04	1,252,924 75
53,948 11			6,927 96		1,242,943 37
44,587 61			28,933 45		603,403 17
21,728 93			44,874 31		550,240 36
23,018 13		2,473 44	89,816 03		432,952 88
2,567,266 87	116,821 31	1,328,785 98	229,393 70	142,730 72	21,292,558 33

APPENDIX

STATEMENT showing the amount expended on the construction and the
(Reports not

By whom Expenditure Inc d.	Year ending 30th June.	Ste. Anne's Lock.	Carillon and Grenville Canals.	Culbute Lock.	Rideau Canal.
		\$ cts.	\$ cts.	\$ cts.	\$ cts.
Imperial Government.....	Up to June 30, 1867	.....	(*)	.....	3,911,701 47
Provincial Government.....	1867	134,456 51	63,053 64	.....	153,062 60
Dominion Government.....	1868	.....	19,817 22	.....	7,593 67
do	1869	.....	.....	.....	.....
do	1870	.....	4,167 96	.....	.....
do	1871	.....	23,119 37	.....	11,732 88
do	1872	1,939 46	165,257 28	.....	4,967 50
do	1873	540 11	136,250 48	.....	18,070 97
do	1874	12,753 27	245,268 38	38,388 99	5,793 16
do	1875	32,627 71	339,864 76	63,659 29	9,310 85
do	1876	24,935 85	326,203 16	76,842 44	2,163 96
do	1877	30,003 08	245,7 8 04	56,081 87	214 11
do	1878	14,618 85	22,676 20	5,933 53	.....
do	1879	22,113 02	243,141 24	20,694 19	7,703 88
do	1880	3,054 68	281,514 27	16,688 20	355 05
do	1881	69,042 76	336,707 53	4,721 62	.....
do	1882	193,158 36	433,084 39	29,567 15	.....
do	1883	172,959 95	416,826 10	14,249 60	.....
do	1884	142,006 25	399,267 16	8,151 16	.....
Totals.....	.....	851,209 86	3 701 947 18	334,978 04	4,132,670 10

* Exp diture not given.

No 2.—*Concluded.*

enlargement of the Canals of the Dominion of Canada, &c.—*Concluded included.*)

Chambly Canal.	St. Peter's Canal:	Survey Baie Verte Canal.	Murray Canal.	Trent Canal.	Tay Canal.	Total.
\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
						4,173,921 47
643,711 76	88,949 39					16,028,840 23
	21,519 72					72,675 15
	70,719 80					126,953 20
	46,193 57					92,902 80
2,872 85						98,020 10
1,906 40						281,586 26
1,159 00		4,877 83				375,258 44
		4,018 90				1,237,818 96
2,415 00	20 97	443 00				1,716,904 37
	11,125 00	110 75				2,389,544 21
80 00	63,330 18	22 30				4,131,396 60
	26,511 51					3,843,338 62
	107,337 75					3,064,098 61
	80,120 54					2,122,893 74
	69,434 76	520 00				2,076,411 65
	484 00					1,586,038 46
			84,071 68	40,767 16	4,831 80	1,697,046 85
	2,471 40		118,187 43	120,643 91	50,878 12	1,578,930 32
651,745 01	588,218 59	9,992 78	202,259 11	161,411 07	55,709 92	46,694,580 04

APPENDIX No. 3.

CANADIAN PACIFIC RAILWAY.

OFFICE OF THE ENGINEER-IN-CHIEF.
 OTTAWA, 1st October, 1884.

SIR,—I have the honor to report to you upon the progress made, up to this date, with the construction of the Canadian Pacific Railway.

Since the date of my last Annual Report (22nd September, 1883), I have made a tour of inspection of the works in progress on the entire line. I found a very large force of men and horses employed, and most satisfactory progress being made. The number of men engaged upon the work last summer may be stated to have been, in round numbers, not less than 25,000.

During the last Session of Parliament an Act was passed (47 Vic., cap. 1), granting to the Canadian Pacific Railway Company a loan of \$22,500,000, of which \$7,500,000 was to be paid to them to extinguish their then floating debt, and the balance as the work of construction proceeded, in the same proportion as is provided for the payment of the balance of the cash subsidy, the Government being first satisfied that the work is proceeding with such speed as to insure the completion of the contract for the eastern and central sections in the month of May, 1886.

All my monthly certificates of value of work done, since the passage of this Act, have been prepared in conformity therewith.

The amount available for prosecuting the work to completion, after discharging the floating debt, was:—

Loan.....	\$15,000,000
Subsidy.....	12,710,788
	\$27,710,788

At the time I made my estimate, during last winter, of the amount which would probably be required to complete the contract, and of the earliest date at which railway communication could be effected between Montreal and Port Moody, the information at my disposal was neither so full nor so complete as I could have desired. I have, therefore, all the greater pleasure in being able to state that the knowledge acquired during my official tour has convinced me that the funds at the company's command are fully adequate to the completion of the contract, and also, that connection from ocean to ocean will be effected by the autumn of next year, if the prosecution of the work proceeds with the same vigor as hitherto.

In order to render my description of the position and progress of the work more intelligible, I introduce here a table of distances between the principal points of the line:—

TABLE OF DISTANCES.

TRUNK LINE.

Montreal to Port Moody.

	Miles.	Miles.
Montreal to Callander.....	345	
Callander to Port Arthur.....	657	
Port Arthur to Red River (opposite Winnipeg).....	428	
Red Rived to Savona's Ferry	1,252	
Savona's Ferry to Port Moody.....	213	
	<hr/>	2,895

Branch Lines Acquired and Built.

St. Lin (St. Thérèse Jnction to St. Lin).....	15	
St. Jérôme (St. Lin Junction to St. Jérôme).....	11	
St. Eustache.....	8	
Aylmer (Hull to Aylmer).....	7 $\frac{1}{2}$	
Brockville.....	45 $\frac{1}{2}$	
Perth.....	12	
Algoma.....	94 $\frac{1}{2}$	
Pembina (Emerson to Winnipeg).....	64 $\frac{1}{2}$	
Colville Landing.....	2	
Selkirk.....	22	
Stonewall (Air Line Junction to Stonewall).....	18 $\frac{1}{2}$	
Pembina Mountain.....	102 $\frac{1}{2}$	
Gretna.....	14	
Emerson and West Lynn.....	15	
	<hr/>	432 $\frac{1}{4}$

Total acquired and built..... 3,327 $\frac{1}{4}$

In addition to the above, there are 60 miles of the extension of the Pembina Mountain Branch located, in readiness for construction.

Summary.

	Miles.
Trunk Line.....	2,895
Branches acquired and built.....	432 $\frac{1}{4}$
	<hr/>
Total.....	3,327 $\frac{1}{4}$
Branch located in readiness for construction.....	60
	<hr/>
	<u>3,387$\frac{1}{4}$</u>

POSITION AND PROGRESS OF THE WORK.

TRUNK LINE.

Moutreal to Callander, 345 miles.

This was a section of constructed railway purchased by the Canadian Pacific Railway Company, and has been in successful operation for some time.

Callander to Port Arthur, 657 miles.

A very large force has been engaged upon this section, and the progress during the past twelve months has been very remarkable. It is upon this section—between a point somewhat east from Pic to Gravel Bay, about 100 miles—that such very heavy work occurs, consisting largely of rock excavation and tunnelling. There are five tunnels within this comparatively short distance.

I have much pleasure in stating that this heavy piece of work is practically finished, the road bed being ready, or thereabout, to receive the rails. The balance of this section is comparatively light, and is rapidly progressing, and I can foresee no difficulty in making rail connection between Callander and Port Arthur by May or June next. The position of the works on this section may be illustrated by the following table:—

					Miles.
From Callander, 345th mile to 530th mile, track laid, ballasting				well advanced	185
“ “ 530th “ 564th “				grading far advanced	34
“ “ 564th “ 654th “				no work done	90
“ “ 654th “ 681st “				grading about half done	27
“ “ 681st “ 800th “				grading about two-thirds done	119
“ “ 800th “ 808th “				track laid	8
“ “ 808th “ 820th “				grading completed	12
“ “ 820th “ 822nd “				track laid	2
“ “ 822nd “ 851st “				grading nearly completed	29
“ “ 851st “ 859th “				track laid	8
“ “ 859th “ 883rd “				grading nearly completed	24
“ “ 883rd “ 887th “				track laid	4
“ “ 887th “ 917th “				grading completed	30
“ “ 917th “ 932nd “				track laid	15
“ “ 932nd “ 935th “				grading completed	3
“ “ 935th “ 1,002nd “				(Port Arthur) track laid and ballasting far advanced	67

Between Callander and Sudbury, 98 miles, the station houses, side tracks, and water service have been provided, and the road has been under traffic for some months. At Port Arthur, a grain elevator of 300,000 bushels capacity has been erected and provided with a wharf, on which tracks are laid. A very fine station house has also been built there.

Port Arthur to Red River (opposite Winnipeg), 428 Miles.

This section was constructed by the Government and transferred to the Canadian Pacific Railway Company in May, 1882, and has been operated by them since that date. When the Company accepted delivery of this section, a certain amount of work remained to be done before it was completed, and this they undertook to do for a sum specified. They have had during the past two seasons, and they still have, several steam shovels and a number of engines and cars employed in ballasting, making up embankments and filling in valleys crossed by temporary bridges. Only nine or ten of these bridges remain to be filled up, and this will probably be done, or nearly so, before the winter sets in. During the past summer there were heavy freshets causing slight delays to the traffic and undermining a temporary trestle bridge spanning a ravine, at which trains were employed by the Company in filling in earth to make a solid embankment. Until these embankments are made,

these temporary structures require careful and constant attention. The necessary renewals of bridges and sleepers have been made, and buildings suitable for the traffic, erected. At Fort William, the foundation of an immense elevator (1,000,000 bushels) has been laid, and the track extended down the river, beyond the Hudson Bay Post.

Red River to Savona's Ferry, 1,252 Miles.

During last month (September) I made a tour of inspection throughout this section. Both the Kicking Horse and the Selkirk Passes impressed me as being most wonderful openings in the two great mountain ranges. The Selkirk Pass especially struck me as affording an example of the operation of geological forces on a gigantic scale. In surveying this immense wilderness, broken up, as it is, with mountain masses, I fully appreciated the difficulties encountered by Major Rogers, who must have spent many a hard day in his search for a passage for the railway; and I felt that success could never have been achieved but for his skill, pluck, and determination to find a way through the Selkirks, if a way were to be found. Through the "Rockies" the work is not, on the whole, of such a character as the name would indicate, and I was much surprised to find long stretches of grading composed of gravel and loose rock, the solid rock work being generally limited to the cañons and to the shores of the lakes along which the line passes. There are a considerable number of tunnels between the summit of the Kicking Horse Pass and Savona's Ferry, the aggregate length of which may be summed up at 7,600 feet. Those to the east of the Beaver River, at the east foot of the Selkirks, are completed or nearly so, and work will be continued during the winter on the rest, so as to have them finished by next spring. The bridging, except at the crossing of the Saskatchewan River and the west crossing of the Columbia River, is light. Over both these streams structures of some magnitude are required. That over the former is completed, consisting of a very substantial iron superstructure resting on abutments and piers of massive masonry.

The following statement will afford a pretty correct idea of the position of the works on this section:—

	Miles.
Red River (1,430 miles) to 2,428 miles, track is laid.....	998
2,428 " to 2,468 " grading will soon be finished.....	40
2,468 " to 2,507 " clearing and grading just commenced	39
2,507 " to 2,607 " no work done.....	100
2,607 " to 2,627 " clearing and grading just commenced....	20
2,627 " to 2,632 " (Savona's Ferry) grading progressing rapidly	55

From Red River to the summit of Kicking Horse Pass, 962 miles, the stations, water services and sidings are complete, and engine sheds and other necessary buildings are erected at intervals suitable for traffic districts. Houses for section men have also been built.

This part of the section is in operation and in good running condition.

Early in the summer there was an exceedingly severe rain storm in the Bow River District, which, from the description given me, I should suppose to have been of the nature of a waterspout. This caused considerable damage to the works, and delayed the traffic for some days; but the damage was promptly repaired and traffic resumed.

Temporary Line.

Between a point about 4 miles west from the Summit of the Kicking Horse Pass, and another point 9 miles further, a tunnel 1,800 feet long, and some very heavy rock excavation occur, which were intended to be the first work attacked on the opening of the working season last spring. To have proceeded with this, however, would have greatly retarded the progress of the work through to the Pacific coast, as the completion of this portion of road would have probably occupied a full season, during which the work beyond it could not have been carried on to advantage. A temporary line of 9 miles was, therefore, suggested, passing round the foot of the mountain, in order to avoid this obstacle for the time being, and to permit the rapid progress of the line to the westward during the present season. This suggestion was adopted, and a substantial temporary line has been built, giving access to the work beyond. On this temporary line, for the space of about 3 miles, there is a very heavy grade. The temporary line will be replaced by a permanent line, upon which the maximum grade will be 116 feet to the mile; and it is over this grade that all material and supplies for the construction of the road westward to Savona's Ferry are now transported, which can be done by means of proper engines, with suitable brake appliances.

Savona's Ferry to Port Moody, 213 miles.

The grading, bridging, track laying and ballasting upon this section are being executed by Messrs. D. O. Mills and Andrew Onderdonk, under contracts with the Government. The work is far advanced towards completion, the track being laid from the Black Canon to Port Moody, a distance of 186 miles, and in the course of a few weeks the track laying will be finished over the entire section. There will however, still remain to be done some ballasting, some rock-facing to embankments exposed to the wash from the Fraser River, and a considerable amount of general trimming up, before the section can be accepted from the contractors as finished. This, however, it is confidently believed, will all be completed by the 30th June next, the date specified by the contract for the completion of the works, when this section will, no doubt, be transferred to the Canadian Pacific Railway Company, under the terms of their contract. The Government have yet to erect some water tanks and buildings before the section will be in a condition to be transferred to the company; but preparations are being made with a view to the erection of these buildings, at a period not later than the date when the work under the grading contracts will be completed.

The condition of the railway may be summarized thus:—

Trunk Line.

	Miles.
Track laid.....	2,246
Grading far advanced on.....	459
No work yet done on.....	190
	<hr/>
	2,895
	<hr/>

Near Lytton, the Fraser River is spanned by a very substantial combined steel and iron cantilever bridge, of two spans of 100 feet each, and one span of 300 feet, resting on piers and abutments of masonry, built on a solid rock foundation, the track being at an elevation of about 125 feet above the level of the river. This structure, which presents a very handsome appearance, was manufactured and erected under the immediate supervision of Mr. Joseph Tomlinson, Bridge Engineer to this Department, and is probably the most important of its kind on the railway.

The two front rows of wooden piles in the wharf at Port Moody should be replaced by piles of iron or some other material equally proof against the ravages of the sea-worm, which is so destructive to timber on the British Columbia coast. This wharf can be approached by vessels of great draft, and is sufficiently spacious for the conduct of a very considerable ocean traffic.

The sections which the Government undertook to construct, under their contract with the Canadian Pacific Railway Company, are now so nearly completed as to necessitate a large reduction in the staff of Government engineers and others; and within a few months the entire staff engaged on these sections will have to be disbanded.

Alignments and Gradients.

The general direction of the road is very good upon the acquired portion of the line between Montreal and Callander, a distance of 345 miles, the maximum gradient is 72 feet per mile. Between Callander and Laggan, some 6 miles to the east of the Kicking Horse Pass, a distance of 2,039 miles, the heaviest grade is 53 feet per mile. Between Laggan and a point 30 miles west of the summit of the Selkirks, a distance of 131 miles, the maximum grade is 116 feet per mile, and this occurs on three inclines only, all coming within a distance of 120 miles, so that they can be worked with great facility. Between 20 miles east of the summit of the Selkirks and Savona's Ferry, a distance of 167 miles, the maximum grade is 66 feet per mile. From Savona's Ferry to Port Moody, 213 miles, the maximum grade is 53 feet per mile.

Branch Lines.

In my report of last year, I stated that the following branches were completed:—

	Miles.
St. Lin	15
St. Jérôme	11
St. Eustache.....	8
Aylmer.....	7½
Brockville	45½
Perth.....	12
Pembina	64½
Colville Landing.....	2
Selkirk	22
Stonewall	18½
Pembina Mountain.....	102½
Gretna.....	14
	322½
	322½

At this time last year the following branches were under construction:—

Algoma Branch, 94¾ miles.

This branch leaves the trunk line at Sudbury Junction (98 miles west of Callander), and runs down to Algoma Mills, on Georgian Bay. The work of construction has been prosecuted during the summer just past. The track is laid and partially ballasted, but is not yet open for traffic.

Emerson and West Lynn Branch, 15 miles.

This branch is a link of the Pembina Mountain Branch, which it leaves about 14 miles north of Gretna, and runs to Emerson. The track is laid; but I understand

that, owing to some difficulty in connection with the crossing of the bridge over the Red River, built by the town of Emerson aided by a Dominion Government subsidy of \$50,000, some delay has occurred in opening the branch for traffic.

I may here remark that the work is well executed, and the structures of their several kinds are well and substantially built. The materials composing them are sound and good. The rails are of steel, generally 56 and 60 lbs. to the yard, except through the Rocky Mountains, where a 70-lbs. steel rail is used.

The rolling stock of the Canadian Pacific Railway consists of:—

- 245 engines.
- 78 first-class cars.
- 33 second class cars.
- 48 baggage and mail cars.
- 25 dining, sleeping and palace cars. .
- 10 emigrant sleeping cars.
- 4,386 platform freight cars.
- 1,867 box and cattle cars.
- 126 conductors' vans, pay cars, &c.
- 8 derricks and coal cars.
- 19 snow ploughs.

In conclusion, I may state that in view of the advanced condition of the works and the progress made with them during the last three years, I am convinced that it is quite possible that the track may be laid over the entire road by this time next year. Mr. Van Horne, the Company's Vice-President, has expressed to me his intention of accomplishing this, and from his great energy and determination of character, I have every confidence that he will do so.

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

COLLINGWOOD SCHREIBER,
Engineer in Chief.

APPENDIX No. 4.

CANADIAN GOVERNMENT RAILWAYS.

OFFICE OF THE CHIEF ENGINEER AND GENERAL MANAGER.

OTTAWA, 1st November, 1884.

	Miles.
Intercolonial Railway	847
Eastern Extension Railway	80
Prince Edward Island Railway	199
Windsor Branch Railway	32
	1158

SIR,—I have the honor to submit to you the reports and accounts in connection with the operation of the railways under my charge, for the year ended the 30th June, 1884. These railways now comprise, in the aggregate, 1158 miles, an increase over the figures of the preceding year of 87 miles. Of this mileage, 1071 miles have been operated by the Government for the entire twelve months, the Eastern Extension Railway, 80 miles in length, for five months and twenty-three days, and the Dalhousie Branch, 7 miles in length and forming part of the Intercolonial Railway system, for seven days only.

I trust that the operation of these railways during the year under consideration may, under all the circumstances, be considered satisfactory on the whole.

The following summary statement will show the results of the year's business on the Government railways:

Name of Railway.	Mileage.	—	Amount.	Profit.	Loss.
			\$ cts.	\$ cts.	\$ cts.
Intercolonial.....	847	Earnings.....	2,353,647 26	9,068 17	
		Expenses.....	2,344,579 09		
Eastern Extension..	80	Earnings.....	30,767 66		2,088 87
		Expenses.....	32,854 53		
Prince Edward Island.....	199	Earnings.....	144,504 12		91,924 01
		Expenses.....	236,428 13		
Windsor Branch.....	33	Earnings.....	23,018 93	878 07	
		Expenses.....	22,140 86		
Total.....				9,946 24	94,010 88
					9,946 24
Loss.....					84,064 64
Less disbursements in connection with accident in 1880 ..					16,073 45
Net Loss.....					67,991 19

 INTERCOLONIAL RAILWAY.

As the Dalhousie Branch (7 miles) was opened for traffic on the 25th June only, or within seven days of the close of the fiscal year, the mileage of the preceding year, 1071 miles, must be taken as the basis in comparing the results of the two years traffic.

Although the net earnings for the year (\$9,068.17) are less than those of the preceding year by \$1479.66, it has been only by the most careful watchfulness on the part of the officers of the railway, that a result even so favorable has been secured. The working expenses having been debited with the sum of \$63,098.25, expended during the year in rebuilding the Moncton offices, destroyed by fire in February, 1883, every effort had to be made to give effect to the policy of economy laid down by the Honorable Minister.

The gross earnings are also slightly below those of 1882-3, but they are nevertheless, in my opinion, fairly satisfactory when the depressed state of the carrying trade is considered. It must also be observed that the volume of traffic, both passenger and freight, exceeds that of any year heretofore. The decrease in the receipts therefore merely testifies to the Honorable Minister's desire to assist the industry of the country, and may be taken as a measure of the benefit conferred, by the low rates granted, upon her trade and manufactures.

The earnings of the past five years were:—

1879-80	-	-	-	-	-	-	-	\$1,506,298	48
1880-81	-	-	-	-	-	-	-	1,760,393	92
1881-82	-	-	-	-	-	-	-	2,079,262	66
1882-83	-	-	-	-	-	-	-	2,370,921	10
1883-84	-	-	-	-	-	-	-	2,353,647	26

The tons of freight carried were:—

1879-80	-	-	-	-	-	-	-	561,924	00
1880-81	-	-	-	-	-	-	-	725,577	00
1881-82	-	-	-	-	-	-	-	838,956	00
1882-83	-	-	-	-	-	-	-	970,961	00
1883-84	-	-	-	-	-	-	-	1,001,163	00

The number of passengers carried was:—

1879-80	-	-	-	-	-	-	-	581,483
1880-81	-	-	-	-	-	-	-	631,245
1881-82	-	-	-	-	-	-	-	779,994
1882-83	-	-	-	-	-	-	-	878,600
1883-84	-	-	-	-	-	-	-	920,870

This steady increase of the volume of traffic of course necessitates a corresponding increase, from year to year, in the rolling stock, in order to give prompt despatch to the business.

The following is a statement of rolling stock purchased on capital account up to the 30th June, 1879, with additions made in each subsequent year.

Rolling Stock.

	Engines.	Passenger Train Stock.			Conductors' Vans.	Box Cars.	Platform Cars.	Coal Cars, Capacity in tons.	Snow Ploughs.	Wing Ploughs.	Flangers.
		1st Class.	2nd Class.	Baggage, Mail, &c.							
	No.	No.	No.	No.	No.	No.	Tons.	No.	No.	No.	
Total, 30th June, 1879.....	100	46	34	33	34	1,162	1,028	4,500	27	9	4
Additions in 1879-80.....			2	2	2		18				
do 1880-81.....	12	2	2	2	3	68	72		1		14
do 1881-82.....	3	3	3	2	6	249	43	6,500			
do 1882-83.....	20	1	10		6	20	210	8,200			
do 1883-84.....	28	16	24	12		30	70		2	1	2
Totals.....	163	68	75	47	51	1,529	1,441	19,200	30	10	20

Since the 30th June, 1879, rolling stock has been built as follows, to maintain the stock, and charged to working expenses :

	Engines.	Passenger Stock.			Conductors' Vans.	Box Cars.	Platform Cars.	Coal Cars, Capacity in tons.	Snow Ploughs.	Wing Ploughs.	Flangers.
		1st Class.	2nd Class.	Baggage, Mail, &c.							
	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	
1879-80.....	7		2			4	21	180			
1880-81.....	6				4	31	31	540			
1881-82.....	4					9	56	440			
1882-83.....	4		2			20	50	185			
1883-84.....	4		1	1		12	66				
Totals	25		5	1	4	76	224	1,325			

The road and rolling stock are in a high state of efficiency. The permanent way is being improved year by year by the introduction of a 67-lb. per yard steel rail in place of the 56-lb. rail hitherto in use, as the lighter rail wears out, while the distance between the sleepers has been reduced from 2 ft., 6 in. to 2 ft. from centre to centre, making a much more solid road.

Many improvements, extensions and additions have been made all along the line, the cost of which has entered into the accounts for operation, but which are certainly not works of ordinary maintenance.

The ocean-borne traffic through the port of Halifax was conducted very successfully during last winter, the facilities for handling freight at the ocean terminus being now such as to permit of the rapid despatch of business.

The increased accommodation provided at St. John has given great satisfaction, as it affords a much more systematic and rapid despatch of business than in the past.

Full information as to the operation of the Intercolonial Railway may be obtained from the reports of the Chief Superintendent, the Chief Engineer, and the Mechanical Superintendent, together with the accounts, all of which are appended hereto.

CAPITAL ACCOUNT.

Halifax Extension.

The expenditure during the year under this heading covered the following works among others: Removing boulders and dredging at the deep-water wharf, building the dockyard wall and cribwork, the erection of an oil shed, and the construction of the approach to the North street bridge.

Increased Accommodation at St. John.

Great progress has been made with these improvements. A bonded warehouse, freight and flour sheds, have been erected, and the yard remodelled. At the close of the fiscal year some progress had been made with the construction of a loading platform, and a brick train shed 500 feet in length by 80 feet in width, roofed with iron and having two large baggage rooms adjoining, was nearly completed. A head house, brick with stone facing, was also in course of erection, at the head of the train shed and connected with it. This building contains the waiting rooms, ticket office, dining hall, Station Master's and other offices, the second floor being arranged as a residence for the Station Master. The building will present a very neat appearance when completed. The approach to the station yard has also being improved by the reduction of the heavy grade formerly existing.

Repairs and Improvements, Rivière du Loup Branch.

The small amount under this heading, \$335.13, was paid in settlement of land damages and legal expenses.

Completion of the Intercolonial Railway.

The expenditure in this connection is in settlement of old claims arising from the original construction of the railway under the Commissioners.

Rolling Stock.

As I stated in my report of last year, the traffic of the railway very heavily taxed the rolling stock, so much so that it has been found necessary to make very considerable additions to it in order to keep pace with the business, and to ensure the satisfactory despatch of the same. The following stock has, therefore, been added during the year, at a cost of \$586,386.84 :—

Engines.	23
First-class cars.	16
Second class cars.	24
Baggage, postal, &c.	12
Box cars.	30
Platform cars.	70
Snow ploughs.	3
Wing ploughs.	1
Flangers.	2

The stock of coal cars at the close of the year was still inadequate to the business, and an additional number of Conductor's vans was also required.

St. Charles Branch.

The work upon this branch was diligently prosecuted throughout the year, and was sufficiently advanced at the end of the year to ensure its being opened for traffic early in July. A considerable amount of work, however, remained to be done in filling up the pond at Point Lévis, and laying the track over the same, as well as in erecting station buildings and freight shed, and a coal wharf. A large sum has been paid for land and damages, and many claims are still unsettled, the amounts tendered having been refused and the claims referred to the Official Arbitrators.

Dartmouth Branch.

At the close of the year the work was not in a very forward state on this branch, much delay having arisen from difficulties in coming to terms with owners of property along the line, whose demands were considered exorbitant. The construction of the bridge over the "Narrows" was in progress, the timber work having been undertaken by Mr. M. J. Hogan, of Quebec, the masonry by Mr. Waddell, of Dartmouth, and the iron superstructure by the Star Manufactory, of the same town.

Dalhousie Branch.

The work on this branch was sufficiently advanced on the 23rd June to admit of its being opened for traffic, but the cutting and embankments still required trimming, the ballasting and the wharf were still to be completed, and a freight house to be erected.

Rivière du Loup Town Branch.

The grading on this branch was in a forward state, and the track was laid for a short distance, but no ballasting had been done, and the bridge over the Point Creek yet remained to be built.

Indiantown Branch.

The surveys upon this branch had been commenced before the close of the fiscal year, but the location was not completed.

Eastern Extension Railway.

This railway connects with the Intercolonial at New Glasgow on the Pictou Branch, and extends eastward to Port Mulgrave on the Strait of Canso, passing through the town of Antigonish. It is 80 miles in length, and forms an important link in connection with the Intercolonial system, as it taps the Cape Breton business, formerly borne by water. The road was built by the Halifax and Cape Breton Railway Company, and the section between New Glasgow and Antigonish, 40 miles, was opened in September, 1879, that between Antigonish and the Strait of Canso, also 40 miles, being opened in December, 1880. From these dates the road was operated by the company until its purchase by the Nova Scotia Government in the spring of 1883. On the 9th January, 1884, the Federal Government purchased from the Provincial Government, the railway, together with their rights in the Pictou Branch of the Intercolonial Railway. The road was operated by the Provincial Government during the time when it belonged to the Province, and by the Federal Government from the 9th January to the 30th June. As previously stated, the working expenses during that period were \$32,854.53, and the earnings \$30,767.66, the loss being therefore \$2,086.87. It may be expected that the results will be more favorable in future years, as the line can be much more economically managed as part of the Intercolonial system. A considerable saving should result from the reorganization of the staff, and the traffic will probably develop year by year under

the new conditions. The rolling stock consists of 9 engines, 6 first-class cars, 4 second class cars, 6 baggage and smoking cars, 2 conductors vans 30 box cars, 70 platform cars, 150 hopper coal cars, 1 snow plough.

Windsor Branch Railway.

This railway is maintained by the Government, and operated by the Windsor and Annapolis Railway Company, upon the same conditions as in former years, the company retaining two-thirds of the gross receipts, and paying the remaining third to the Government in consideration of maintenance, the cost of which it is found sufficient to cover. The road is reported by the General Superintendent and Chief Engineer to be in good working order, and a personal inspection, which I made within the last few months, enables me to verify their statement.

Prince Edward Island Railway.

No improvement appears in the traffic of this railway during the last fiscal year, the gross earnings having been, in fact, slightly below those of the year 1882-83, and until the country is much more thickly settled than at present, no material improvement can, I fear, be looked for. During the greater part of the year the business is very small, the regular trains running very light. It is only during the autumn months, while the movement of the crops continues, that any considerable amount of traffic offers, and for about six weeks at this season, the rolling stock, almost idle for the rest of the year, is taxed to its utmost capacity. The earnings were \$144,504.12, against \$146,170.42 in 1882-3, showing a decrease of \$1,666.30. The working expenses, though still heavy, were less than during the previous year, having been:—

Gross working expenses	\$236,428.13
Less indemnity in connection with accident in 1880	16,073.45
	<u>—————</u>
	\$220,354.68

While in the previous year they were:—

Gross working expenses	\$252,808.41
Less indemnity in connection with accident in 1880	9,941.45
	<u>—————</u>
	\$242,866.96

Decrease	<u>—————</u>
	\$22,512.28

The actual results of the year's operations were therefore:—

Earnings	\$144,504.12
Expenses	220,354.68
	<u>—————</u>

Loss on the year's operations	<u>—————</u>
	\$75,850.56

This result is far from being so satisfactory as could be wished, but the field of operation is so very limited that there is no room for a more vigorous canvass for business. I therefore, as I explained before, have no hope of any material increase in the earnings, but I trust that a better exhibit may be made in future, as regards expenditure, and that the two sides of the account may be more equal.

The permanent way and road-bed were never before in such fine condition, and the same may be said of the rolling stock, with the exception of the original freight cars, which are falling to pieces from age, and are being rapidly got rid of.

It is proposed to rebuild forty-eight box cars and ten platform cars during the current fiscal year, and thirty-two box cars and twenty platform cars in 1885-6.

This will bring the rolling stock to an adequate figure, and the cost of working the Mechanical Department should then be very light.

The rolling stock consists of—

Engines	20
1st class cars	16
2nd do	14
Postal and smoking cars	3
Box and cattle cars	175
Platform cars	125
Conductors' vans	3
Paymasters' cars	1
Snow ploughs	7
Flangers	6

Of the above stock, the following were re-built during the year: twenty box cars, ten flat cars, one snow plough.

CAPITAL ACCOUNT.

Rolling Stock.

The following rolling stock has been built during the year: two first-class and two second-class passenger cars, and one postal car. The passenger cars were required for excursion purposes during the summer season, and the postal car in connection with the winter mail service across the Straits

Cape Traverse Branch.

This branch connects with the Prince Edward Island Railway at County Line Station, and runs in a southerly direction to Cape Traverse, on the Northumberland Strait, where the ice boats land in winter, a distance of 13 miles. From this point to Cape Tormentine, on the mainland, the distance is 9 miles. A line is in course of construction by the New Brunswick and Prince Edward Island Railway Company to connect Cape Tormentine with the Intercolonial Railway at Sackville, and when this line and the Cape Traverse Branch are finished, and a steamer put on the route between the two capes, travel between the mainland and Prince Edward Island will be materially accelerated.

The grading and bridging are in a forward state. Some of the track is laid, and the work will probably be completed before the winter sets in. The expenditure during the year upon this branch was \$120,745.94.

I have the honour to be, Sir,
Your obedient servant,

COLLINGWOOD SCHREIBER,
Chief Engineer, General Manager.

INTERCOLONIAL RAILWAY.

OFFICE OF THE CHIEF SUPERINTENDENT,
MONCTON, N.B., 5th November, 1884.

COLLINGWOOD SCHREIBER, Esq.,
Chief Engineer and General Manager Government Railways,
Ottawa.

SIR,—I have the honour to submit the following Report upon the working of the Intercolonial Railway for the fiscal year which ended 30th June, 1884.

I enclose the reports of the Chief Engineer and the Mechanical Superintendent, and also the following statements prepared by the Chief Accountant and Treasurer:—

- | | |
|---|-------------------|
| No. 1. Capital account. | |
| “ 2. Revenue account. | |
| “ 3. Locomotive power | (Abstract No. 1). |
| “ 4. Car expenses, | (“ “ 2). |
| “ 5. Maintenance of way and works | (“ “ 3). |
| “ 6. Station expenses | (“ “ 4). |
| “ 7. General charges | (“ “ 5). |
| “ 8. General stores account. | |
| “ 9. General balance. | |
| “ 10. Comparative statement of damages. | |

The length of railway in operation during the year was the same as last year—840 miles.

On the 23rd June, seven days before the close of the year, the branch line, 7 miles in length, to the town of Dalhousie, N.B., was opened for traffic.

The length of railway on the 30th June, 1884, was, therefore, 847 miles.

CAPITAL ACCOUNT.

The total cost of road and equipment on 30th June, 1883, was, according to last years report . . .	\$ 41,176,654 19
Deduct refunds on account of previous years expenditures.	109,401 58
	<u>\$ 41,067,252. 61</u>

The additions during the year were as follows:—

For Halifax extension	47,671 45
“ Increased accommodation at St. John,	139,432 00
“ Repairs and improvements, Rivière Du Loup Line	835 13
“ The completion of the Intercolonial Railway	388,740 34
“ Rolling stock	586,386 84
“ The St. Charles Branch	259,054 96
“ “ Dartmouth Branch	14,470 77
“ “ Dalhousie Branch	67,157 76
“ “ Rivière Du Loup Town Branch	10,748 35
“ “ Indiantown Branch	384 00
“ “ Miscellaneous works	97 50
	<u>\$ 1,514,979 10</u>

Making the total cost to the 30th June, 1884 \$ 42,582,231 71

The deduction made in this year's accounts from the cost of the railway, on the 30th June, 1883, was made by direction of the Auditor General.

The amount deducted consists mainly of cheques issued to pay for land taken for the St. Charles Branch and other works. The persons in whose favor these cheques were drawn having refused the amounts offered them, their claims were referred to the Dominion Arbitrators and the cheques were cancelled.

The expenditure at Halifax was for the completion of the improvements undertaken at that place.

At St. John, arrangements were made for improving and increasing the accommodation for passenger traffic. The erection of a new station house was commenced and the train shed belonging to it was completed and put into use.

The amount for completion of the Intercolonial consists of payments on account of claims in connection with the construction of the line between Rivière Du Loup and Truro, under the Commissioners, and of the legal and other expenses of settling the same.

Work on the St. Charles Branch was continued, but it was not completed during the year.

The Dartmouth Branch was commenced a short time before the close of the year.

The Dalhousie Branch was so far completed that trains could be run over it with safety, and it was therefore opened for traffic in the month of June.

The work of grading the Rivière du Loup Town Branch was commenced and some progress was made.

REVENUE ACCOUNT.

This account again shows an excess of earnings over expenditure, the net earnings being about the same as last year.

The gross earnings of the year were . . . \$2,353,647.26

The working expenses were . . . 2,344,579.09

Net earnings . . . \$ 9,068 17

The following shows the net earnings for each of the following years:—

		Net Earnings.	
1880-91—Gross earnings	- - -	\$1,760,393 92	
Expenses	- - -	1,759,851 27	
			\$ 542.65
1881-83—Gross earnings	- - -	\$2,079,262 66	
Expenses	- - -	2,069,657 48	
			9,605.18
1882-83—Gross earnings	- - -	2,370,921 10	
Expenses	- - -	2,360,373 27	
			10,547.83
1883-84—Gross earnings	- - -	2,353,647 26	
Expenses	- - -	2,344,579 09	
			9,068.17

Total Net earnings for four years - - - \$29,763.83

The gross earnings show a slight decrease when compared with last year, as follows:—

		Gross Earnings.	
1882-83	- - - - -	\$2,370,921.10	
1883-84	- - - - -	2,353,647.26	
Decrease	- - - - -	\$ 17,273.84	

The earnings per mile of railway compares with last year as follows:—

		Earnings per mile of railways.		Decrease.
1882-83	- - - - -	\$2,822 52		
1883-84	- - - - -	2,801 96		
				\$20 56

The following is a comparative statement of a few of the chief articles of freight, showing the quantity carried in this and in the previous year:—

	1882-83.	1883-1884.	Increase.	Decrease.
Barrels flour.	983,916	815,641		168,275
Bushels grain.	1,195,601	654,635		540,966
Lumber, in feet.	104,633,417	131,120,948	26,487,531	
Head of live stock..	68,338	62,090		6,248
Other goods, in tons	704,608	729,923	25,315	

The following shows the quantity of each of the above articles carried each year, for five years :—

	1879-80.	1880-81.	1881-82.	1882-83.	1883-84.
Barrels flour.	525,248	672,310	692,095	983,916	815,641
Bushels grain.	324,021	565,678	560,253	1,195,601	654,635
Lumber, in feet.	55,462,654	72,841,388	78,356,418	104,633,417	131,120,948
Head of live stock..	70,990	61,574	73,479	68,338	62,090
Other goods in tons.	422,256	544,354	647,561	704,608	729,923

The gross tonnage carried—

In 1883-84 was	1,001,163 tons.
In 1882-83 was	970,961 "

An increase of 30,202 "

It will be seen by the above that while there has been a decrease in flour, grain and live stock carried, there has been a large increase in lumber, and the gross tonnage carried has also increased.

The number of passengers carried was—

In 1883-84	920,870
In 1882-83	878,600
Increase	42,270

EXPENDITURE.

The working expenses have decreased slightly as compared with last year.

1882-83	\$2,360,373.27
1883-84	2,344,579.09

Increase 15,794.18

The Engine, train and car mileage compares with last year, as follows :—

The engine mileage was—

	Miles.
In 1883-84	4,407,655
In 1882-83	4,406,189
Increase	1,466

The train mileage was—

In 1883-84	3,653,961
In 1882-83	3,615,192
Increase	38,769

The car mileage was—

In 1883-84	41,741,080
In 1882-83	41,526,553
Increase	214,527

The working expenses per mile of railway, and per mile run by engines and trains, compare as follows with last year, showing in each case a decrease: —

Per mile of railway—

1882-83	\$2,809 97
1883-84	2,791 16
Decrease	\$18 81

Per mile run by engines—

	Cents.
1882-83	53·57
1883-84	53·19
Decrease	·38

Per mile run by trains—

1882-83	65·29
1883-84	64·17
Decrease	1·12

The necessary repairs were made to the permanent way and structures and all the works in connection with the railway were maintained in a thorough state of efficiency.

The re-laying of the main line with heavier steel rails, at the cost of working expenses, was continued, and 32 miles of new rails were laid.

There were also, 278,677 new sleepers put into the main track and 70 miles of the track were ballasted.

A number of sidings were put in at various places.

The necessary repairs were made to fences, and 132 miles of new fences were erected. Six miles of new snow fences were built and 4,000 lineal feet of snow sheds were rebuilt.

The buildings on all parts of the line received necessary repairs.

Seven new station houses and freight houses were built, besides other buildings, and extensive repairs and additions were made to many station houses and freight houses.

The new building at Moncton, for the general offices of the railway, to replace that destroyed by fire in February, 1883, is nearly completed.

The whole cost of this building is being charged to the working expenses.

Semaphore signals were erected at eight stations.

Four new tanks, of an improved kind and of greater capacity than those heretofore in use, were erected, and other improvements were made in the water supply.

The cost of all these improvements and additions, and of others which I have not specified, forms part of the working expenses.

In the month of April an unusually heavy freshet in New Brunswick and Nova Scotia caused great damage. At several points between Painsec and Amherst the track was broken by the washing away of culverts, which left great openings in the embankments, which had to be bridged over before trains could pass. Temporary repairs were at once made, so that the traffic was only delayed for a few hours. The permanent repairs were commenced as soon as possible, and have now been completed in a thoroughly substantial manner.

The rolling stock received necessary repairs and is in good order.

Four new locomotives were purchased to make good the depreciation of the stock from use, and their cost was charged to working expenses.

Eighty cars of various kinds having been worn out, were replaced by new ones, and the cost charged to working expenses.

STORES.

The value of stores purchased was	\$1,109,991 78
The value of stores used was	1,104,093 06
The value of old material sold was	36,740 81

The value of the stores on hand at the end of the year was :—

Ordinary stores, including fuel	\$486,049 48
Iron and steel rails	251,924 82
Second-hand material serviceable	35,600 80
Old material for sale	63,945 81

Total stores on hand \$837,520 91

The increase is caused chiefly by the rails, fuel and old materials on hand. It gives me pleasure to state that in general the several officers and employees have performed their duties in a satisfactory and efficient manner.

I have the honour to be, Sir,
Your obedient servant,

D. POTTINGER.
Chief Superintendent.

INTERCOLONIAL RAILWAY.

CHIEF ENGINEER'S OFFICE,
MONCTON, N.B., 25th October, 1884.

SIR,—I have the honour to submit my report of the working of the Engineering Department for the year ending 30th June, 1884.

TRACK.

The mileage of the main line and branches in actual operation has been increased from 840 to 847 miles as follows :—

	Miles.
Previously reported	840
Dalhousie branch	7
Total	847

The Dalhousie Branch extends from Dalhousie Junction to the Town of Dalhousie.

All of the old iron rails have now been removed from both the main line and branches and replaced with steel rails.

During the year 32½ miles of old steel rails in the main line, weighing 56 pounds to the lineal yard, were taken up and replaced with new steel rails, weighing 67 pounds to the lineal yard.

SLEEPERS.

During the year 278,677 sleepers have been renewed on the main line.

BALLASTING.

About 70 miles of the main line have been newly ballasted.

SEMAPHORE SIGNALS.

New distant semaphore signals have been put up at Halifax, Richmond, Moncton, Coal Branch, Kent Junction, Derby, Cedar Hall, and St. Fabien.

SNOW SHEDS AND FENCING.

4,000 feet of snow shedding has been renewed on northern division Nos. 2 and 3, and 5,160 feet thoroughly overhauled and repaired.

Six miles of snow fencing have also been erected on these divisions.

In addition to the ordinary repairs of fences, 132½ miles of new wire fence have been erected.

The ordinary barbed wire (4 wires and a top rail) has been chiefly used.

A great many new farms have been taken up on the line between Moncton and Newcastle, and between Metapedia and St. Flavie, where no fencing was erected when the line was built, and protecting these farms has added largely to the cost of fencing.

About 10 miles of the Everett flexible picket wire fencing was used during the year, and so far it has proved satisfactory.

TURNTABLES.

A cast iron turntable, 46 feet in diameter, was provided at Point du Chêne, to replace a wooden one.

This was the last wooden table left on the road.

Wrought iron end girders were provided for the turntables at Campbellton and Truro.

WHARVES, &C.

The deep water wharf at Richmond received a thorough overhauling; 120 piles, from 50 to 60 feet long, were driven to support the bents of coal trestle, where the supporting cribs had settled out of place.

The wharves at Stewiacke, Pictou Landing, Point du Chêne, St. John and Campbellton, all received considerable repairs.

BUILDINGS.

On the Eastern Division a new freight house, 60 by 25 feet, and 50 by 38 feet, was erected at Windsor Junction, and a small station at Onslow, near Truro.

New platforms were built at Bedford, Oakfield, Enfield, Elmsdale, Milford, Stewiacke, Stellarton, Onslow and Maccan.

The old station house at Debort was taken down, and the materials utilized for the repairs and renewals of buildings on the Eastern Division.

Truro and Londonderry stations were re-shingled.

A general offices building has been provided at Moncton, to replace the building destroyed by fire in February, 1883. It is of pressed brick, with freestone trimmings. Size—178½ by 58½ feet, two stories, with Mansard roof and stone basement. The greatest care has been taken to make the building fire-proof. All partition walls throughout are built of brick. The floors are built solid, with 3 by 5 inch scantling laid on edge, plastered underneath, and covered with 2 inches of cement concrete above. Over the concrete a 1½-inch hard pine floor is laid in the ground and first flats. Ample vault capacity has been provided for all Departments. \$63,098.25 were expended on this building to the 30th June, 1884.

A new station has been erected at Painsec Junction, to replace the old one destroyed by fire.

Hampton station was raised up and rebuilt

A new station was provided at Brookville, near St. John.

The train shed of the new passenger station at St. John was completed and opened for business on the 2nd of June, 1884.

Temporary offices and waiting rooms have been provided in the train shed, pending the completion of the head house.

The freight houses and station platforms at Amherst, Sackville, Memramcook Point du Chêne, Shediac, Moncton, Petitcodiac, Apohaqui and Norton, all received considerable repairs.

A new platform was erected at Hampton.

On Northern Division No. 1, a new combined passenger station and freight house and platform was erected at Kent Junction.

A new flag station and platform were erected at Beresford, between Bathurst and Petite Roche.

The passenger platforms at Bathurst were extended 90 feet.

New loading platforms were erected at Weidford, Rogerville, Bathurst and Nash's Creek.

On Northern Division No. 2, a dwelling was erected for the section foreman at Metapedia.

An addition was made to Little Métis station, to make dwelling apartments for the Agent, and the old dwelling apartments were fitted up for a ladies' waiting room.

The old coal shed was moved from the south end of the yard to the north end of the station, and converted into a freight shed.

New station buildings and platforms were built at St. Anaclet, opposite Father Point, and St. André.

On Northern Division No. 3, heavy repairs were made at St. Fabien, Bic, Trois Pistoles and St. Arsene Stations.

The exterior walls of the former and the latter were filled with sawdust.

In connection with the St. Charles Branch, house accommodation was provided for eleven locomotives.

BRIDGES, &c.

Six short spans of iron, from 17 to 23 feet, were put in place of wooden stringers requiring renewal.

A wooden trestle overhead bridge at Bathurst was replaced by an iron structure, with central span of 80 feet and two side spans of 20 feet each.

In April occurred, between St. John and Halifax, the heaviest freshet known since the road was built. Between Painsec and Amherst two large arch culverts were undermined and destroyed, and between the same points four other washouts took place. Bridges have been erected in place of the arch culverts above referred to, and the washouts repaired.

The iron superstructure of the Memramcook bridge, which was badly broken and twisted by a jam of mill logs from a broken dam on the river above, has been made good, and the abutments and superstructure have been raised 4 feet.

Gangs of painters and rivetters have been engaged on all divisions of the road, scraping, painting, and doing general repairs to the iron bridges.

A new sidewalk 1,000 feet long was laid on the Restigouche Bridge, and one 200 feet long on Moffatt's Bridge.

WATER SERVICES.

The charge of this service was transferred from the Engineering to the Mechanical Department on the 1st of January last.

Before the transfer, tanks were erected as follows:—

Canaan	50,000	gallons	capacity
Rogersville	25,000	"	"
Belledune	20,000	"	"
Charlo	20,000	"	"

A second tub of 12,000 gallons capacity was also provided at St. Thomas.

A gravitation supply, with a 6-inch main pipe and stand pipe on main line, was provided west of St. Simon.

BRANCH LINES.

The following branches have been constructed, or partially constructed, during the past year.

	Miles.
St. Charles Branch	15
Rivière du Loup Town Branch	4
Dalhousie Branch	7
Dartmouth "	4

The filling and ballasting on the St. Charles Branch, referred to in last year's report, was practically completed at the close of the year, and the track was in fair running order.

RIVIÈRE DU LOUP BRANCH.

A contract for the grading of this branch was entered into with Messrs. Theriault & Deschene, of Rivière du Loup, on the 17th of September, 1883. The grading was not completed at the close of the year.

DALHOUSIE BRANCH.

A contract for the grading of this branch was entered into with Messrs. Warren Taylor & Co., of Salisbury, N.B., on the 25th of July, 1883. The grading was not completed until June of this year. The ballasting was done by the Department by day's labor.

The branch was opened for traffic on the 23rd of June.

A combined passenger and freight station was built at Dalhousie town, also an engine house, coal shed, and a freight shed on the wharf extension.

The Government purchased from the municipality of Restigonche a wharf property in the town of Dalhousie, and an addition of 250 by 50 feet was made to it, so that good accommodation is now afforded to vessels and steamers drawing 16 feet of water.

DARTMOUTH BRANCH.

The most expensive work in connection with this branch is the bridging of the Narrows at Richmond. The channel is 600 feet wide, and from 60 to 75 feet deep. Contracts were let for this work in April, as follows:—The wood trestling and piling to M. J. Hogan, Quebec. The masonry of swing span to Duncan Waddell, Dartmouth, and the superstructure of the swing span to the Starr Manufacturing Company, Dartmouth, and work under these contracts is in progress.

A location was made for the Indiantown Branch, extending from Derby up the South-west Miramichi River, to Indiantown, a distance of 14 miles.

The track throughout the whole line is in good order.

I am, Sir,

Your obedient servant,

P. S. ARCHIBALD,

Chief Engineer.

D. POTTINGER, Esq.,
Chief Superintendent,
Moncton, N.B.

 INTERCOLONIAL RAILWAY.

MECHANICAL SUPERINTENDENT'S OFFICE,
 MONCTON, N.B., 7th November, 1884.

DEAR SIR,—I beg to submit, for your information, the following statements showing the operations of the Mechanical Department for the year ending 30th June, 1884 :—

A.—Statement showing the number of locomotives and the various classes of cars.

B.—Statement showing the locomotive and car mileage, and the average number of passenger and freight cars hauled per mile, run by engines.

C.—Abstract of locomotive returns.

D.—Statement showing the cost of locomotive power for each month during the year.

E.—General statement of the expenses of the Mechanical Department.

During the year four new locomotives were purchased and charged to working expenses. One second-class passenger, one baggage and express, twelve box and sixty-six platform, to replace an equal number condemned were this year, rebuilt at the cost of working expenses.

Twenty-eight locomotives, sixteen first-class, twenty-four second class passenger cars, two postal and smoking, ten baggage and express, thirty box and seventy platform cars were received on the road on account of capital.

The rolling stock is in good condition.

I am, Sir,

Your obedient servant,

A. H. WHITNEY,

Mechanical Superintendent.

D. POTTINGER, Esq.

Chief Superintendent, Intercolonial Railway.

A.—INTERCOLONIAL RAILWAY.

STATEMENT showing the number of Locomotives and the various classes of Cars on the 1st July, 1883, and on the 30th June, 1884.

	The Various Classes of Cars.															
	Locomotives.	First Class Passenger.	Second Class Passenger.	Postal and Smoking.	Baggage and Express.	Vans.	Box.	Cattle.	Platform—10, 15 and 20 Tons.	Hoppers—5 Tons.	Gondola—20 Tons.	Total.	Snow Ploughs.	Wing Ploughs.	Flangers.	Total.
On hand, 1st July, 1883, serviceable.....	138	52	50	15	19	50	1,421	10	1,368	595	783	4,423	28	9	18	55
do do condemned.....		1		91	1	1	6	2	3		14					
Total	138	53	51	15	20	51	1,427	72	1,371	595	783	4,437	28	9	18	55
Built in Moncton shops, on account Capital																
Purchased on account Capital	23	10	22	2	8				20							
do do working expenses.....	4															
do do Capital	5	6	2		2		30		50							
Condemned—replaced by new.....	7															
Total, 30th June, 1884.....	163	68	75	17	30	51	1,457	72	1,441	595	783	4,589	30	10	20	60
Condemned on hand, 1st July, 1883.....																
do during year.....									3			14				
Total condemned.....									65			77				
Less—Rebuilt during year																
do do									68			91				
Total condemned.....									66			80				
Condemned, 30th June, 1884.....									2							
Add—Serviceable and repairing.....	163	68	75	17	29	48	1,456	69	1,439	595	782	4,578				
Total stock, 30th June, 1884.....	163	68	75	17	30	51	1,457	72	1,441	595	783	4,589				

B.—INTERCOLONIAL RAILWAY.

STATEMENT of Locomotive and Car Mileage for Year ending 30th June, 1884.

Months.	Locomotive Mileage.		Car Mileage.				Average.		Snow Ploughs.
	Passenger.	Freight.	Passenger.	Express, Postal and Baggage.	Freight.	Total.	Passenger	Freight.	
1883—July.....	82,534	168,984	397,563	149,711	2,254,475	2,801,749	6.62	13.40	.....
August.....	85,411	197,896	394,477	158,181	2,262,587	3,215,245	6.47	13.50	.....
September.....	78,678	195,196	357,030	146,745	2,694,695	3,198,370	6.41	13.80	.....
October.....	80,815	228,263	376,525	149,169	3,248,298	3,773,992	6.50	14.23	.....
November.....	75,356	221,456	320,267	145,547	3,069,777	3,535,691	6.18	13.86	.....
December.....	72,392	233,720	316,284	138,688	2,903,226	3,358,198	6.29	12.98	.....
1884—January.....	71,671	250,488	301,842	140,439	3,101,044	3,543,325	6.17	12.34	.....
February.....	66,959	219,776	291,718	132,528	2,827,068	3,241,314	6.10	12.86	.....
March.....	71,555	255,253	300,217	144,437	3,295,204	3,739,858	6.21	12.91	.....
April.....	71,313	244,316	340,874	149,708	3,347,451	3,838,033	6.87	13.70	.....
May.....	71,781	245,862	321,464	146,469	3,363,919	3,831,852	6.52	13.68	.....
June.....	78,780	234,485	326,139	159,943	3,177,473	3,663,553	6.17	14.15	.....
Total.....	907,245	2,675,695	4,034,400	1,761,564	35,945,116	41,741,080	6.39	13.43	.....

C.—INTERCOLONIAL RAILWAY.

ABSTRACT of Locomotive Returns for Year ending 30th June, 1884.

Months.	Hours in Steam.	Locomotive Mileage.	Consumption.				Average Consumption per 100 Miles.				
			Tons of Coal.	Pints of Oil.	Lbs. of Tallow.	Lbs. of Waste.	Miles to hour in Steam.	Lbs. of Coal.	Pints of Oil.	Lbs. of Tallow.	Lbs. of Waste.
1883—July	28,471	307,361	6,947	20,409	9,834	5,683	10.79	50.62	6.64	3.20	1.84
August	31,740	343,131	7,876	21,898	11,110	5,869	10.81	51.41	6.38	3.23	1.71
September	31,537	335,088	8,229	22,263	11,163	5,605	10.62	55.01	6.64	3.33	1.67
October	36,156	377,824	9,506	22,730	11,885	6,174	10.44	56.85	6.01	3.14	1.63
November	34,205	361,778	9,195	21,054	11,286	4,617	10.57	56.93	5.81	3.12	1.27
December	35,214	368,207	10,242	21,547	11,601	5,602	10.45	62.80	5.85	3.15	1.52
1884—January	41,658	409,373	12,046	23,832	12,023	5,851	9.82	65.91	5.82	2.93	1.42
February	37,520	363,533	10,796	24,837	10,042	5,768	9.68	66.52	6.69	2.76	1.59
March	41,024	407,652	11,729	26,342	12,179	6,270	9.93	64.44	6.46	3.23	1.54
April	36,837	366,260	9,619	23,598	12,011	6,293	10.48	55.78	6.10	3.10	1.62
May	36,081	385,585	9,277	23,937	12,137	6,770	10.68	53.89	6.21	3.14	1.76
June	33,324	361,893	8,590	26,048	10,455	6,232	10.85	53.16	7.19	2.88	1.73
Total	423,767	4,407,655	114,052	278,025	136,736	70,804	10.40	57.96	6.30	3.12	1.58

E.—INTERCOLONIAL RAILWAY.

GENERAL STATEMENT of the Expenses of the Mechanical Department, for the Year ending 30th June, 1884.

The miles run by trains were.....		3,653,961
do engines were.....		4,407,655
do cars were.....		41,741,080
do snow ploughs were.....		37,938
	\$ cts.	\$ cts.
The cost of locomotive power.....		757,162 49
The cost of repairs :		
Repairs to passenger cars.....	62,522 38	
do postal, express and baggage cars.....	18,203 49	
do freight cars and vans.....	181,146 73	
		261,872 60
Oil and waste for packing.....		33,097 86
Miscellaneous.....		1,817 37
The cost of locomotive power per 100 miles run by trains was.....		20 72
do do do engines.....		17 15
do do do cars.....		1 81
The cost of repairs to cars per 100 miles by train.....		7 16
do do engines.....		5 94
do do cars.....		0 63
The cost of oil and waste for packing per 100 miles by train.....		0 90
do do do engines.....		0 75
do do do cars.....		0 07
The cost of repairs to passenger cars per 100 miles run by them.....		1 54
do postal, express and baggage do.....		1 03
do freight cars and vans do.....		0 50

No. 2.—INTERCOLONIAL RAILWAY.

REVENUE ACCOUNT, Year ending 30th June, 1884.

DR.

CR.

Previous Year.	Expenditure.	Year ending 30th June, 1884.	Previous Year.	Earnings.	Year ending 30th June, 1884.
\$ cts.		\$ cts.	\$ cts.		\$ cts.
707,062 65	Locomotive power	757,162 49	741,992 72	Passenger traffic.....	760,045 05
508,187 86	Car expenses	531,215 91	1,487,601 98	Freight do	1,451,540 12
582,638 91	Maintenance way and works do	660,801 18	141,326 40	Mails and sundries.....	142,062 09
313,496 98	Station expenses do	325,873 10			
167,353 84	General charges do	171,776 70			
2,339,320 24	Car mileage	2,346,879 38			
21,053 03		Or. 2,260 29			
2,360,373 27	Balance.....	2,344,579 09			
10,547 83		9,088 17			
2,370,921 10		2,353,647 26	2,370,921 10		2,353,647 26

THOS. J. WILLIAMS,
Chief Accountant and Treasurer.

MONCTON, N.B., 30th June, 1884.

No. 3.—INTERCOLONIAL RAILWAY.

LOCOMOTIVE POWER—(Abstract No. 1.)

Previous Year.	—	Year ending 30th June, 1884.
\$ cts.		\$ cts.
7,475 16	Mechanical Superintendent's salary, Clerk's, Office and Travelling expenses.....	7,820 65
175,786 58	Wages, Drivers, Firemen and Cleaners	175,444 71
298,896 76	Fuel.....	285,551 75
41,460 13	Oil, Tallow, Waste and small Stores.....	50,232 96
165,233 63	Repairs to Engines, Tenders and Engine Tools.....	178,909 93
27,365 46	Water, including Pump and Tank repairs.....	38,702 29
47,844 93	Miscellaneous	40,500 20
\$767,082 65		\$757,162 49

THOS. J. WILLIAMS,
Chief Accountant and Treasurer.

MONCTON, N.B., 30th June, 1884.

No. 4.—INTERCOLONIAL RAILWAY.

CAR EXPENSES—(Abstract No. 2.)

Previous Year,	—	Year ending 30th June, 1884.
\$ cts.		\$ cts.
55,289 05	Repairs to Passenger cars	62,522 38
16,209 23	do Postal, Express and Baggage cars	18,203 49
178,706 45	do Freight cars and Vans.....	181,146 73
167,755 27	Wages of Conductors, Train Baggage Masters and Brakesmen.....	177,628 79
26,724 95	Oil and Waste for packing.....	33,097 86
48,786 21	Small Stores and Fuel.....	42,441 72
14,716 70	Miscellaneous	16,174 94
\$508,187 86		\$531,215 91

THOS. J. WILLIAMS,
Chief Accountant and Treasurer.

MONCTON, N.B., 30th June, 1884.

No. 5.—INTERCOLONIAL RAILWAY.

MAINTENANCE OF WAY AND WORKS—(Abstract No. 3).

Previous Year.	—	Year ending 30th June, 1884.
\$ cts.		\$ cts.
5,206 55	Chief and Assistant Engineer's salaries, Clerks, Office and Travelling expenses.....	3,804 73
297,305 24	Wages in repairing Roadway, Fences and Semaphores, including new Sidings laid in	280,153 41
47,800 95	Rails and Fastenings, including new Sidings laid in	18,770 54
64,519 20	Sleepers	46,968 78
39,151 35	Timber, Lumber, etc., for repairs to Bridges, Cattle-guards, Crossings, Snow-sheds, Fences, etc.....	38,792 39
11,749 53	Repairs to Wharves	6,686 48
67,503 78	Repairs to Buildings and Platforms, including extension of and additions to same.....	105,929 71
12,588 69	Repairs to Snow Ploughs, Flangers and Tools	15,738 56
33,974 20	Clearing Ice and Snow	41,660 32
2,839 42	Miscellaneous	2,296 26
582,638 91		560,801 18

THOS. WILLIAMS,
Chief Accountant and Treasurer.

MONCTON, N.B., 30th June, 1884.

No. 6.—INTERCOLONIAL RAILWAY.

STATION EXPENSES—(Abstract No. 4).

Previous Year.	—	Year ending 30th June, 1884.
\$ cts.		\$ cts.
243,760 22	Salaries and wages of Station Masters, Agents, Clerks, Telegraph Operators, Station Baggage Masters, Yard Masters, Switchmen, Watchmen and Laborers	254,396 66
69,736 76	Fuel, Oil, Light, Stationery, Tickets and other incidental expenses	71,476 44
.....	Miscellaneous .....	.....
313,496 98		325,873 10

THOS. WILLIAMS,
Chief Accountant and Treasurer.

MONCTON, N.B., 30th June, 1884.

No. 7.—INTERCOLONIAL RAILWAY.

GENERAL CHARGES—(Abstract No. 5).

Previous Year.		Year ending 30th June, 1884.
\$ cts.		\$ cts.
68,120 15	Chief Superintendent, District Superintendents, Train Despatchers, General Freight Agent, General Passenger Agent, Clerks, Office and Travelling expenses.....	63,016 07
20,330 15	Accounting Department, salaries of the Treasurer, Traffic Auditor, Paymaster, Cashier, Clerks, Office and Travelling expenses ..	19,448 87
13,360 85	Damages to men, animals and goods	17,083 30
20,620 49	Ferry service.....	22,566 09
1,215 00	Telegraph expenses (not including pay to operators)	2,261 93
32,053 59	Miscellaneous, printing, advertising, etc.....	31,107 32
12,183 61	Agency expenses	15,893 12
167,933 84		171,376 70
	Special Vote—Mrs. E. C. Ennis, Indemnity for injuries to her late husband, E. C. Ennis.....	400 00
		171,776 70

THOS. WILLIAMS,
Chief Accountant and Treasurer.

MONCTON, N.B., 30th June, 1884.

No. 8.—INTERCOLONIAL RAILWAY.

DR. GENERAL STORES ACCOUNT, Year ending 30th June, 1884. CR.

1883.	1884.	1883. June 30.	1884. June 30.	By Issues during year. Old material sold.	Balance— Ordinary stores, including Fuel Iron and Steel Rails, Fasten- ings, &c. Second-hand material, service- able. Old material for sale.	\$	cts.	\$	cts.
To Balance.....						567,739	27	1,014,093	06
Purchases during year.....								36,740	81
Labour.....								486,049	48
Charges from other Departments..								251,924	82
Staff pay rolls.....								35,600	80
						1,320,615	51	63,945	81
						1,888,354	78		
								837,520	91
								1,888,354	78

THOMAS WILLIAMS,
Chief Accountant and Treasurer.

MONCTON, N.B., 30th June, 1884.

No. 9.—INTERCOLONIAL RAILWAY—Concluded.
GENERAL ACCOUNT, 30th June, 1884—Concluded.

DR.

CR.

	\$	cts.	\$	cts.	\$	cts.
Brought forward.....			1,037,375	88		
Pullman Palace Car Co.....			151	25		
Steamer "Admiral" and owners.....			695	58		
Steamer "Contest".....			397	00		
Canadian Locomotive and Engine Co.....			3,829	18		
Moncton Sugar Refining Co.....			9,631	93		
Halifax Cotton Co., siding.....			11,863	48		
Moncton Cotton Co., siding.....			1,765	53		
Goldbrook Rolling Mills.....			1,987	41		
Western Union Telegraph Co.....			9	40		
Departmental Accounts—						
Militia.....	2,706	64				
Agriculture.....	9,591	35				
Dorchester Penitentiary.....	58	78				
Marine and Fisheries.....	2	28				
Post Office.....	45,400	24				
Individual accounts.....			57,759	29		
			30,908	01		
			1,155,243	94		
Brought forward.....					1,155,243	94

THOMAS WILLIAMS,
Chief Accountant and Treasurer.

MONCTON, N.B., 30th June, 1884.

No. 10.—INTERCOLONIAL RAILWAY.

COMPARATIVE STATEMENT of Averages, Year ending 30th June, 1884.

	1884.	1883.
Mileage of railway	840	840
Engine mileage	4,407,655	4,406,189
Train do	3,653,961	3,615,192
Cars do	41,741,080	41,526,553
	\$ cts.	\$ cts.
Receipts per engine mile.....	53 40	53 81
do mile of railway.....	2,801 95	2,822 52
	Per cent.	Per cent.
Percentage of passenger earnings to gross earnings	32·29	31·30
do freight do do	61·67	62·74
do other do do	6·04	5·96
Expenses per engine mile—		
Drivers', Firemen's and Cleaners' wages.....	3·98	3·99
Fuel.....	6·02	6·78
Oil, tallow, waste and small stores	1·14	1·01
Repairs to engines.....	4·66	3·75
Water and tank repairs.....	0·88	0·62
Miscellaneous	0·92	1·09
Total.....	17·00	17·24
Mechanical Superintendent's salary, office and travelling expenses.....	0·18	0·17
	17·18	17·41
Locomotive power per engine mile	17·18	17·41
Car expenses do	12·05	11·53
Maintenance of way and works do	12·72	13·22
Station expenses do	7·39	7·12
General charges do	3·90	3·81
	53·24	53·09
Car mileage	Cr. 0·05	0·48
Total per engine mile.....	53·19	53·57
Locomotive power per train mile.....	20·72	21·22
Car expenses do	14·54	14·06
Maintenance of way and works do	15·35	16·12
Station expenses do	8·92	8·67
General charges do	4·70	4·64
	64·23	64·71
Car mileage	Cr. 0·06	0·58
Total per train mile	64·17	65·29
Working expenses per mile of railway.....	\$2,791 16	\$2,809 97

THOS. WILLIAMS,

Chief Accountant and Treasurer .

MONCTON, N.B., 30th June, 1884.

INTERCOLONIAL

RETURN of Accidents and Casualties which have occurred in Canada
30th June,

(This Return is made up in compliance with the Provisions

Date.	Time of Day or Night.	Number of Train.	Description of Train.	Name of Conductor.	Name of Driver.	No. of Engine.
1883.						
July 13...	1.50 p.m.	24	Freight.....	G. McLeod	M. Wall	7
do 21...	12.30 p.m.	.....	.....	.....	.....	.....
do 21...	1.30 a.m.	9	Express.....	J. Ahern	John Ross.....	25
do 24...	7.05 a.m.	.....	Special	E. Camire.....	A. Lacroix.....	76
Aug. 2...	7.45 a.m.	11	Freight	J. Stronach.....	A. Davey	74
do 2...	6.40 a.m.	.....	Special	A. E. Brown	Geo. Milne.....	90
do 5...	12.15 p.m.	10	Express.....	J. Ahern.....	John Ross.....	25
do 10...	7.03 p.m.	.....	Special	J. E. Evans	H. M. Stewart.....	40
do 9...	10.25 a.m.	.....	Shunting	J. G. McNaughton	A. B. White.....	27
do 11...	10.30 p.m.	.....	do .....	.....	S. Ross.....	99
do 14...	7.00 p.m.	5	Freight	W. J. Campbell.....	J. Gillfillan.....	46
do 20...	.....	.....	.....	.....	.....	.....
do 31...	3.00 p.m.	.....	Ballast	E. Collins.....	J. Devereau	101
Sept. 1...	6.05 p.m.	6	Freight	Geo. A. Chesley.....	G. C. Palmer.....	59
do 3...	8.00 a.m.	.....	Shunting	L. Steele	J. McLellan	93
do 14...	7.15 a.m.	.....	Special.....	G. Margeson.....	J. Sproull.....	88
do 15...	6.10 p.m.	2	Express	D. Rutherford	J. W. Sawyer.....	71
do 15...	9.40 a.m.	.....	Special	Wm. Morgan	J. Devenne.....	127

RAILWAY.

on the Line of the Intercolonial Railway, during the Year ending 1884.

(of the Railway Act of 1868, 31 Vic., cap. 68, sec. 43.)

Place of Accident.	Name of Person Injured.	Whether Passenger or Employé.	Particulars of Accident.	Extent of Injury.	Verdict of Coroner's Jury.
Richmond.....	Kenneth Gunn.	Employé..	When coupling engine and cars got his hand caught.	Hand slightly injured.	
do	George Bird	do ...	Fell	Put shoulder out of joint.	
Moncton.....	Cecilia Martin.	Neither...	Was struck by train on Main street crossing.	Slightly injured.	
Notre Dame de Portage.	Olivier Bourke.	Employé..	Train struck hand car on which he was riding.	do ...	
Riverside.....	Unknown	Neither....	Walking on track; was struck by train.	Fatal.....	Accidental.
Near Spring Hill	Herbert Sharpe	Employé..	Buried under car of coal which was thrown from the track in a collision.	do	
Near Polly Bog..	Wm. Whittle...	Neither...	Lying on track; was struck by train.	do	do
Mortimer Crossing.	Thos. Beck.....	do	While crossing track was struck by train.	do	do
Moncton.....	Albert Welling	Employé..	While coupling cars.....	Arm injured...	
do	James Lockhart	do ...	do	Hand injured ..	
Pointe du Chêne	Walter Harney (boy).	Neither....	Attempted to run under cars and was caught under wheel.	Foot crushed..	
Little Metis.....	Anthyme Petre	Employé..	Fell from top of snow shed.	Fatal.....	do
St. John.....	Robinson (boy)	Neither....	Jumped from car while in motion, and foot caught under wheel.	Foot crushed...	
Plumweseep.....	Thos. Long	Neither ...	While crossing track in wagon was struck by train.	Seriously inj'd.	
Richmond.....	William Spain..	Employé .	Coupling cars	Head injured ..	
Folly Lake	Fredk. Brown..	do ...	Fell from top of car.....	Sprained ankle	
Near Shubenacadie.	Mrs. Smith.....	Neither ...	While walking on track was struck by train.	Fatal.....	Accidental.
Moncton	J. C. Northrup.	Employé ..	While attempting to cross over train fell between cars.	do	do

INTERCOLONIAL

RETURN of Accidents and Casualties which have occurred in

Date.	Time of Night or Day.	Number of Train.	Description of Train.	Name of Conductor.	Name of Driver.	No. of Engine.
1883.						
Sept. 16...	.....	.....	.....	.....	.....	.....
do 18...	3.30 p.m.	.....	Special	W. Crockett.....	N. McLean	54
do 19...	6.10 p.m.	33	Express	Geo. Walker.....	D. McNeil	132
do 21...	2.30 p.m.	19	Freight	G. Margeson.....	J. Navin.....	107
do 25...	8.50 a.m.	.....	.....	.....	.....	.....
do 26...	10.20 p.m.	10	Express	W. Kelly.....	B. Carr	56
do 28...	7.30 p.m.	42	Freight.....	J. T. McGinn	S. Ross	115
Oct. 1...	2.30 p.m.	24	do	J. McLeod.....	M. Wall.....	102
do 3...	1.50 p.m.	.....	Shunting.....	.....	A. B. White.....	27
do 4...	10.00 a.m.	.....	Freight	M. Cummings.....	A. McCabe	143
do 5...	9.45 a.m.	.....	Militia Special...	Jas. McDonald	P. Ashe.....	91
do 6...	11.45 a.m.	2	Express	G. H. Trueman.....	{ John Stewart..... { T. Prince	55 67
do 8...	6.40 a.m.	.....	Shunting .....	.....	James Cole.....	27
do 11...	11.20 p.m.	.....	Special.....	C. A. Atkinson.....	Jas. McAuley.....	106
do 13...	11.00 a.m.	18	Freight.....	W. J. Dickson.....	Geo. Feetham.....	4
do 18...	6.00 p.m.	.....	Special.....	Wm. Thompson	N. McLean	19
do 19...	1.30 p.m.	.....	Shunting	J. G. McNaughton	P. Forgarty.....	34
do 22...	11.55 p.m.	37	Freight.....	J. McLeod.....	W. Bastin.....	138
do 23...	10.00 a.m.	.....	.....	.....	.....	.....
do 24...	11.55 p.m.	.....	Special.....	N. D. Archibald.....	R. Wilson	123
do 27...	5.15 a.m.	39	Accommodation.	L. Couture.....	— Lacroix.....	76
Nov. 2...	8.45 a.m.	15	Freight	B. White.....	D. Cameron	133

RAILWAY.

Canada, on the Line of the Intercolonial Railway, &c.—*Continued.*

Place of Accident.	Name of Persons Injured.	Whether Passenger or Employé.	Particulars of Accident.	Extent of Injury.	Verdict of Coroner's Jury.
Near Red Pine...	Peter Kelly.....	Employé .	Fell from hand car and run over.	Rib broken	
Near Rogersville	E. Molaley.....	Neither ...	Fell from car while loading freight.	Wrist broken..	
River Ouelle.....	Thos. Chrétien.	do ...	Jumped from train while in motion.	Slightly inj'd.	
Londonderry ...	Thos. Beals.....	Employé .	Slipped when stepping from engine.	Knee broken...	
Weldford.	J. B. Humphrey	do ...	While handling freight...	Sprain'd sev'ly	
Near Petitcodiac	Newsboy.....	Neither....	Fell from train while in motion.	Slightly inj'd.	
Miller's Siding...	Wm. Irving ...	Employé .	Coupling cars	Arm crushed..	
Halifax.....	John Richards..	do ...	Struck by train while walking on track.	Seriously inj'd	
Moncton	Chas. Wilbier .	do ...	Coupling engine to car...	Hand crushed.	
Jacquet River ...	Wm.Smallwood	do ...	When closing cab window got his hand caught.	Hand cut.....	
Cold Brook.....	J. A. Wilson...	do ...	Injured in face by powder from rifle discharged by militia man on him.	Eye injured.....	
} Pollet River...	— Brown	Passenger	Jumped from train while in motion.	Slightly inj'd.	
Moncton	Melvin Lockhart.	Employé .	Coupling cars	Hip crushed ...	
Chatham Junction.	Lewis Burreis...	do ...	Coupling cars.....	Arm crushed.	
Aulac.....	Lewis Ohisholm	do ...	Unloading freight.....	Fingers do ...	
Rogersville	John Arsenault	do ...	Fell between cars.	Arm injured...	
Moncton	John Finney....	do ...	Coupling cars.	Leg do ...	
Near Little Metis	Jas. Smith.....	do ...	Hand caught by bell cord	Hand do ...	
Near Bathurst ...	D. McDonald...	Neither....	Fell from overhead bridge	Bruised.....	
Stellarton.	Nelson Cope-land.	Employé..	While working under engine.	Arm scalded.	
Point Lévis.....	Frs. Guimond.	Passenger	Jumped from train while in motion and fell through bridge.	Drowned.....	Accidental.
Amherst.....	M. Steeves.....	Employé .	Coupling cars.....	Hand injured.	

INTERCOLONIAL

RETURN of Accidents and Casualties which have occurred in

Date.	Time of Day or Night.	Number of Train.	Description of Train.	Name of Conductor.	Name of Driver.	No of Engine.
1883.						
Nov. 5...	12.00 p.m.	17	Freight.....	Geo. McCully.....	Geo. Feetham.....	4
do 8..	11.15 a.m.	.....	Special.....	H. Aubin.....	H. Gorham.....	29
do 10...	12.40 p.m.	18	Freight.....	Geo. McCully.....	Geo. Feetham.....	4
do 11...	10.30 a.m.	.....	Shunting.....	.....	D. Mains.....	97
do 16...	2.55 a.m.	.....	do.....	.....	James Stratton.....	94
do 17...	11.45 p.m.	.....	do.....	.....	A. B. White.....	99
do 22...	5.00 a.m.	.....	do.....	.....	E. Tobin.....	93
do 24...	12.25 p.m.	24	Freight.....	C. J. Rhodes.....	H. Smith.....	39
do 28...	.....	44	do.....	M. Cummings.....	J. J. Smith.....	143
do 29..	3.35 p.m.	.....	Special.....	J. Craigie.....	B. Cooke.....	122
do 29...	11.15 a.m.	.....	do.....	Wm. Morgan.....	J. Donald.....	92
Dec. 21...	11.15 a.m.	36	Accommodation.	W. L. McDougall.....	D. Pineo.....	113
do 24...	9.40 a.m.	27	Freight.....	A. W. Melick.....	J. R. Moore.....	46
1884.						
Jan. 16...	5.45 a.m.	.....	Special.....	D. Grant.....	Jas. Sproull.....	124
do 20...	4.40 a.m.	.....	do.....	E. Camire.....	H. Levey.....	21
do 21...	2.10 a.m.	.....	do.....	J. E. Evans.....	N. Sinclair.....	74
do 22...	10.00 p.m.	.....	do.....	E. L. Watts.....	R. Martin.....	143
Feb. 3...	3.00 a.m.	12	Express.....	John Stronach.....	Jno. Ross.....	152
do 7...	8.00 p.m.	.....	Special.....	W. Marchessault.....	A. Shickle.....	134
do 8...	3.00 p.m.	.....	do.....	P. McGee.....	H. Gorham.....	29
do 10...	8.50 p.m.	41	Freight.....	do.....	T. G. Scott.....	141
do 14...	12.30 p.m.	48	do.....	A. Moreau.....	W. Brock.....	77

RAILWAY.

Canada on the Line of the Intercolonial Railway, &c.—Continued.

Place of Accident.	Name of Person Injured.	Whether Passenger or Employé.	Particulars of Accident.	Extent of Injury.	Verdict of Coroner's Jury.
Spring Hill.....	Robt. Gilmore.	Employé..	Unloading freight.....	Hand injured.	
St. Fabien.....	Frank Gosselin	do ...	Coupling cars.....	Collar bone broken.	
Amherst.....	W. M. Dormand	do ...	do	Hand injured.	
Rivière du Loup	Alfd. Brillant.	do ...	While coupling cars, foot caught in guard rail.	Fatal.....	Accidental.
Moncton.....	Wm. Forgarty.	do ...	Coupling cars.....	Hand injured.	
do	Frank Gayton.	do ...	do	do ...	
Richmond.....	Douglas Drysdale.	do ...	Fell between cars while shunting.	Fatal.....	do
Elmsdale.....	D. Crowley.....	do ...	Barrel of tallow fell on him.	Stomach injured.	
Weldford.....	J. F. Card.....	do ...	Door of van closed on his hand.	Fingers injured.	
River Philip Bridge.	O. K. Fillmore.	Neither...	Struck by train while walking on track.	Fatal.....	do
Spring Hill.....	John Sullivan.	Employé..	Coupling cars.....	Side and back injured.	
Jones' Crossing, near Newcastle	John Oxford....	Neither...	Struck by train while driving across track.	Fatal.....	do
Pollet River	J. W. Croswaite	do ...	do ...	do	do
Stellarton	John Aikins....	Employé..	Coupling cars.....	Arm injured..	
Chaudière.....	Geo. Roberge...	do ...	Struck by train while walking on track.	Fatal.....	do
Near Berry Mills	D. Sweeny	do ...	Fell from top of car.....	Face and head injured.	
Dalhousie.....	W. A. Warman	do ...	Coupling cars	Hand injured.	
Moncton	Fred. Miller....	do ...	Head-light of engine exploded.	Face burned..	
St. Charles.....	A. Dumont.....	do ...	Coupling cars	Fatal.....	No inquest.
Rimouski.....	F. Dubé	do ...	Fell from top of cars.....	do	do
Metapedia.....	Duncan Gallon	do ...	Tank pipe fell on him....	Shoulder inj'd	
St. Francis.....	T. Blouin.....	Passenger.	Attempting to board train while in motion fell between cars.	Leg fractured.	

INTERCOLONIAL

RETURN of Accidents and Casualties which have occurred in

Date.	Time of Night or Day.	Number of Train.	Description of Train.	Name of Conductor.	Name of Driver.	No. of Engine.
1883.						
Feb. 22...	1.10 p.m.		Special	A. Bouchard.....	A. Shickle.....	134
March 3...	5.00 p.m.		do	W. Marchessault.....	L. Michaud.....	117
do 12...	5.00 p.m.		do	J. E. Evans.....	E. Rushton	103
do 18...	7.00 a.m.	15	Freight.....	F. A. Davison .....	.....	.....
do 19...	5.50 a.m.		Special	J. W. Henderson	N. McLean.....	74
do 20...	4.20 a.m.		do	A. Grant.	Jas. Sproull	124
do 27...	11.00 a.m.		do	M. Cummings.....	S. Wilson.....	44
do 24...	3.30 p.m.		do	J. McDonald	H. Lightbody.....	135
Mar. 25...	8.20 p.m.	35	Accommodation	A. Armstrong	W. Sinclair.....	141
do 31...	12.00 p.m.	35	do	Z. Lockhart	W. D. Martin	25
April 1...	7.00 a.m.		Special	Jas. Kean	John Ryan.....	19
do 1...	7.00 a.m.		do	do	do	19
do 26...	10.00 p.m.		Shunting .....	.....	H. Whitney	14
May 1...	11.00 a.m.	23	Freight.....	J. Berry	J. Gilfillan..	108
do 2...	2.30 p.m.		Shunting .....	.....	.....	.....
do 26...	10.00 a.m.		do .....	.....	P. Fogarty	34
do 27...	2.30 p.m.		Special	W. J. Ross	J. Robert.....	118
do 27...	9.30 p.m.		do	W. J. Campbell.....	J. J. Irvine	50
do 30...	1.00 a.m.		.....	.....	.....	.....
do 31...	9.05 p.m.	6	Freight	Geo. A. Chesley	S. Watson.....	43
June 8...	8.30 p.m.		Shunting.....	.....	B. Goodwin	94
do 12...	12.23 a.m.	39	Freight	M. Cummings	P. Ashe	146
do 10...	4.00 p.m.		Special.....	W. McCafferty.....	John Edwards.....	125

RAILWAY.

Canada, on the line of the Intercolonial Railway, &c.—Continued.

Place of Accident.	Name of Person Injured.	Whether Passenger or Employé.	Particulars of Accident.	Extent of Injury.	Verdict of Coroner's Jury.
St. Jean Port Joli	Wm. Gauvereau and 2 daughters, and boy named Tremblay.	Neither...	Struck by train while driving across track.	Slightly inj'd.	
St. Charles.....	A. Fournier....	Employé...	Coupling cars.....	Hand do	
Canaan.....	Alex. Irvine....	do	do	Crushed.....	
Moncton.....	James McDormond.	do	Lamp globe broke while he was cleaning it.	Cut his arm...	
Dalhousie.....	A. L. Keiver....	do	Coupling cars.....	Fing'rs crush'd	
Albion Siding...	H. Whidden....	do	do	Chest do	
Birch Ridge.....	T. Robins.....	do	Fell off train while in motion.	Ankle sprain'd	
De Bert.....	Wm. Pushie....	do	Coupling cars.....	Finger crush'd	
Jacquet River...	Thos. Barclay.	Neither...	Struck by train while walking on track.	Ankle broken, and otherwise injured.	
Berry's Mills.....	Z. Lockhart....	Employé...	While getting on train...	Wrenched his back.	
Near St. Flavie..	John Harney...	do	Collision between two special trains.	Fatal.....	Accidental.
do	John Ryan.....	do	do do	Scalded.....	
Moncton.....	H. Wright.....	do	Coupling cars.....	Hand crushed.	
Oxford.....	H. A. Black....	do	Closing door of box car.	Hand jammed.	
Moncton.....	W. McDermott.	do	Fell from box car.....	Shoulder and arm injured.	
do	Albert Welling	do	Coupling cars.....	Hip and back crushed.	
Campbell Siding	Thos. Lyons....	do	Fell from top of car.....	Side injured...	
Moncton.....	J. Stewart....	do	When stepping f'm engine	Sprained ankle	
do	W. W. Williams.	do	Fell over baggage truck.	Rib broken....	
do	— McAnnelly...	do	Fell from engine tender.	Head injured..	
Campbellton....	J. Chatterton..	do	Coupling cars.....	Wrist injured.	
Coal Branch.....	D. Sweeney....	do	do	Arm injured...	
Rocky Lake.....	Geo. McLeod...	do	do	Foot injured...	

INTERCOLONIAL

RETURN of Accidents and Casualties which have occurred in

Date.	Time of Night or Day.	Number of Train.	Description of Train.	Name of Conductor.	Name of Driver.	No. of Engine.
1884.						
June 16...	5.15 p.m.	26	Accommodation	J. Coffee	D. A. Cameron.....	137
do 17...	9.00 p.m.	.....	Special	C. B. Humphrey	J. Stratton.....	104
do 20...	10.20 a.m.	10	Night express	Wm. Kelly.....	R. Carr	63

RAILWAY.

Canada on the Line of the Intercolonial Railway, &c.—*Continued.*

Place of Accident.	Name of Person Injured.	Whether Passenger or Employé.	Particulars of Accident.	Extent of Injury.	Verdict of Coroner's Jury.
Moncton.....	Jno. Linkletter	Employé	Fell from gondola car	Wrist and face injured.	
do	Fred'k Robin..	do ...	Fell from between cars...	Leg injured....	
St. John.....	Jas. Williams..	Passenger	Fell from passenger car while train was in motion	Shoulder and side injured.	

 EASTERN EXTENSION RAILWAY.

OFFICE OF THE CHIEF SUPERINTENDENT,
 MONCTON, N.B., 7th November, 1884.

SIR,—I have the honor to submit the following report upon the working of the Eastern Extension Railway, from the 9th January, 1884, to the 30th June, 1884.

This railway extends from New Glasgow to Port Mulgrave, on the Strait of Canso, a distance of 80 miles. It was formerly called the Halifax and Cape Breton Railway, and more recently was known, for a short time, as the Nova Scotia Railway. It came under the control of the Dominion Government on the 9th January, 1884.

I enclose the report of the Chief Engineer of the Intercolonial Railway on the permanent way and works, and also the report of the Mechanical Superintendent of the Intercolonial Railway on the rolling stock, and the following statement prepared by Accountant and Auditor:—

- No. 1. Capital account.
- “ 2. Revenue account.
- “ 3. General balance.

The amount paid on account of the purchase of the road and equipment was \$1,284,311.97.

There was no expenditure on capital account during the period covered by this report, except that above stated.

The operating expenses were	\$32,854 53
The gross earnings were	30,767 66
	\$2,086 87
Showing a loss of	\$2,086 87

The road and rolling stock are in fair running order.

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

D. POTTINGER,
Chief Superintendent.

COLLINGWOOD SCHREIBER, Esq.,
 Chief Engineer and General Manager of Government Railways,
 Ottawa.

 INTERCOLONIAL RAILWAY.

CHIEF ENGINEER'S OFFICE,
 MONCTON, N.B., 25th October, 1884.

SIR,—I have the honor to submit the following report on the maintenance of the Eastern Extension Railway, for the year ending 30th of June, 1884.

This road extends from New Glasgow to the Strait of Canso, a distance of 80 miles.

It is comparatively a new road, having been completed and opened throughout for traffic in December, 1880.

The track is laid with steel rails 4½ inches high, and weighing 57 lbs. to the lineal yard, is well ballasted, and is in good running order. With the exception of

some slight repairs to the pile bridges at Pine Tree Gut, and at South River, Antigonish, no extra works have been done outside of the ordinary maintenance of permanent way, fences and buildings.

I am, Sir,

Your obedient servant,

P. S. ARCHIBALD,
Chief Engineer.

D. POTTINGER, Esq.,
Chief Superintendent, Moncton, N.B.

INTERCOLONIAL RAILWAY.

MECHANICAL SUPERINTENDENT'S OFFICE,
MONCTON, N. B., 14th November, 1884.

Dear Sir,—I beg to submit the following report on the Eastern Extension Railway, to June 30th, 1884.

In the month of January last, this road was taken over by the Intercolonial Railway, with the following rolling stock, viz., nine engines, six first-class, four second-class, and four postal, baggage and express cars, two conductors' vans, twenty-five box, five cattle, seventy platform, one hundred, and fifty hopper cars, and one snow plough.

During the following month I had an examination made of the rolling stock, and found that, to put in as good condition as the stock on the Intercolonial Railway, would require an expenditure of \$19,307.30, on the following.

Engines	\$8,710 00
First-class cars	3,314 00
Second-class cars	1,557 00
Conductors' vans	101 00
Baggage, postal and express	2,009 00
Box, cattle, hopper and flat cars	3,606 30
Snow plough	10 00
Total	\$19,307 30

Nothing has been done during the year towards improving the condition of the rolling stock, but it has been kept in as good condition as it was at the time it was taken over.

The water service is not in a very efficient condition; the tenders are now filled by the Haggas water elevator.

To erect and equip a sufficient number of water stations would require an expenditure of \$10,000.

I am, Sir,

Your obedient servant,

H. A. WHITNEY,
Mechanical Superintendent.

D. POTTINGER, Esq.,
Chief Superintendent Intercolonial Railway.

No. 2.—EASTERN EXTENSION.

REVENUE ACCOUNT, 9th January to 30th June, 1884.

DR.

CR.

Expenditure.	Amount.	Earnings.	Amount.
Motive power	\$ cts.		\$ cts.
Maintenance of way	1,965 98	Passenger traffic	15,738 72
do cars	9,765 56	Freight traffic	9,860 25
Traffic expenses	1,357 95	Mails and sundries	5,178 69
General expenses	6,657 32	Balance:—	
Ferry expenses	2,754 78	Loss on operating	2,086 87
	4,492 94		
	32,854 53		32,854 53

G. GRANT BULLEY,
Accountant and Auditor.

NEW GLASGOW, N.S., 30th June, 1884.

Dr.

No. 3.—EASTERN EXTENSION RAILWAY.

GENERAL BALANCE, 30th June, 1884.

	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Working expenses—				
Motive power.....	7,965 98		15,738 72	
Maintenance of way.....	6,765 56		9,850 25	
Maintenance of cars.....	1,337 95		5,178 69	
Traffic expenses.....	6,667 32			
General expenses.....	2,754 78			
Ferry expenses.....	4,463 94			
Capital account.....				30,767 66
Cash.....	1,284,311 97			1,284,268 87
Windsor and Annapolis Railway.....	2 01			1,549 95
Boston and Maine Railway.....	36 42			2,410 96
Nova Scotia Steamboat Co.....	1 26			289 86
Rimeuski Steamship.....	145 46			639 83
Stores.....	6,898 12			1,608 41
Rents.....	55 00			0 82
Western Union Telegraph Co.....	24 40			3 20
Bank of Montreal.....	2,615 57			1 96
Departmental accounts—				17 97
Militia.....	40 50			384 59
Post Office.....	1,448 40			58 89
Cooke & Co.....	1,488 90			42 06
D. Harrington & Co.....	1 80			224 07
Morrison & Co.....	31 50			45 00
E. Clay.....	106 00			
Robert Dewar.....	53 55			
N. Pusline.....	31 63			
	0 10			
Total	1,330,314 12			1,330,314 12

Cr.

EASTERN EXTENSION RAILWAY.

Return of Accidents and Casualties which have occurred in Canada, on the Line of the Eastern Extension Railway, during the Half-Year, ending 30th June, 1884.

(This Return is made up in compliance with the Provisions of the Railway Act of 1868.—31 Victoria, chap. 68, Sect. 43.)

Date.	Time of Day or Night.	No. of Train.	Description of Train.	Name of Conductor.	Name of Driver.	No. of Engine.	Place of Accident.	Name of Person Injured.	Whether Passenger or Employé.	Particulars of Accident.	Extent of Injury.	Verdict of Coroner's Jury.
1884.												
March 10.	7.10 p.m.	...	Special	Finlay Ross.	John Dunbar.	...	Near Port Mulgrave.....	W. Strachan	Neither....	Struck by train while walking on track....	Fatal	Accidental.
do 10.	do	...	do	do	do	...	Near Port Mulgrave.....	B. Strachan.	do	Struck by train while walking on track....	Leg broken.	

WINDSOR BRANCH RAILWAY.

OFFICE OF THE CHIEF SUPERINTENDENT,
MONCTON, N. B., 7th November, 1884.

SIR,—I have the honor to submit the following statements, which showing the results of the working of the Windsor Branch Railway, for the year ended 30th June, 1884:—

- No. 1.—Revenue Account.
No. 2.—Maintenance of way and works.
No. 3.—General balance.
No. 4.—Statement of earnings.

I also send you the report of the Chief Engineer on the condition of the permanent way and works.

This line, 32 miles in length, was operated during the year by the Windsor and Annapolis Railway Company, on the same terms as last year, the company being allowed to retain two-thirds of the gross earnings, the balance, one-third, being paid over to the Government, the latter maintaining the line.

The gross earnings for the year amounted to . . .	\$23,018 93
The expenditure for maintenance of way and works was	22,140 86
	<u>\$878 07</u>

The permanent way and all the works belonging to this railway have been maintained in good working order.

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

D. POTTINGER,
Chief Superintendent.

COLLINGWOOD SCHREIBER, Esq.,
Chief Engineer and General Manager of Government Railways,
Ottawa.

INTERCOLONIAL RAILWAY.

CHIEF ENGINEER'S OFFICE,
MONCTON, N.B., 25th October, 1884.

SIR,—I have the honour to submit the following report on the maintenance of the Windsor Branch, for the year ending 30th June, 1884.
The length of this branch is 32 miles.

TRACK.

Five thousand eight hundred and sixty lineal feet of old iron rails were taken up and replaced with steel rails, weighing 57 lbs. to the lineal yard.

A new freight siding was put in at Windsor Junction, and the through siding at Ellershous extended.

SLEEPERS.

During the year 13,096 sleepers were renewed.

FENCING.

Eight miles of old pole fence was renewed with barbed wire fence, the same as in use on the main line.

Twenty-one new farm gates were provided for the wire fences.

Extensive repairs were made to the old fencing over the whole line.

BUILDINGS AND PLATFORMS.

The engine house at Windsor was overhauled and repaired.

Necessary repairs were made to stations at Mount Uniacke, Ellershouse and Newport.

The platforms at 3-Mile Plains was re-covered.

BRIDGES, CULVERTS, &C.

The masonry of Sackville Bridge received necessary repairs, a stone culvert was rebuilt near Ellershouse.

New cattle guards were put in at Newport Station.

The wharf at Windsor was repaired and 100 tons of ballast put in breast-work.

The turn table at Windsor was repaired.

The track is in good running order.

I am, Sir,

Your obedient servant,

P. S. ARCHIBALD,
Chief Engineer.

B. POTTINGER, Esq.,
Chief Superintendent Intercolonial Railway,
Moncton, N.B.

No. 1.—WINDSOR BRANCH RAILWAY.

REVENUE ACCOUNT, Year ending 30th June, 1884.

Previous Year.	Expenditure.	Year ending 30th June, 1884.	Previous Year.	Receipts and Earnings.	Amount Year ending 30th June, 1884.
\$ cts.		\$ cts.	\$ cts.		\$ cts.
23,103 93	Maintenance, Way and Works.....	22,140 86	8,019 81	Passenger Traffic.....	8,126 23
	(Abstract No. 1.)		15,134 41	Freight Traffic.....	13,932 84
			989 67	Mails.....	959 87
	Balance.....	878 07			
1,009 96		23,018 93	24,113 89		23,018 93
24,113 89					

R. B. BOGGS,
Acct. W. B. Ry.

MONCTON, N.B., 30th June, 1884.

No. 2.—WINDSOR BRANCH RAILWAY.
(ABSTRACT No. 1)—MAINTENANCE, Way and Works.

Previous Year.	Particulars.	Amount.
\$ cts.		\$ cts.
5,879 63	Repairs of track.....	5,217 62
3,095 63	Rails and Fastenings.....	3,210 05
4,217 31	Sleepers.....	6,844 22
23 52	Switch locks.....	13 80
2,393 91	Bridges.....	276 16
18 52	Signals.....	108 93
122 57	Culverts and Cattle Guards.....	301 66
2,361 70	Bridgings and Platforms.....	389 78
1,332 96	Fences.....	3,803 40
94 83	Handbars and trollies.....	29 14
414 12	Removing snow and ice.....	435 74
385 74	Tools and repairs.....	253 12
9 40	Wharf at Windsor.....	
1,268 44	Accountants' Office expenses.....	1,257 16
1,595 65	Miscellaneous.....	
23,103 93		22,140 86

MONCTON, N.B., 30th June, 1884.

R. B. BOGGS,
Accountant, Windsor Branch Railway.

No. 3.—WINDSOR BRANCH RAILWAY.
MONTHLY STATEMENT of Receipts—One-third Earnings.

Month.	Passengers.	Freight.	Mails.	Totals.
1883.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
July.....	1,066 58	1,017 61	79 73	2,163 92
August.....	1,190 02	1,125 41	79 74	2,395 17
September.....	918 52	1,208 49	79 73	2,206 74
October.....	642 45	1,619 97	80 76	2,342 18
November.....	556 88	1,546 42	80 76	2,184 06
December.....	594 89	1,225 17	80 75	1,900 81
1884.				
January.....	405 01	837 01	79 74	1,321 76
February.....	395 54	789 43	79 73	1,264 70
March.....	413 79	1,049 39	79 73	1,542 91
April.....	528 06	1,185 56	79 73	1,793 35
May.....	631 59	1,352 31	79 74	2,063 64
June.....	782 89	976 07	79 73	1,838 69
	8,126 22	13,632 84	959 87	23,718 93

MONCTON, N.B., 30th June, 1884.

R. B. BOGGS,
Accountant, Windsor Branch Railway.

PRINCE EDWARD ISLAND RAILWAY.

SUPERINTENDENT'S OFFICE,
CHARLOTTETOWN, 1st October, 1884.

SIR,—I have the honor to submit the following report of the operation of the Prince Edward Island Railway for the year ending 30th June, 1884, and to transmit herewith the accounts for the same period, comprising :—

No. 1.	Capital accounts.	
" 2.	Revenue accounts.	
" 3.	Locomotive power.	(Abstract No. 1.)
" 4.	Car expenses.	(" " 2.)
" 5.	Maintenance of way and works	(" " 3.)
" 6.	Station expenses.	(" " 4.)
" 7.	General charges.	(" " 5.)
" 8.	Monthly statement of earnings.	
" 9.	Statement of general stores account.	
" 10.	General balance.	
" 11.	Comparative statement of averages.	

I also enclose the report, accompanied by statements, of the Mechanical Superintendent and Storekeeper.

CAPITAL ACCOUNT.

The total expenditure on capital account to 30th June, 1883, was.	\$3,523,692 62
Add to which, the expenditure on rolling	\$ 9,917 44
Cape Traverse Branch	120,745 94
	130,663 38
Making the total expenditure to 30th June, 1884	\$3,654,356 00

The rolling stock provided on capital account up to the 30th June, 1883, was :—

20	engines.
14	first-class passenger cars.
12	second-class " "
2	postal and smoking " "
175	box and stock " "
125	platform " "
3	conductors' vans.
7	snow ploughs.
6	flangers.
1	pay car.

And during the year ended 30th June last, this stock has been increased by :—

2	first-class passenger cars.
2	second-class and baggage cars.
1	postal and smoking " "

The two first-class and three second-class passenger cars referred to in my last report, were completed this year and have been in service.

REVENUE ACCOUNT.

You will notice a slight decrease in the receipts, as compared with last year. I account for this, in part, from the fact that the "Northern Light," owing to the heavy ice and continual easterly winds, was, for a long time, unable to make the

usual average number of trips In consequence, freight, passengers and mails, which would have been carried by railway between Charlottetown and Georgetown during the winter and early spring, were afterwards sent by other routes.

A loss was also caused on account of navigation between Summerside and Point du Chêne not opening until all the small harbors were clear of ice, thus enabling traffic, which the road would have had, to go by other conveyances.

The gross earnings for the year amounted to	\$144,504 12
Previous year	146,170 42
Decrease	<u>\$ 1,666 30</u>

The earnings per mile of railway compare with the previous year, as follows:—

1882-83	\$736 37
1883-84	727 98
A decrease per mile of	<u>\$ 8 39</u>

The length of road operated in each year was the same, viz. : 198½ miles.

STATEMENT.

	Passengers carried.	Earnings.
1882-83	117,162	\$63,319 55
1883-84	118,988	62,926 26
Increase	<u>1,826</u>	Decrease <u>\$ 393 29</u>

	Tons of Freight carried.	Earnings.
1882-83	51,920	\$71,038 55
1883-84	51,841	70,701 74
Decrease	<u>79</u>	<u>\$ 336 81</u>

The engine mileage compared with last year, was:—

1882-83	313,760
1883-84	291,760
Decrease	<u>22,000</u>

The train mileage compared with last year was:—

1882-83	248,819
1883-84	238,130
Decrease	<u>10,689</u>

The car mileage compared with last year, was:—

1882-83	1,237,103
1883-84	1,208,423
Decrease	<u>28,680</u>

It will be observed that while almost as many tons of freight were moved as in the previous year, and a great many more passengers carried, the engine, train and car mileage show large decreases.

EXPENDITURE.

The operating expenses as compared with the previous year, are as follows:—

	Ordinary.	Renewals, Rolling Stock, Rails and Fastenings.	Total.
1882-3	\$252,747 19	\$ 61 22	\$252,808 41
1883-4	216,856 67	19,571 46	236,428 13
Increase		\$19,510 24	
Decrease	\$35,890 52		\$16,380 28

Included in the above expended on new work are the following items:—

Station Master's dwelling, Alberton	\$ 775 20
Extension at Wellington	350 79
“ at Charlottetown freight house	702 36
Also for payments during the year in connection with an accident which occurred in August, 1880	16,073 45
Total	<u>\$17,901 80</u>

TRACK.

During the year, 61,856 sleepers have been put in track, and new sidings have been laid at:—

	Feet.
Starch Factory, Hunter River	203
Summerside wharf	981
	<u>1,184</u>
And sidings at the following places were extended:—	
Clyde	300
Morell	100
	<u>400</u>
Total	<u>1,584</u>

There are now on the line 150 sidings of an aggregate length of over 14½ miles; 6,800 cubic yards of ballast were distributed where most needed on the Eastern, and 9,450 cubic yards of stone ballast on the Western Division. The latter is expensive to procure and pack under sleepers, but it is the only description of good ballast available on the Western Division.

Seven and one-half miles of track were re-laid with steel rails between Elliott's and Freetown, on the Western Division.

Many other repairs and renewals were made to the permanent way.

BRIDGES, CATTLE GUARDS, &c.

The bridges received the necessary repairs, and new tops were put on those at Blueshank and Mill River.

Three new cattle guards were built, forty-six were renewed, and the remainder repaired.

A large new culvert was put in at Alberton. Two new culverts were put in at other points, sixteen received new stringers, and seven were thoroughly repaired and pointed with cement.

BUILDINGS AND PLATFORMS.

The freight house at Wellington was extended 25 feet, main building lowered and repaired, and in addition to a long new platform in front, one was placed around station and freight house.

The freight house on Summerside Wharf, and those at Hunter River and Georgetown, received repairs.

Charlottetown freight house was widened 11 feet, making an increase in width of one-third; 12,000 cedar shingles were used to repair the old roof of this building.

County Line, Bradalbane and Morrell stations were repaired.

The coal shed at Summerside received extensive repairs.

Many flag stations were repaired and color-washed.

A new flag station and platform was built at PUISVILLE.

New platforms were also placed at Clyde, Brackley Point, Union, Dundee, Lot 40, and Baldwin's; 280 cubic yards of ballast were used in grading around Baldwin's.

The loading ground at St. Peter's Station was extended by building a breast-work, and filling in 500 cubic yards of earth. At Hunter River a retaining wall 280 feet long was built for a loading ground, which has been properly graded.

The pits in Charlottetown round house had sides pointed and bottoms rebuilt with cement.

The roof of store house, Charlottetown, and offices in connection therewith, was repaired and re-shingled.

A new hand-car house was erected at Selkirk.

All other buildings and works on line received the necessary light repairs.

WHARVES, &C.

Extensive repairs were made to the wharves at Summerside, Charlottetown and Georgetown, and about 315 tons of stone ballast, together with a large quantity of brush, were used to repair washouts at these wharves.

Souris wharf received slight repairs. The roadway on Charlottetown wharf was planked a distance of 300 feet by 14 feet wide.

The breast-work east of Charlottetown station was washed out, requiring in its repair 250 tons of good stone ballast and a large quantity of brush.

FENCING.

Thirty-six thousand and sixty-six feet of snow fence, and about 30 miles of common board and pole fence were rebuilt. The greater part of above had been burned or blown down.

Six hundred feet of new snow fence were put up. A post and rail fence 275 feet long was erected in Summerside yard.

In addition to above, the necessary repairs have been made on the fencing generally.

WATER SUPPLY.

The "Haggas" water system is still in use and is giving good satisfaction.

ROLLING STOCK.

One new engine was purchased during the year from the Canadian Locomotive and Engine Company, of Kingston, and charged to working expenses. It replaces one which was condemned and struck off the list. The Mechanical Superintendent reports it in every respect a first-class engine.

Twenty 10-ton box cars, ten 10-ton platform cars and one snow-plough, have been rebuilt in the workshops of the railway at Charlottetown. I have reason to believe that the work will compare favorably with any done in Canada.

The rolling stock has received the necessary repairs, and has been maintained in an efficient condition. In the ensuing year, however, forty-eight box cars and ten platform cars will require to be rebuilt.

STORES.

The purchase of stores during the year amounted to \$87,589.46, which includes \$16,098.72 for new steel rails and fastenings.

The value of stores on hand 30th June, 1884, was:—

General stores	\$50,904 33
Coal	3 797 54
Rails and fastenings	31,374 38
	<hr/>
	\$86,076 25
	<hr/>

The stores have, for the most part, been purchased by tender and contracts, which follows out the practice of past years.

I submit herewith a comparative statement for 1882-83 and 1883-84, of the quantities of the various classes of freight carried and of the earnings from this source.

It gives me pleasure to state that the several officers and employés have performed their duties in a satisfactory and efficient manner.

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

JAMES COLEMAN,
Superintendent.

COLLINGWOOD SCHREIBER, Esq.,
Chief Engineer and General Manager Government Railways,
Ottawa.

PRINCE EDWARD ISLAND RAILWAY.

MECHANICAL SUPERINTENDENT'S OFFICE,
CHARLOTTETOWN, 30th September, 1884.

SIR,—I beg to submit the following statements showing the operations of the Mechanical Department of this railway for the fiscal year ending 30th June, 1884.

- A.—Monthly statement of cost of locomotive power.
- B.—Statement of the performance and consumption of locomotives.
- C.—Monthly statement of car mileage.
- D.—Statement showing the number of locomotives, cars and snow ploughs.
- E.—Comparative statement of the expense of the Mechanical Department for the years 1882-83 and 1883-84.

To maintain the stock there was purchased, during the year, and charged to working expenses, one new locomotive, at a cost of \$8,750. This locomotive was purchased to replace an old one condemned and struck off the list. It was manufactured by the Canadian Locomotive and Engine Company, of Kingston, Ont., and is in every respect a first class engine.

The two first and three second-class passenger cars, referred to in my last report (now in use for about a year), have given entire satisfaction.

During the year we have rebuilt twenty 10-ton box cars and ten 10-ton flat cars, to replace a similar number of old 8-ton cars. These cars have been rebuilt at a cost of \$8,039.18, which sum is embraced in the working expenses.

The cars rebuilt to maintain the stock are much stronger and of greater capacity than the original stock, and, in consequence, I am satisfied, will be much more serviceable and less costly to maintain.

By reference to statement D, it will be seen that the stock of locomotives, cars and snow ploughs, provided on Capital Account, consists of:—

- 20 locomotives.
- 16 first-class passenger cars.
- 14 second-class passenger and baggage cars.
- 3 postal and smoking cars.
- 175 box cars.
- 125 platform cars.
- 3 conductors' vans.
- 1 pay car.
- 7 snow-ploughs.
- 6 flangers.

I am pleased to be able to report that the efficiency of the rolling stock has been well maintained and is in good condition.

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

J. UNSWORTH,
Mechanical Superintendent and Storekeeper.

JAMES COLEMAN, Esq.,
Superintendent Prince Edward Island Railway,
Charlottetown.

PRINCE EDWARD ISLAND RAILWAY.
MECHANICAL DEPARTMENT.

A.—STATEMENT of the Cost of Locomotive Power for the Year ended 30th June, 1884.

Months.	Miles run by Engines, less Ballasting.		Cost of							Average Cost per Mile run.				
	Enginemen's Wages.	Fuel.	Oil, Tallow, and Small Groceries.	Repairs.	Water, including Tank and Pump Repairs.	Miscellaneous, including Office Expenses and Houses.	Total.	Enginemen.	Fuel.	Oil, Tallow, &c.	Repairs.	Water.	Miscellaneous.	Total.
	\$	cts.	\$	cts.	\$	cts.	\$	cts.	\$	cts.	\$	cts.	\$	cts.
1883—July	30,136	1,309 40	1,539 72	244 87	2,636 16	5 23	297 30	4 34	5 11	0 81	8 74	0 02	0 99	20 01
August	26,839	1,264 11	1,588 16	277 95	2,039 37	14 64	5,315 41	4 38	5 51	0 97	7 07	0 05	0 45	18 43
September	28,665	1,172 28	1,487 18	226 88	2,643 47	66 25	308 44	4 09	5 19	0 79	9 22	0 23	1 07	20 59
October	30,771	1,203 97	1,683 64	231 09	2,609 12	9 16	233 34	3 91	5 47	0 75	8 43	0 03	0 76	19 40
November	29,222	1,170 68	1,817 80	231 84	3,015 66	31 09	306 35	4 00	5 47	0 79	10 32	0 11	1 05	22 49
December	21,292	1,045 09	1,323 56	195 75	2,779 48	31 75	389 26	4 91	6 21	0 92	13 05	0 15	1 83	27 07
1884—January	17,639	1,145 12	1,114 86	148 71	2,669 16	32 83	5,512 86	6 49	6 32	0 84	15 13	0 18	2 59	31 25
February	16,345	987 55	1,001 56	133 52	2,321 07	29 29	4,848 28	5 92	6 13	0 81	14 20	0 18	2 42	29 66
March	21,064	1,152 32	1,457 68	183 84	2,418 33	76 37	326 11	5 47	6 92	0 87	11 48	0 36	1 55	26 65
April	17,210	885 11	888 24	136 59	2,362 44	3 83	258 91	5 14	5 16	0 80	13 73	0 02	1 50	26 35
May	22,501	981 70	1,121 36	174 54	1,939 19	20 06	239 81	4 36	4 98	0 78	8 62	0 09	1 06	19 89
June	28,076	1,107 38	1,378 93	192 73	1,912 77	19 59	243 00	3 94	4 91	0 69	6 81	0 07	0 98	17 28
Totals	291,760	13,404 71	16,402 69	2,378 01	29,346 22	340 07	3,531 17	4 59	5 62	0 82	10 06	0 11	1 21	22 41

J. UNSWORTH,
Mechanical Superintendent and Storekeeper.

PRINCE EDWARD

MECHANICAL

B.—STATEMENT of the Performance and Consumption

Months.	Hours in Steam.	Train Mileage.				Miles run by Engines.			
		Passenger.	Freight and Mixed.	Ballasting.	Piloting.	With Train.	Light.	Shunting.	Total.
1883—July	3,787	11,438	13,144	2,842	.....	27,424	108	5,706	33,238
August	4,275	12,156	13,865	3,788	.....	29,809	157	3,745	33,711
September.....	3,567	10,978	12,632	1,527	.....	25,137	90	5,075	30,302
October	3,628	10,274	14,084	482	.....	24,840	28	6,406	31,274
November	3,503	10,452	13,490	170	.....	24,112	26	5,280	29,412
December	2,773	4,250	12,958	.....	82	17,290	30	3,972	21,292
1884—January.....	2,960	664	13,548	.....	117	14,329	30	3,280	17,639
February	2,666	156	12,832	.....	838	13,826	26	2,961	16,813
March	3,224	67	13,279	.....	4,400	17,746	52	3,266	21,064
April.....	2,573	228	13,096	321	13	13,658	190	3,683	17,531
May.....	3,038	1,629	15,378	341	.....	17,338	36	5,458	22,842
June	3,276	9,382	13,168	546	.....	23,096	25	5,501	28,622
Totals.....	39,270	71,674	161,474	10,017	5,450	248,615	792	54,333	303,740

ISLAND RAILWAY.

DEPARTMENT.

of Locomotives, for the Year ended 30th June, 1884.

Total Mileage.		* Average of Cars per mile run with Train.	Average Mileage.		Consumption.				Consumption for 100 Miles run by Engines.			
Cars.	Snow Ploughs.		Miles to one hour in Steam	Of Cars to one of Engine.	Bushels of Coal	Pints of Oil.	Pounds of Tailow.	Pounds of Waste.	Bushels of Coal	Pints of Oil.	Pounds of Tailow.	Pounds of Waste.
144,001	.....	5.25	8.78	4.33	12,341	1,339	907	482	37.12	4.02	2.72	1.45
160,550	.....	5.38	7.89	4.76	12,320	1,611	1,144	530	36.54	4.77	3.39	1.57
135,648	.....	5.39	8.49	4.47	13,125	1,144	927	427	43.31	3.77	3.05	1.40
122,834	.....	4.94	8.62	3.93	13,198	1,432	900	448	42.20	4.57	2.87	1.43
125,626	391	5.21	8.39	4.27	13,212	1,022	935	452	44.93	3.47	3.17	1.53
78,544	3,119	4.56	7.67	3.69	9,537	1,128	650	354	44.79	5.31	3.05	1.66
64,176	5,171	4.51	5.96	3.64	7,929	954	480	289	44.95	5.40	2.72	1.64
62,665	4,397	4.82	6.30	3.72	7,416	852	499	248	44.10	5.06	2.96	1.47
66,616	9,535	4.99	6.53	3.16	10,462	1,000	745	291	49.66	4.74	3.53	1.38
72,660	192	5.32	6.81	4.14	6,954	756	553	288	39.66	4.31	3.15	1.64
122,681	186	7.07	7.52	5.37	10,531	1,012	737	405	46.10	4.82	3.22	1.77
118,953	.....	5.15	8.74	4.12	11,319	1,027	810	392	39.54	3.58	2.83	1.36
1,274,954	22,990	5.25	7.73	4.19	128,344	13,277	9,287	4,606	42.25	4.37	3.05	1.51

*Deduct piloting from train mileage in making these averages.

J. UNSWORTH,
Mechanical Superintendent and Storekeeper.

PRINCE EDWARD ISLAND RAILWAY.

MECHANICAL DEPARTMENT.

C.—MONTHLY STATEMENT of Car Mileage for the Year ended 30th June, 1884.

Months.	1st Class.	2nd Class.	Postal, Baggage and Express.	Box, Stock and Hay.	Platform.	Total.
1883—July	28,521	29,005	8,373	44,095	34,007	144,001
August	40,595	48,072	10,305	31,489	30,089	160,550
September	26,129	28,198	8,080	44,215	29,026	135,648
October	28,507	29,012	9,022	39,063	17,240	122,834
November	23,633	27,377	8,269	55,445	10,902	125,628
December	17,159	17,240	6,944	31,719	5,482	78,544
1884—January	14,682	13,116	6,126	19,905	10,347	64,176
February	12,788	10,757	4,929	17,029	17,162	62,665
March	13,488	11,292	5,255	18,979	17,602	66,616
April	13,880	11,299	8,536	25,008	13,937	72,660
May	15,463	14,537	10,679	62,964	19,038	122,681
June	23,723	22,602	9,212	44,577	18,839	118,953
Totals	258,568	262,507	95,730	434,478	223,671	1,274,954
Less Ballasting .....	.....	8,435	226	2,748	55,122	66,531
Balance	258,568	254,072	95,504	431,730	168,549	1,208,423

J. UNSWORTH,

Mechanical Superintendent and Storekeeper.

PRINCE EDWARD ISLAND RAILWAY.

MECHANICAL DEPARTMENT.

D.—STATEMENT showing the Number of Locomotives and the various classes of Cars and Snow Ploughs on hand, 30th June, 1883 and 1884.

Particulars.	Locomotives.	Classification of Cars.										
		1st Class.	2nd Class and Baggage.	Postal and Smoking.	Box and Stock.	Platform.	Vans.	Pay Car.	Total.	Snow Ploughs.	Flangers.	Total.
On hand 30th June, 1883, serviceable.....	19	14	12	2	162	112	3	1	308	7	6	13
do do condemned	1	.....	.....	.....	13	13	.....	.....	26	.....	.....	.....
Total Stock, 30th June, 1883	20	14	12	2	175	125	3	1	332	7	6	13
Purchased and charged to Working Expenses ...	*1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Built at Charlottetown Railway Works and charged to Capital .....	.....	2	2	1	.....	.....	.....	.....	5	.....	.....	.....
Total Stock, 30th June, 1884	20	16	14	3	175	125	3	1	337	7	6	13
Condemned on hand 1st July, 1883	1	.....	.....	.....	13	13	.....	.....	26	.....	.....	.....
do during the year.....	.....	.....	.....	.....	48	3	.....	.....	51	1	.....	1
Less purchased	1	.....	.....	.....	61	16	.....	.....	77	1	.....	1
do rebuilt .....	.....	.....	.....	.....	20	10	.....	.....	30	1	.....	1
.....	.....	.....	.....	.....	41	6	.....	.....	47	.....	.....	.....
Add serviceable and repairing.....	20	16	14	3	134	119	3	1	290	7	6	13
Total on record.....	20	16	14	3	175	125	3	1	337	7	6	13

* The Locomotive purchased and charged to working expenses replaces the one which was condemned.

J. UNSWORTH,

Mechanical Superintendent and Storekeeper.

PRINCE EDWARD ISLAND RAILWAY.

MECHANICAL DEPARTMENT.

E.—COMPARATIVE STATEMENT of the Expenses of the Mechanical Department, for the Year ended 30th June, 1884.

	1883.	1884.
The miles run by trains were	248,819	238,130
do engines were.....	313,760	291,760
do cars were	1,237,103	1,208,423
do snow-ploughs were.....	27,711	22,990
	\$ cts.	\$ cts.
The cost of locomotive power was	86,509 95	65,402 87
do repairs to cars was	17,432 82	22,438 49
do labor, oil and waste, for packing, was	794 13	669 17
do repairs to passenger cars was	12,047 33	7,237 29
do do postal, express and baggage cars was	755 53	2,163 11
do do freight cars and vans was	4,629 96	13,036 09
The cost of locomotive power per 100 miles run by trains was	34 76	27 46
do do do engines was	27 57	22 41
do do do cars was	6 99	5 41
The cost of repairs to cars per 100 miles run by trains was	7 00	9 42
do do do engines was.....	5 55	7 69
do do do cars was.....	1 40	1 85
The cost of labor, oil and waste for packing per 100 miles run by trains was...	0 31	0 28
do do do engines was	0 25	0 22
do do do cars was.....	0 06	0 05
Repairs to passenger cars per 100 miles run by trains were	4 84	3 04
do postal, express and baggage cars were	0 30	0 90
do freight cars and vans were	1 86	5 47

J. UNSWORTH,
Mechanical Superintendent and Storekeeper.

No. 1.—PRINCE EDWARD ISLAND RAILWAY.

Dr.

CAPITAL ACCOUNT.

Cr.

		1883.		1884.	
1882.					
June 30...	To cost of Road and Equipment to date.....		\$	3,523,692 62	\$
					3,523,692 62
1884.					
June 30...	To Expenditure, year ended 30th June, 1884:—				
	On Rolling Stock.....			\$	9,917 44
	On Cape Traverse Branch			120,745 94	
				130,663 38	
				3,654,356 00	
					3,654,356 00
		1883.		1884.	
		June 30...	By Dominion of Canada	June 30...	By Dominion of Canada
					130,663 38

W. T. HUGGAN,
Accountant and Auditor.

CHARLOTTETOWN, P.E.I., 30th June, 1884.

No. 2. —PRINCE EDWARD ISLAND RAILWAY.
REVENUE ACCOUNT for Year ended 30th June, 1884.

Previous Year.	Expenditure.	Year ended 30th June, 1884.	Previous Year.	Receipts.	Year ended 30th June, 1884.
\$ cts.		\$ cts.	\$ cts.		\$ cts.
86,509 95	Locomotive Power per Abstract No. 1...	65,402 87	63,319 55	Passenger Traffic.....	62,926 26
31,084 97	do do 2...	36,718 15	71,038 55	Freight do.....	70,701 74
87,862 92	Maintenance Way and Works do 3...	81,954 16	11,812 32	Mails and Sundries.....	10,876 12
23,899 79	Station Expenses do 4...	24,452 59		Total Receipts.....	144,504 12
22,950 78	General Charges do 5...	27,900 36	146,170 42	Balance.....	91,924 01
	.....Totals.....	236,428 13	106,637 99	.....Totals.....	236,428 13
252,808 41			252,808 41		

W. T. HUGGAN,
Accountant and Auditor.

CHARLOTTETOWN, P.E.I., 30th June, 1884

No. 3.—PRINCE EDWARD ISLAND RAILWAY.

LOCOMOTIVE POWER. (Abstract No. 1.)

Previous Year.	Details.	Year ended 30th June, 1884.
\$ cts.		\$ cts.
1,364 09	Mechanical Superintendent's salary, Clerks, office and travelling expenses	1,281 31
14,789 57	Wages of Drivers, Firemen and Cleaners.....	13,404 71
17,650 59	Fuel.....	16,402 69
1,713 22	Oil, Tallow, Waste and Small Stores.....	2,378 01
47,248 17	Repairs to Engines, Tenders and Engine Tools.....	29,346 22
1,332 57	Water, including Pumps and Tank repairs.	340 07
2,411 74	Miscellaneous.....	2,249 86
86,509 95	Totals.....	65,402 87

W. T. HUGGAN,
Accountant and Auditor.

CHARLOTTETOWN, P.E.I., 30th June, 1884.

No. 4.—PRINCE EDWARD ISLAND RAILWAY.

CAR EXPENSES. (Abstract No. 2.)

Previous Year.	Details.	Year ended 30th June, 1884.
\$ cts.		\$ cts.
12,047 33	Repairs to Passenger Cars.....	7,239 29
753 53	do Postal and Baggage Cars.....	2,163 11
4,629 96	do Freight cars and Vans.....	13,036 09
11,327 56	Wages of Conductors, Train and Baggage Masters, and Brakemen.....	11,057 06
794 13	Oil and Waste for packing.....	669 17
1,984 87	Small Stores and Fuel.....	2,049 35
145 59	Miscellaneous.....	504 08
31,584 97	Totals.....	36,718 15

W. T. HUGGAN,
Accountant and Auditor.

CHARLOTTETOWN, P.E.I., 30th June, 1884.

No. 5.—PRINCE EDWARD ISLAND RAILWAY.

MAINTENANCE OF WAY AND WORKS.—(Abstract No. 3.)

Previous Year.	Details.	Year ended 30th June, 1884.
\$ cts.		\$ cts.
316 64	Engineer's salary, Clerks, Office and Travelling Expenses.....	369 96
39,661 14	Wages in repairing Roadway, Fences and Semaphores.....	40,154 87
5,480 55	Rails, Chairs and Spikes.....	14,720 13
21,644 30	Sleepers.....	13,457 85
7,786 17	Timber and lumber for repairs to Bridges, Cattle-guards, Fences, &c.....	2,172 40
1 470 41	Repairs to Wharves.....	1,415 80
7,126 86	do Buildings.....	4,846 52
2,953 01	do Snow ploughs, Flangers and Tools.....	3,158 64
1,423 84	Clearing Ice and Snow.....	1,657 99
87,862 92	..... Totals	81,954 16

W. T. HUGGAN,
Accountant and Auditor.

CHARLOTTETOWN, P.E.I., 30th June, 1884.

No. 6.—PRINCE EDWARD ISLAND RAILWAY.

STATION EXPENSES.—(Abstract No. 4.)

Previous Year.	Details.	Year ended 30th June, 1884.
\$ cts.		\$ cts.
18,117 37	Salaries and wages of Station Masters, Agents, Clerks, Telegraph Operators, Station Baggage-men, Yardmasters, Switchmen, Watchmen and Laborers.....	18,022 45
5,782 42	Fuel, Oil, Light, Stationery, Tickets and other Incidental Expenses.....	6,430 14
.....	Miscellaneous .....	.....
23,899 79	..... Totals	24,452 59

W. T. HUGGAN,
Accountant and Auditor.

CHARLOTTETOWN, P.E.I., 30th June, 1884.

No. 7.—PRINCE EDWARD ISLAND RAILWAY.

GENERAL CHARGES—(Abstract No. 5).

Previous Year.	Details.	Year ended 30th June, 1884.
\$ cts.		\$ cts.
5,642 10	Superintendent's and Train Despatcher's salaries, Clerks, Office and travelling expenses	5,303 87
5,529 14	Accountant and Auditor's, Paymaster's and Cashier's salaries, Clerks, Office and travelling expenses	5,267 94
395 58	Advertising	480 70
10,394 94	Damages to men, animals and goods	16,262 52
615 57	Telegraph expenses (not including pay to operators)	342 46
373 45	Miscellaneous	242 87
22,950 78	Totals	27,900 36

W. T. HUGGAN,
Accountant and Auditor.

CHARLOTTETOWN, P.E.I., 30th June, 1884

No. 8.—PRINCE EDWARD ISLAND RAILWAY.

MONTHLY STATEMENT OF RECEIPTS.

Months.	Passenger Traffic.	Freight Traffic.	Mails and Sundries.	Totals.
1883.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
July	7,859 26	5,347 68	713 00	13,919 94
August	7,329 28	6,395 84	708 00	14,433 12
September	6,652 42	6,687 55	709 00	14,048 97
October	7,515 78	8,304 44	707 00	16,527 22
November	5,961 22	9,666 32	716 50	16,347 04
December	4,202 01	4,264 04	1,583 00	10,049 05
1884.				
January	2,942 17	2,642 88	1,351 00	6,936 05
February	2,291 29	2,768 85	718 00	5,778 14
March	3,061 68	3,122 20	720 50	6,904 38
April	4,553 20	3,729 41	803 12	9,085 73
May	5,047 43	10,213 14	1,445 00	16,705 57
June	5,507 52	7,559 39	702 00	13,768 91
Totals	62,926 26	70,701 74	10,876 12	144,504 12

W. T. HUGGAN,
Accountant and Auditor.

CHARLOTTETOWN, P.E.I., 30th June, 1884.

No. 9—PRINCE EDWARD ISLAND RAILWAY.

STATEMENT of General Stores Account, Year ended 30th June, 1884.

1883.		Dr.	\$ cts.	\$ cts.
June 30...	To Balance brought forward			72,104 89
1884.				
June 30...	To Purchases during the year, including rails.....		87,589 48	
	Charges from other Departments		11,297 45	
	Pay rolls		3,404 56	
				102,291 47
1884.		Cr.		
June 30...	By Issues during the year.....			88,320 11
	Balance. { Ordinary Stores	\$50,904 33		
	{ Fuel	3,797 54		
	{ Rails and Fastenings on hand..	31,374 38		
				86,076 25

W. T. HUGGAN,
Accountant and Auditor.

CHARLOTTETOWN, P.E.I., 30th June, 1884.

No. 10.—PRINCE EDWARD ISLAND RAILWAY.

Dr. GENERAL BALANCE. Cr.

	\$ cts.		\$ cts.
General Stores.....	86,076 25	Dominion Account	89,536 51
Cash	1,566 64	Accident Insurance.....	3,892 81
Stations	1,187 77		
Militia Department.....	105 24		
Post Office Department.....	4,362 00		
Intercolonial Railway.....	29 99		
Suspense Account	101 43		
Total.....	93,429 32	Total	93,429 32

W. T. HUGGAN,
Accountant and Auditor.

CHARLOTTETOWN, P.E.I., 30th June, 1884.

No. 11.—PRINCE EDWARD ISLAND RAILWAY.

COMPARATIVE STATEMENT of Averages for Year ended 30th June, 1884.

Details.	1884.	1883.
Mileage of railway open.....	198½	198½
Engine mileage.....	291,760	313,760
Train do.....	238,130	248,819
Car do.....	1,208,423	1,237,103
Receipts per engine mile..... Cents	49·52	46·59
do mile of railway..... \$	727·98	736·37
Percentage of passenger earnings to gross receipts.....	43·55	43·32
do freight do do.....	48·92	48·60
do other do do.....	7·53	8·08
Expenses per engine mile:—		
Drivers', Firemen's and Cleaners' wages.....	4·59	4·71
Fuel.....	5·62	5·63
Oil, Tallow, Waste and Small Stores.....	·82	·54
Repairs to engines.....	10·06	15·06
Water and tank repairs.....	·12	·42
Miscellaneous.....	·77	·77
	21·98	27·13
Mechanical Superintendent's salary, Office and Travelling expenses.....	·44	·44
Total..... Cents	22·42	27·57
Locomotive power per engine mile.....	22·42	27·57
Car expenses do.....	12·58	10·07
Maintenance way and works do.....	28·08	28·00
Station expenses do.....	8·38	7·62
General charges do.....	9·57	7·31
Total per engine mile..... Cents.	81·03	80·57
Locomotive power per train mile.....	27·46	34·78
Car expenses do.....	15·42	12·69
Maintenance way and works do.....	34·41	35·31
Station expenses do.....	10·27	9·60
General charges.....	11·72	9·22
Total per train mile..... Cents.	99·28	101·60
Working expenses per mile of railway..... \$	1,191 07	1,273 60

W. T. HUGGAN,
Accountant and Auditor.

CHARLOTTETOWN, P.E.I., 30th June, 1884.

PRINCE EDWARD ISLAND RAILWAY.

DESCRIPTIVE STATEMENT of Freight Earnings, for the Year ended 30th June, 1884.

Description of Freight.	Quantities.		Tons.		Amount.	
	1883.	1884.	1883.	1884.	1883.	1884.
					\$ cts.	\$ cts.
Oats..... Bush.	350,684	507,291	5,961	8,624	7,078 36	12,103 24
Wheat and other Grain..... "	10,699	6,134	321	180	545 61	317 17
Potatoes and Roots..... "	170,587	52,164	5,115	1,565	6,657 66	1,736 20
Flour..... Bbls.	34,540	25,789	3,456	2,579	5,656 85	3,917 70
Mackerel..... "	7,192	14,490	1,079	2,174	1,059 59	2,289 14
Herring..... "	3,844	2,449	576	367	942 02	577 68
Cod and other Fish.....			122	200	329 94	421 97
Canned Fish and Meats..... Cases.	23,934	28,068	838	912	1,499 65	1,623 01
Oysters..... Bbls.	2,441	3,658	244	366	301 49	543 76
Fish Barrels..... No.	5,813	5,139	334	235	314 80	249 40
Timber, Hewn and Unhewn... C. ft.	162,039	110,706	4,277	2,848	3,201 13	2,077 98
Lumber, Sawn..... Sup. ft.	2,655,248	3,305,281	3,495	4,283	2,981 86	3,889 23
Shingles..... M.	9,041	8,886	1,355	1,333	1,335 27	1,383 64
Cordwood and Tanbark..... Cords.	3,159	2,808	5,969	5,329	3,338 06	2,945 50
Shingle timber, &c. Cars.	54	64	538	669	442 88	606 25
Coal..... "	147	134	1,355	1,351	764 58	742 10
Lime..... Bbls.	2,027	3,703	216	377	276 95	426 30
Limestone..... Cars.	113	84	1,074	935	343 54	283 86
Brick and building stone..... "	34	70	315	712	178 90	351 15
Mussel mud..... "	156	196	1,564	1,975	521 96	647 13
Salt.....			1,038	898	1,261 50	864 82
Live Stock..... No.	4,245	4,957	1,012	1,179	2,055 60	2,440 94
Pressed Hay.....			24	67	32 09	74 67
Fresh Beef.....			136	24	328 76	71 33
Pork in Carcass.....			390	273	1,127 46	759 38
Pork in Barrels..... Bbls.	2,062	795	309	162	397 33	165 38
Butter and Cheese.....			20	43	76 49	136 31
Eggs..... Pkgs.	24,140	28,175	861	1,005	2,095 88	2,517 80
Farina starch.....				1,362		1,417 62
Merchandise.....			9,926	9,814	24,448 73	23,805 69
Wharfage, Storage, &c.					1,443 61	1,315 39
			51,920	51,841	71,038 55	70,701 74

STATEMENT OF PASSENGER TRAFFIC.

	1883.	1884.
Total number carried.....	117,162	118,988
do receipts.....	\$62,319 55	\$62,926 26
Receipts per passenger in cents.....	54.54	52.88

PRINCE EDWARD ISLAND RAILWAY.

RETURN of Accidents and Casualties which have occurred on the Prince Edward Island Railway, during the Year ended 30th June, 1884.

Date.	Time of Night or Day.	No. of Train.	Description of Train.	Name of Conductor.	Name of Driver.	No. of Engine.	Place of Accident.	Names of Persons Injured.	Whether Passenger or Employé.	Particulars of Accident.	Extent of Injury.	Verdict of Coroner's Jury.
1883.												
July 16.	11.20 am	1	Express...	D. H. Macgowan.	N. D. Armour.	14	O'Leary	{ John McDougall	Neither...	While attempting to cross track in a wagon, was run into by train.	Slightly hurt	
Oct. 21.	11.00 am	...	Shunter ...	.....	J. Currie	1	Summerside	{ Mgt. McDougall — Gould.	do ... do ...	do ... Boy attempted to jump into box car being placed in siding; was caught between car and fence.	Fatal. Severe scalp wounds.	Accidental.
1884.												
Feb. 18.	8.00 am	1	Express...	D. H. Macgowan.	D. Pound.....	5	Royalty Junction	D. McKenna	Employé...	While coupling cars	Finger crushed; amputated	
May 5.	5.30 p.m	...	.....	.....	.....	...	Summerside.....	.....	Neither ...	A number of children	Leg broken..	

 APPENDIX No. 5.

GOVERNMENT RAILWAYS IN OPERATION.

OFFICE OF THE CHIEF ENGINEER,
OTTAWA, 14th November, 1884.

SIR,—On the 2nd May last I was instructed by Department letter, No. 21073, to cause surveys to be made for the purpose of securing the shortest and best route for a line of railway between Montreal, St. John and Halifax, the following routes being selected for this purpose:—

A.—Montreal to Lennoxville.

B.—Moose River (on International Railway, north of Moose Head Lake) to Harvey, on the St. John and Maine Railway.

C.—Moose River (south or across Moose Head Lake) towards Matawamkeag, on the European and North American Railway.

D.—Chaudière Junction, on the Intercolonial Railway, to Hartland and Woodstock.

E.—Rivière Ouelle, on the Intercolonial Railway, to Edmonton, on the New Brunswick Railway.

F.—Rivière Du Loup, on the Intercolonial Railway, to Edmonton, on the New Brunswick Railway.

I immediately took steps for the organization of these surveys, placing the following gentlemen in charge:—

Division A.—Mr. R. Adams Davy.

“ B.—(Western Section) Mr. Ambrose Duffy.

“ B.—(Eastern “) Mr. Vernon Smith.

“ C.—Mr. Park Spofford.

“ D.—(Western Section) Mr. A. L. Light.

“ D.—(Eastern “) Mr. G. P. L. Fellows.

“ E.—

“ F.— } Mr. M. J. Crawford.

These gentlemen took the field immediately after having procured the requisite supplies and camp equipage, and have been engaged in field operations during the whole season. They are only now beginning to return to Ottawa, to prepare their plans, profiles and estimates. Messrs. Davy, Duffy and Smith have arrived at the Capital and are now busy in the office, and they report that they have found lines very eligible for railway construction. I may add that the reports which have reached me from those engineers still in the field are very favorable, but until the plans, profiles and estimates are complete on all the routes, I shall not be in a position to report fully or to make a comparison of the several routes surveyed and the sections of country traversed. So soon as I am in possession of this information I will report to you more fully.

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

COLLINGWOOD SCHREIBER,
Chief Engineer and General Manager.

A. P. BRADLEY, Esq.,
Secretary, Department Railways and Canals.

APPENDIX No. 6.

No. 1.

DEPARTMENT OF RAILWAYS AND CANALS,
SUPERINTENDING ENGINEER'S OFFICE,
MONTREAL, 30th October, 1884.

SIR,—I have the honor to submit my report on the various works under my charge, for the fiscal year 1883-84, ended on 30th June last, as called for by your letter, No. 64453.

These works are the Lachine Canal and the Beauharnois Canal, on the River St. Lawrence, and the Chambly Canal and St. Ours Lock and Dam, on the Richelieu River.

They have been maintained in an efficient state, without accident or interruption to the traffic.

Statements are annexed showing the amount collected for fines, damages, &c., together with monthly returns of the highest and lowest water registered at the upper and lower entrances of each canal, and on each mitre sill of St. Ours Lock.

LACHINE CANAL.

The traffic on this canal was maintained without interruption from any cause whatsoever during the fiscal year.

It was closed by ice on 1st December, 1883. The water was drawn off on the evening of the 18th April, and let in again on the evening of 3rd May, and the canal was fully opened for navigation on the morning of 5th May. The lower reach, however, was not filled to full height until the 12th of May, to enable the contractors for the St. Gabriel Basin to complete the front walls of their work. But there was no detention to the trade, as the level afforded a draught of 9 feet.

The principal repairs made during the year were as follows:—

LOCKS.

Old Lock No. 1.

Received new valves, new foot bridges, and three new working crabs for lower gates. The upper gates received two new crabs, new valve working screws and new mullions.

Old Lock No. 2.

The whole of the masonry was thoroughly pointed with cement. Two new crabs were placed at lower gates, and new face binders and valve screws on the upper gates.

Old Lock No. 3.

New valves were placed in both pairs of gates; and four new crabs and new valve working screws on the lower gates.

Old Lock No. 4.

The lower gates were taken out and replaced by new gates, with new crabs for same, and new valves and working screws were furnished to the upper gates.

Old Lock No. 5,

Or the Guard Lock, received new valves in one lower gate, and new crabs, valve screws and chambers for upper gates.

NEW LOCKS.

No repairs were required at these locks.

The tubes or crank masts for operating the valve screws, as furnished with the new gates, were not sufficiently strong to stand the strain to which they were subjected in working the three valves of each gate when connected together.

They have been replaced by tubes of milled steel, formed by boring a round bar to the proper depth, and leaving the head, to which the working crank is fitted, solid.

These tubes were made in the Government workshops, and answer the purpose intended in every respect.

BRIDGES.

Swing bridges Nos. 1, 2 and 3 at Mill street, Wellington and Seignours streets received new flooring, had all the bolts tightened, and were painted throughout. Swing bridges Nos. 4, 5 and 6, situated at Napoleon Road, Cote St. Paul and Lachine were newly planked. These are old bridges, and must soon be replaced by new ones. The two first named especially are not considered safe for extra heavy loads. All the stationary or fixed bridges, 15 in number, were re-planked, and five of them situated at Lachine, were strengthened by placing extra side stringers on blocks on top of flooring and bolting them through to the bottom stringers with 7 bolts.

A new stationary bridge, 50 feet long by 12 feet wide, was built over the enlarged entrance of the head race to the factories at Cote St. Paul. It connects the long pier above the lock with the bank for towing purposes.

WEIRS.

Weir No. 1 received new brass nuts for the working screws.

Weir No. 2 was furnished with 2 new gates, 4 new screws with chambers and brass nuts, and the whole of the masonry was thoroughly pointed.

Weir No. 3 had new steps provided for the 3 swinging gates.

Weir No. 4. The 8 gates of this weir were removed. The four swing gates received new steps, bottom castings and top iron fastenings. The 4 hoisting gates received new slides and some other trifling repairs. A leak from the head race of the factories on the south side of this weir necessitated the removal of a large portion of the flooring of the tail race to staunch it. The space from which the puddle was washed out by the leak was filled by concrete and the flooring relaid.

Supply Weirs Nos. 5 and 6, at Lachine, were found to be in a critical condition when the water was drawn off the canal. Two of the gates in No. 5 were so badly broken that they could not be repaired. They were replaced by new ones. Three of the other gates had their shafts so much bent that the gates had to be removed and new shafts furnished.

Two of the piers of masonry between the gates of Weir No. 6 were displaced, as supposed by sunken timber. This masonry was put back in position and secured there by bolting angle irons at bottom and top to the sills and lintels. To admit of this work being done, however, new stop logs of oak had to be provided, as the head of water to be shut off was 15 feet.

BASINS, WHARVES, &C.

The dock wall on the south-east side of Basin No. 2, in front of the mills and factories, and the wall on the north-west side of Basin No. 4, opposite the stores of the Montreal Warehousing Company, were pointed.

Six of the small bridges over the flumes leading to the mills at Basin 2 were renewed. Four new head gates and working screws were furnished for the flume at Pillow & Hersey's, two each for the flume at Ira Gould & Son's and Rodgers & King's, late Bartley's. Many of the head gates at other mills on this basin must be renewed next spring.

The great extent of the wharves on this canal and its branches, and the heavy traffic on them, calls for a large expenditure in repairs. They have been maintained in an efficient state.

FLOUR SHEDS.

The fine sheds at Basin No. 2 are old, and require frequent repairs. The roofs of Nos. 1 and 2 of these sheds are covered with sheet iron, but the boards to which this sheet iron is nailed are so doted from age that they can scarcely hold the nails, and an ordinary wind loosens the iron.

It will soon be necessary to renew the whole of this covering, both the wooden sheeting and the iron.

The sills and lower ends of the posts of the St. Gabriel sheds are decayed and must be renewed. New sills must be provided and the lower ends of the posts spliced. As this work has been authorized at the date of this report, and an appropriation granted, it will be carried on during the winter and completed before spring.

OTHER BUILDINGS, FENCES, &C.

The gravel roofing of the storehouse, carpenter shops, iron-fitting shops and stonemason's dwelling, which are all in one building, was renewed; and the blacksmith's shop and two dwelling houses of employés were repaired and are in fair condition.

The watch-houses at the different locks and bridges received necessary repairs, and are comfortable for those men when not on duty outside.

The fence between the old canal and road, at Lachine, was thoroughly repaired; and a new fence was built for the protection of the public along the tail-race of the large weir at head of Basin No. 2, in Montreal.

PIERS AND BOOMS AT LACHINE.

The superstructure of six of the mooring piers in the old timber basin was rebuilt above the water line. Eight of the booms, which had become water-soaked, were turned over and sheeted on the bottom with cedar timber, so that, when replaced, they float almost as well as when newly built.

A new pier of 12 by 10 feet was built at the upper end of the basin for the support of the head boom during high winds.

All the guide-piers in the new entrance on Section 11 have been connected by temporary single stick booms. The space thus enclosed furnishes accommodation and protection for a large quantity of timber, the boomage dues on which considerably increase the revenue. But as this section is now open for navigation, and the present arrangement is only temporary, properly constructed booms should be provided as soon as possible.

The single-stick booms now in use are not considered safe during storms, and if broken, damage to vessels and loss of timber might occur, for which Government would be responsible.

BANKS, ROADS, &C.

The towing paths on both sides of the canal, with their back drains and off-take ditches, have been kept in excellent condition. Side walls on summit level repaired in many places where damaged by rafts and vessels. Two hundred new mooring posts have been used to replace those that were old or decayed. All weeds and thistles growing on the banks and Government grounds adjoining, were cut at the proper time. The roads at the different flour sheds and basins, approaches to bridges, wharves, &c., have been repaired and kept in good order.

The River St. Pierre and drains leading to it from the canal were all thoroughly cleaned, and the low lands through which they pass are dry and producing good crops.

Since the enlargement of the canal, leaks have occurred several times, through the north-west bank, about the centre of Section 8. These were always discovered in time to prevent serious damage, chiefly by old Mr. Evers, who lives on that side of the canal, near the point where the leaks take place. He does this voluntarily, and has never asked or received any compensation for it. As he is old and feeble, and the nearest place at which he could give notice of a leak is one mile and a-half from where he lives, it was thought to be well, as a precaution, to connect his house with the canal telephone line which passes his door. This connection has already proved useful on two occasions. As a further precaution, a supply of puddle clay is kept at different points on the bank in this vicinity. This clay was brought down in scows from the cross-dams of Section 11, when they were being removed, as there is no water-tight material to be had in the neighborhood of the leaks.

SPARE LOCK GATES.

There are ten pairs of spare gates on this canal. They are all in good order and stored in the basin on Section 11, which is the only place where gates can be kept in the water in safety on this canal. These gates are numbered for the locks they are intended for and can be readily got at when required.

CONSTRUCTION.

The work done on this canal during the year, not under contract and chargeable to construction, was as follows:—

Dredging in the 19 feet channel in Basin No. 2, as far as the Wellington Basin.

The placing of a concrete wall or footing under the front face of the dock wall on the south-east side of Basin No. 2.

Clearing out the bottom of new Lock No. 5. Placing lamp-posts and building a lock shanty at the same lock.

The material dredged from the above channel was deposited for filling on the new St. Gabriel Basin grounds, except a portion used to grade low places, behind the wharves, at Wellington Basin, and on the point of land above Lock No. 3, now much used as a landing place for cordwood, lumber, &c. Ships drawing 18 feet of water can now pass from the harbor to the Wellington Basin.

There has been no leakage under the dock wall since the concrete was placed beneath it.

A point of land situated below the St. Gabriel locks, between the tail race from the weir and the tail race from the mills, which has not been utilized since the enlargement of the canal, was faced with timber on the side next the mills tail race, where it has a frontage of 100 feet. This was filled with dredged material, and three mooring posts were placed on it. It is now used extensively by the manufacturers at this lock for shipping and receiving heavy machinery and other goods.

A large portion of the wharves on this canal, more particularly those on the new basins, as well as the St. Gabriel flour sheds, are still unprovided with light of any kind. As the work of loading and discharging vessels is carried on by night as

well as by day, the want of light leads to great inconvenience and danger. Some system of lighting, either gas or electric, should be provided before next season.

WORKS UNDER CONTRACT.

Bridge over New Lock at Lachine.

This bridge, for which Mr. John McDougall was contractor, was completed and brought into use in November, 1883.

St. Gabriel Basins Nos. 3 and 4.

The contractors, Messrs. Rodgers & Farrell, commenced work at these basins in July, 1883, and continued to work at excavation and embankment until the 15th of December, when they were stopped by the frost. The foundation for the side wall on the canal front was also prepared, as far as could be done, by a steam dredge.

A large quantity of material was also delivered. During the winter the delivery and preparation of materials and plant was continued.

Fourteen derricks, and masts and wires for six electric lights, were erected on the canal bank in rear of the line of wall to be built when the water was drawn off the canal.

This was done on the 18th of April, and could not have been done sooner, as the the water in the river was too high. On the 19th the water was down to the level of the backwater of the river in this reach, being a depth of about 3 feet 9 inches only of water on the canal bottom. The contractors then formed light dams outside the line of dock wall foundation, fixed their pumps and commenced unwatering the space thus enclosed. On the 20th April excavation was begun on the foundation, and on the 22nd, in the afternoon, the first stone of the wall was laid.

The work was carried on night and day and on Monday, 5th of May, the lowest point of the wall was high enough to permit the filling of this reach sufficiently to afford 9 feet draft and open the navigation. The water was not raised to the full height until the 12th of May, to enable the contractors to get their wall above the level of 13 feet of water.

In this wall, and short sections into each basin, there are 3,700 cubic yards of masonry, of which 3,100 yards were built between 22nd April and 5th May.

Excavation in Basin No. 3 was resumed on 6th May, and on 9th of June the side wall was commenced at the north end. Since then the work has progressed fairly but slowly, the rate of progress not being sufficient to ensure the completion of the basins during this season.

MACADAMIZED ROAD

From Lachine to late St. Paul Road.

Tenders were invited for the construction of this road in March last. The work was awarded to Messrs. Edward Onelette & Co., of Lachine, who signed the contract on the 5th of June, and commenced work immediately after. Several culverts have been built, and a large portion of the grading has been done.

Since the close of the fiscal year, a contract for fencing has been given to the same parties, and they are now working at it.

This road is $1\frac{1}{2}$ miles long, and is situated on the south-east side of the canal, on a strip of land conceded for the purpose immediately outside of the canal land, except for a short distance at its junction with the Lower Lachine Road, where, by the permission of the Government, it is located on the canal land.

NEW WORKS OF ENLARGEMENT.

As stated in report for last year, all these works were completed, except on Section No. 11. The contractors of Section No. 9 had not then been settled with, but a final settlement has since been made with them, by arbitration.

SECTION No. 11.

The operations on this section during the year, consisted of the general completion of all work connected with the enlargement with the exception of sub-marine excavation.

They comprised the building of side walls, the grading, ditching and filling between and behind them, the placing of snubbing posts, building of mooring or guide piers, &c.

Sub-marine excavation was commenced this year on 30th April, and has been carried on without interruption during the months of May and June. The amount of excavation remaining yet to be done is small, but it consists entirely of trimming the sides of the channel and cleaning up the bottom in rock cutting, which is found to be very tedious work. It is expected, however, that it will be completed during the season.

Mr. Killaly, the resident Assistant Engineer in charge of this work, reports that the final estimate for this section is in an advanced state, and that upon the completion of the work outside there will not be much delay in furnishing it.

BEAUHARNOIS CANAL.

This canal was closed by ice on the 1st of December, 1883, and was re-opened for navigation on the 26th April, 1884. No accident occurred and consequently there was no interruption to navigation during the fiscal year.

LOCKS AND LOCK GATES.

One pair of gates was built for and placed in the upper end of Lock No. 11, and the building of a pair of upper gates for Lock No. 9 has been commenced.

General repairs were made to the gates of Locks 6, 7, 8, 10, 11 and 14; and the working chains of the lower gates of Locks 7 and 8, and of all the gates of Lock 14, were renewed. Three pairs of old gates were hauled out and taken apart. The walls of tail-race below weir of Lock 14 were rebuilt, and an iron railing on them similar to that above the weir. Nine bumping posts were removed at different locks, and many others repaired.

BRIDGES.

The work in connection with removal of swing bridge at Lock 14 was completed. The bridges at Locks 8, 9, 10, 11 and 13, received considerable repairs. At No. 8 the cap and braces and part of flooring were removed. The end beams and ballast boxes of bridges at Locks 9 and 10 were removed, and a new ballast box and locomotive furnished to St. Timothy bridge.

Timber is being prepared to rebuild the bridge at Lock 13. Numerous small bridges over ditches and discharges were rebuilt, and others repaired.

BANKS, DAMS, DYKES, &c.

The dykes and dams at Hungry Bay, Ile aux Chats and Grando Ile, received extensive repairs, having been much damaged by high water and storms in the spring, the Hungry Bay dyke especially, which had to be raised for a large portion of its length.

The canal banks were raised in many places, and the slope walls repaired. One hundred and sixty new snubbing posts were placed on the banks, and a large number of others taken up and re-set. All culvert wells, side ditches and discharges were cleaned during last summer, and, in the spring, the snow and ice was removed from

them. The weeds were mowed, as usual, on both sides of the canal, at the proper seasons.

WHARVES, &C.

The superstructure of wharf on south side of canal, near the upper entrance, was rebuilt from low-water line, and well filled with stone. All other wharves and piers were kept in good repair.

BUILDINGS, FENCES, &C.

A new dwelling house was built for the Superintendent. It includes, also, a suitable canal office. The Lockmaster's house at Lock No. 10 was rebuilt and enlarged.

New fences were made around the lockmen's premises at Valleyfield, and also round the house of the Lockmaster at Lock No. 7. All the other dwelling houses, with the outbuildings and fences, were kept in good repair.

A wing of 80 by 20 feet was added to the workshop. It is to be used as a saw-mill and lathe room.

CHAMBLY CANAL.

Was closed by frost on 30th November, 1883, and re-opened on 5th of May, 1884. The navigation was maintained without accident or interruption of any kind.

Work done during the fiscal year is divided under two heads, viz: Ordinary repairs, and improvements chargeable to income.

The ordinary repairs were principally as follows:—

LOCKS.

New mitre sills were placed at upper ends of Locks 2, 3, 5 and 6, and the flooring of Locks 3, 4, 5 and 6 was renewed. The gates of Lock No. 1 were furnished with new foot bridges, and those of Locks 8 and 9 with new sluice gates, two at Lock 8, and three at Lock 9.

BRIDGES AND BY-WASHES.

Swing Bridge No. 1 was replaced by a new one. The flooring of bridges Nos. 7 and 8 was renewed. A small road bridge, near bridge No. 2, and five towing-path bridges on St. Thèrese Island were rebuilt.

By-wash No. 2 was re-planked.

BANKS, DITCHES, &C.

The side walls were repaired between Locks 3 and 5 for about one mile in length on each side, and the banks were raised and widened between the same points. A slide below Fryer's By-wash was repaired. The banks in the vicinity of Locks 3, 4, 5, 6 and 7 were covered with a coat of gravel. A new ditch was made on the east side of canal, between Locks 6 and 7, and the old ditches and culverts were cleaned throughout.

THE GARDE CORPS

Or fence between the canal and public road, from St. John's to St. Thèrese, about 7 miles in length, was repaired and in some places rebuilt.

BUILDINGS.

Five lighthouses were built. One of them is on the end of the pier at the lower entrance of the canal, and the others are range lights, two at the Chambly Canton

and two at the village of Chambly Basin. A new dwelling-house was built for the Keeper of Bridge No. 2, with out buildings, fences, &c., complete. New kitchens were also built for the lock masters' houses at Locks 3 and 5. The houses at Locks 4 and 5 and at Bridge 7 were re-shingled and painted. Twenty-five pairs of window blinds were put on different houses of lock masters and bridge keepers. A canal office was fitted up at St. John's, in the storehouse, on the wharf, lately bought from Mr. Pierce.

The canal office at Chambly was provided with double windows. A new carpenter's shop was erected at Chambly, and the yard adjoining it fenced.

WHARVES.

The wharf above Lock 7, at Chambly, was extended for a length of 100 feet by 45 feet in width. A moving pier for rafts was built in Chambly Basin. It is 18 by 12 feet, and 9 feet in height.

WORKS OF IMPROVEMENT.

(Chargeable to Income.)

STEAM DREDGE.

In July, August and September, 1883, this dredge was employed in cleaning and deepening the bottom of the canal to a depth of eight feet at several points between St. Th  rese Island and Lock No. 2 at Chambly. The material was used for raising and widening the banks where required, and where not wanted for that purpose, it was placed in spoil banks for future use.

The upper entrance at St. John's was deepened to 8 feet during the month of October. The dredge was then removed to Chambly, and worked there between Locks 2 and 6, until the close of navigation, when it was placed in winter quarters.

In the spring, the dredge and scows, floating derrick, &c., were put in thorough repair. At the opening of navigation, deepening where necessary was resumed above Lock No. 2, and at the end of the fiscal year (June 30th) had advanced upwards as far as Bridge No. 3. a distance of 2 miles.

PIER AT ST. JOHNS.

The long pier between the upper entrance and the river was raised from two to 3 feet in height, for a length of 900 feet at its upper end. This portion was well filled with stone, and is now of the same height as the remainder of the pier, down to Jone's Bridge, which had been already raised.

LOCKS.

During the winter and spring the upper wing wall, recess walls, and part of chamber walls of Locks 2, 3, 4 and 6, were taken down and rebuilt, in the same manner as was adopted for the lower end of these locks two years ago. The lower courses, from foundation to water level, being constructed of timber, backed with concrete, and the upper portion, above water line, being built of ashlar masonry.

ST. OURS LOCK AND DAM.

Navigation was closed at this lock by ice on 29th November, 1883, and reopened on 7th April, 1884. Traffic was slightly interrupted on three days in five, to adjust lock gates, viz., for one and a-half hours on the 26th, three and a half on the 27th, and five on the 28th—in all ten hours.

Repairs were of the ordinary kind. Framed steps were placed on the side hill, leading to public road, and at each end of the lock, leading to the piers and booms.

The landing stages and booms were removed to a place of safety in the fall, and in the spring were repaired and replaced.

The mooring posts were also removed from the piers above the lock, for the winter.

At the lock the lower gates were adjusted, having been lifted by the high water in spring. The dry retaining wall on north side of lock was repaired; three mooring posts were renewed, and other minor repairs effected. The old lock gates taken out last year were removed to the island, where they will be repaired and held in reserve as spare gates.

The ice was cut away from the lock gates, piers and dam before the water rose in the spring.

The large scow in connection with the dam, received necessary repairs; but the dam itself required none.

The usual repairs required in spring and fall were made to the Superintendent's dwelling house, outbuildings, fences, &c.

No fines were imposed, nor were any damages collected during the year.

I have the honor to be, Sir,

Your most obedient servant,

E. H. PARENT,
Superintending Engineer.

LACHINE CANAL.

STATEMENT of Fines and Damages collected during the Fiscal Year ended 30th June, 1883.

Date.	Name of Vessel.	Name of Owner.	Fines.	Damages.	Total.
			\$ cts.	\$ cts.	\$ cts.
1883.					
Sept. 3...	Bark Oger.....	O. Krohg.....		20 00	
do 10...	Barge Almira.....	O. Portelance.....	10 00		
do 19...	Steamer Maxwell.....	Kelly & Co.....	20 00		
1884.					
June 6...	8 Spars.....	John Lee & Co.....	4 00		
do 11...	Barge Europa.....	Montreal Transportation Co.	4 00		
do 25...	do Don.....	Cantin & Sons.....	4 00	8 00	
Total.....			42 00	28 00	70 00

M. CONWAY,
Superintendent.

LACHINE CANAL OFFICE,
MONTREAL, July, 1884.

LACHINE CANAL.

STATEMENT of Amounts collected for Bank Dues and Wintering Vessels, during the Fiscal Year ended 30th June, 1884.

Date.	Items.	Number.	Rate.	Amount.
1883-84....			\$ cts.	\$ cts.
	Firewood			1,342 43
	Wintering vessels			171 54
	Total			1,513 96

JOHN O'NEILL,
Collector.

CANAL OFFICE,
MONTREAL, July, 1884.

LACHINE CANAL.

STATEMENT of Basin, Firewood and Bank Dues collected during the Fiscal Year ended 30th June, 1884.

Date.	Items.	Amount.
1883-84....		\$ cts.
	Basin dues	1,276 61
	Firewood	69 81
	Bank	74 00
	Total	1,420 42

J. B. DESCHAMPS,
Pro Collector.

CANAL OFFICE,
LACHINE, July, 1884.

BEAUHARNOIS CANAL.

STATEMENT of Fines and Damages collected during the Fiscal Year ended
30th June, 1884.

Date.	Name of Vessel.	Name of Owner.	Fines.	Damages.	Total.
1883.			\$ cts.	\$ cts.	\$ cts.
July 20...	Barge Colborne.....	Montreal Transportation Co.		15 00	
1884.					
May 28...	Tug J. R. Booth.....	Booth & Co.....	10 00		
June 9...	Propellor Shickluna.....			12 00	
		Total	10 00	27 00	37 00

J. F. BÉIQUE,
*Superintendent.*BEAUHARNOIS CANAL OFFICE,
MELOCHEVILLE, July, 1884.

LACHINE CANAL.

STATEMENT showing the Depth of River Water on the Mitre Sills of Lock No. 1 at
lower entrance, and Lock No. 5 at upper entrance, during the Fiscal Year ended
30th June, 1884. (From Lockmaster's Returns.)

Months.	Lock No. 1, Lower Sill.		Lock No. 5, Upper Sill.	
	Highest.	Lowest.	Highest.	Lowest.
1883.	ft. in.	ft. in.	ft. in.	ft. in.
July	22 6	20 6	14 2	13 0
August	20 7	18 7	13 0	11 9
September	18 7	17 11	11 10	11 4
October	18 4	17 8	11 6	11 0
November	19 3	18 1	12 3	11 4
December	35 10	18 10	12 11	11 6
1884.				
January	38 0	30 7	12 8	10 11
February	33 3	30 7	12 0	10 8
March	34 7	29 3	14 0	10 2
April	37 5	22 5	14 5	13 3
May	24 5	21 3	15 4	14 4
June	22 7	19 9	14 3	12 7

BEAUBARNOIS CANAL.

STATEMENT showing the Depth of River Water on the Mitre Sills of Lock No. 6 at lower entrance, and Lock No. 14 at upper entrance, during the Fiscal Year ended 30th June, 1884. (From Lockmaster's Returns.)

Months.	Lock No. 6, Lower Sill.		Lock No. 14, Upper Sill.	
	Highest.	Lowest.	Highest.	Lowest.
1883.	ft. in.	ft. in.	ft. in.	ft. in.
July.....	13 2	12 0	13 1	12 9
August.....	12 0	11 6	13 1	12 2
September.....	11 5	10 6	13 0	12 3
October.....	11 0	10 2	12 6	11 10
November.....	11 2	10 7	13 1	11 11
December.....	11 9	10 9	12 11	12 0
1884.				
January.....	17 0	11 5	13 0	11 4
February.....	18 3	15 0	12 6	11 6
March.....	19 0	15 8	13 9	11 10
April.....	16 2	14 6	13 7	13 0
May.....	15 6	14 1	13 11	13 0
June.....	14 2	12 7	13 0	12 8

CHAMBLY CANAL.

STATEMENT showing the Depth of River Water on the Mitre Sills of Lock No. 9 at lower entrance, and Lock No. 1 at upper entrance, during the Fiscal Year ended 30th June, 1884. (From Lockmaster's Returns.)

Months.	Lock No. 9, Lower Sill.		Lock No. 1, Upper Sill.	
	Highest.	Lowest.	Highest.	Lowest.
1883.	ft. in.	ft. in.	ft. in.	ft. in.
July.....	13 2	11 2	9 7	8 9
August.....	11 1	9 6	8 9	7 6
September.....	9 7	8 11	7 9	7 0
October.....	8 10	8 2	7 8	6 7
November.....	9 10	8 2	7 11	6 7
December.....	9 5	8 1	7 8	6 2
1884.				
January.....	9 0	8 3	7 4	7 0
February.....	13 0	8 10	9 0	7 2
March.....	20 10	12 5	10 9	8 11
April.....	20 0	17 4	12 3	10 10
May.....	17 8	15 8	12 5	10 9
June.....	15 5	12 0	10 10	8 9

ST. OURS LOCK.

STATEMENT showing the Depth of River Water on the Mitre Sills of St. Ours Lock, during the Fiscal Year ended 30th June, 1884. (From Lockmaster's Returns.)

Months.	Lower Sill.		Upper Sill.	
	Highest.	Lowest.	Highest.	Lowest.
1883.	ft. in.	ft. in.	ft. in.	ft. in.
July.....	13 6	11 4	11 4 $\frac{1}{2}$	10 0
August.....	11 2	8 11	10 1 $\frac{1}{2}$	8 10
September.....	9 2	8 0	9 0	8 6
October.....	9 6	8 1	9 0	7 10
November.....	10 0	8 7	9 3	8 0
December.....	12 5	9 7	9 7	7 11
1884.				
January.....	12 9 $\frac{1}{2}$	11 9	8 7	7 10
February.....	14 9	12 6	10 9	8 6
March.....	21 6	13 6	17 4	10 2
April.....	23 0	16 10	18 6	14 1
May.....	17 0	15 5	14 6	12 10
June.....	15 2	10 9	12 9	10 8

No. 2.

OTTAWA RIVER CANALS.

REPORT FOR THE FISCAL YEAR ENDING 30TH JUNE, 1884.

OTTAWA, 27th August, 1884.

SIR,—I have the honor herewith to transmit my Annual Report upon the various works under my charge, in connection with the "Construction" of the Ottawa River Canals and their present condition, under the head of "Maintenance."

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

D. STARK,
Superintending Engineer, O. R. C.

A. P. BRADLEY, Esq.,
Secretary Department Railways and Canals.

CONSTRUCTION.

STE. ANNE'S CANAL.

The work here, under contract to Messrs. Baskerville, O'Connor & Cassidy, are entirely completed, and the final estimate for the firm of all the work done is in progress.

The deepening of the upper entrance, in the hands of Messrs. E. E. Gilbert & Son, is being proceeded with; and the contractors, having made some alterations and improvements in their dredging machinery during last winter, are making considerably better progress this year than formerly.

It is confidently expected that all this dredging will be finished in the course of the summer of 1885, when everything relating to a 10-foot navigation upon this portion of the Ottawa River will have been provided, unless it be the further straightening of the channel below the canal, which, although not absolutely called for at present, owing to the existence of a transverse cut to the south shore, already formed, will still prove, in several respects, a convenience to the navigation which may, ere long, be granted it.

CARILLON CANAL.

All the works in connection with this canal, under the contract of Messrs. R. P. Cooke & Co., were completed last year, and are acting satisfactorily.

CARILLON DAM.

The repairs which became necessary to this structure, on the occurrence of the break described in last year's report, are now completed and the gap filled up. The rush of water through this gap, during the period it took to staunch it, had the effect of washing away the material upon which the dam was founded to a depth of 30 feet below the natural bed of the river, by a width of 70 feet, and a length, up and down stream, of 170 feet.

The whole of this excavation is now filled with stone and crib-work, in one compact mass, to the level of the river's natural bed, and with the superstructure, also entirely filled with stone, and securely fastened down,—a work of such strength, weight and solidity has been formed as renders the recurrence of an accident like that of last year out of the question.

I would remark that, in consequence of the great increase of strength given to this portion of the dam, a consideration of the expenditure upon these repairs should be based upon the fact that much of it is for what actual repair did not call for, and is therefore fairly entitled to be viewed as coming under the head of construction.

The necessity for a further strengthening of the remaining portions of the dam has been already reported on.

SLIDE.

The structure across the head of the slide, in which the machinery lies for working the stop-logs and sluice-gates, is built too low for the season of high water, and has to be raised.

It is proposed to do this in the course of the coming winter.

GRENVILLE CANAL.

Green's Point Entrance.

Here the whole of the works are completed, except some in the entrance and a certain amount of "finishing up" between the locks.

The former consists in the removal of the south wall of the old combined locks, with a spit of earth and rock still standing behind it; the building of a new retaining wall of dry masonry near the shore and along the face of the old lock walls, which, when completed, will form the north side of the entrance; and some crib work round the point of the south side, being a continuation of the southerly wall, and affording berths and wharfrage to steamers and barges while awaiting the passage through the lock of tows, &c.

These various portions of work finished, which they are expected to be this fall the whole design at this point will have been carried out, everything in connection with the trench between the locks, the upper lock itself and the approaches above it being completed.

GRENVILLE ENTRANCE.

Everything here has been done except a small amount of dredging and cleaning out at the head of the entrance, which the contractor did not find it convenient to execute at the time the rest of the work was completed, and which is now in hand. It will be all finished before the close of navigation.

CULBUTE WORKS.

Nothing has been required to be done in connection with these works, save the settling of land damages, accruing from the raising of the river by the dams at the Grand Calumet Falls and Rocher Fendu Rapids.

These are now being examined and enquired into by the valutors appointed for the purpose, in company with the engineer resident there during the construction of the works.

Considerable progress has already been made by these gentlemen.

The removal of a small shoal above the locks at Culbute, which now stands directly in the way of their upper entrance approach, is the only thing remaining to be done to entirely complete the original design, and this work is in hand.

This closes the report in so far as construction is concerned.

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

D. STARK,
Superintendent Engineer. O. R. C.

OTTAWA RIVER CANALS.

MAINTENANCE.

ST. ANNE'S CANAL.

Navigation closed here on the 26th November, 1883, and was reopened on the 26th April, 1884.

It has been conducted throughout the year without accident or interruption of any kind.

The ordinary repairs needed to the gates of the old lock have been made, and these were also repainted.

Ten iron snubbing posts for the new lock have been inserted.

All the necessary and ordinary repairs called for to piers, booms, &c., have been attended to.

New booms, for the better protection of vessels, and the retaining walls, have been provided; and three new piers, with booms between them, have been constructed on the north side of the upper entrance, for the guidance of vessels approaching the lock.

Some two thousand feet of fencing, along the boundaries of the Government property, has also been erected and painted.

CARILLON AND GRENVILLE CANALS.

These canals were closed on the 27th November, 1883, and reopened on the 28th April, 1884.

There have been no interruptions to traffic from any cause during the year, and no repairs of importance have been called for.

The lock gates and machinery connected with them were painted in the spring, and a dwelling for the lockmaster of the Upper Lock at Carillon, was erected and completed in the month of December, 1883.

CHUTE A BLONDEAU.

The lock here is in bad condition, so bad, that doing anything to it in the shape of repair is useless. As mentioned in my report of last year, something should be done here, to assist tugs up the old Chute during high water, either by the erection of a new lock or the provision of a chain tug.

It is probable that the blasting away of some of the rock which forms the channel of the old rapids, and which could be easily got rid of in the deep water that surrounds them, would by equalizing the current the whole way from Greece's Point to the head of the Carillon Canal have a good effect. I should recommend a thorough survey of the river at this point being made, with a view to ascertaining what could be effected in this way.

GREECE'S POINT.

The old lower locks at this entrance called for a considerable amount of repair at the commencement of the season, but the new one being got ready by the opening of navigation this spring, they were dismantled and are now totally obliterated by the work of the enlargement. The canal here is worked through the new locks entirely, all the machinery of which is in good working order. Dwellings for the lockmasters at this point are much wanted.

The locks along the rest of the canal have not called for any repairs of consequence. They still stand in good order.

The old wooden suspension blocks at the Guard Lock have been removed and been replaced by wrought iron straps let into the masonry; in several respects a great improvement.

The gates of the Guard Lock and their machinery were also repainted.

GRENVILLE ENTRANCE.

Here the enlargement undertaken for the better accommodation of the traffic is completed.

With respect to the canal between these entrances, all the debris, boulders, &c., which are every winter thrown down by the action of frost and ice were cleared away before the opening of navigation, and the whole prism of the canal was cleared out as well as time would permit.

Of course the widening out of this extent of canal (some four miles) to give it proportion to the new lock, would be a boon of no small magnitude to the trade, as that alone is wanting to enable forwarders to increase the power and size of their steamers and barges to meet the superior calibre of navigation now elsewhere existing between the cities of Ottawa and Montreal.

CULBUTE CANAL.

No repairs of consequence have been called for here, and little or nothing in the shape of traffic has passed through the locks during the year.

D. STARKE,
Superintendent Engineer, Ottawa River Canals.

No. 3.

CORNWALL CANAL.

CORNWALL, 27th August, 1884.

SIR,—I have the honor to submit the following Annual Report on the works under my charge, for the fiscal year ended 30th June, 1884:—

The Cornwall Canal was maintained in an efficient state until the 6th August, 1883, when the lower gates of Lock No. 19, broken by the barge "Argo," caused a delay to navigation of seventy-eight hours. The canal was closed by the ice on the 8th of December, 1883, and opened for navigation on the 29th April, 1884. It continued in good working order until the 10th May, 1884, when the propeller "Ocean" broke the lower gates of Lock No. 19 (the same lock that had the gates broken by the barge "Argo"). Delay to navigation by the propeller "Ocean," seventy-two hours.

The works executed during the past season come under the head of ordinary repairs to gates, waste-weirs and bridges. Rebuilding two pairs of lock gates. General repairs to lock-houses and the usual cleaning of side ditches and drains.

I have the honor to be, Sir,

Your obedient servant,

D. A. McDONELL,
Superintendent.

A. P. BRADLEY, Esq.,
Department of Railways and Canals.

CORNWALL CANAL.

STATEMENT showing the Depth of River Water on the Mitre Sills of Lock No. 15 at lower entrance, and Lock No. 21 at upper entrance, during the Fiscal Year ended 30th June, 1884.

Months.	Lock No. 15, Lower Sill.		Lock No. 21, Upper Sill.	
	Highest.	Lowest.	Highest.	Lowest.
1883.	ft. in.	ft. in.	ft. in.	ft. in.
July	11 10½	11 3	11 11	11 6
August	11 7	11 0	12 1	11 0
September	11 7	10 7	12 0	10 10
October	11 1	10 6	11 1	10 2
November	11 8	10 4	11 2	10 4
December	13 8	10 7	10 9	10 1
1884.				
January	26 0	14 0	11 7	8 9
February	26 4	23 0	11 11	10 2
March	29 2	16 2	11 10	9 9
April	15 3	11 9	12 0	11 1
May	12 0	11 8	12 3	11 6
June	11 9	11 5	11 10	11 4

D. A. McDONELL,
Superintendent.

No. 4.

WILLIAMSBURGH CANALS.

MORRISBURG, 23rd August, 1884.

Sir,—I have the honor to submit my Report on the working and condition of the Williamsburgh Canals under my charge, for the fiscal year ending 30th June, 1884.

These canals (consisting of the Farran's Point, Rapide du Plat, Point Iroquois Junction, and Gallops Canals) were closed for the season of 1883, on the 16th December, and re-opened for traffic on 1st May, 1884. No interruption or delay in the navigation occurred during the season.

FARRAN'S POINT CANAL.

On this canal repairs were executed on the lock gates. Four new sheaves were placed in chamber holes. Three hundred and forty feet of the pier at the lower entrance was rebuilt. The pier at the head, and ice-breaker at the foot, will require repair during current year. The banks of this canal have been kept in good repair.

RAPIDE DU PLAT CANAL.

New blocks for pivot of swinging gates were placed on coping, and new knees were put into lower gates of Lock No. 23. One of these gates was taken out, and new valves put in at Lock No. 24. One new knee was put in upper gate; also, a new roller and bed-plate. New bumping posts were put in at the head of the same lock. The pier at the lower entrance of this canal was repaired, and timber has been got out for further repair of the pier at the head. The banks were repaired by stoning. This canal requires dredging in several places.

POINT IROQUOIS JUNCTION AND GALLOPS CANAL.

The lower gates of Lock No. 26 were repaired by placing new blocks for pivot of swinging gates, and new knees. One of these gates was taken out, and a new valves put in. General repairs were done on the upper gates at Locks Nos. 25 and 27. The swing bridge at Lock No. 25 was repaired by building a new ballast box, placing new timbers in several parts, raising pivot stone, adjusting pivot, and laying a new track. The swing bridge at Lock No. 26, also received repairs. Repairs were done to the several piers and locks along the line of this canal, and timber has been got out for completion of repairs to the pier at the head of the Gallops Canal. The work of cleaning out the ditch on the north side of Point Iroquois Canal, and the stoning of it to the 9 mile road, west of Iroquois, was completed. The banks of these canals have been kept in good repair, and the stone renewed whenever necessary. The booms in Point Iroquois Canal were overhauled this spring, and put in thorough repair. The buoys in the River St. Lawrence, between Johnstown and Dickenson's Landing, under my charge, were replaced this spring.

The water in the River St. Lawrence continuing high, furnished a good depth of water to the Canals.

I annex a statement showing the extreme depth of water on the mitre sills of the several locks at the entrance and outlet of these Canals, during the year.

All of which is respectfully submitted.

I have the honor to be, Sir,

Your most obedient servant,

A. G. MACDONELL,

Superintendent Williamsburgh Canals.

A. P. BRADLEY, Esq.,

Secretary Department Railways and Canals,

Ottawa.

WILLIAMSBURGH CANALS.

STATEMENT showing extreme Depth of Water on the Mitre Sills of the several Locks during the Year ended 30th June, 1884.

FARRAN'S POINT CANAL.

Months.	Lock No. 22, Lower Sill.		Months.	Lock No. 22, Lower Sill.	
	Highest.	Lowest.		Highest.	Lowest.
1883.	ft. in.	ft. in.	1884.	ft. in.	ft. in.
July	10 11	10 5	January	11 0	9 3
August	10 11	10 6	February	10 9	8 3
September	10 9	9 7	March	11 3	8 0
October	10 3	8 6	April	11 0	9 10
November	10 9	9 0	May	11 6	10 6
December	10 6	9 0	June	11 3	10 8

RAPIDE DU PLAT CANAL.

Months.	Lock No. 23, Lower Sill, Foot of Canal.		Lock No. 24, Upper Sill, Head of Canal.	
	Highest.	Lowest.	Highest.	Lowest.
1883.	ft. in.	ft. in.	ft. in.	ft. in.
July	11 6	10 9	11 9	10 9
August	11 8	10 3	11 9	10 0
September	11 10	10 2	11 9	10 0
October	10 7	9 3	10 6	9 9
November	10 4	9 3	10 6	9 3
December	10 8	8 6	10 0	9 9
1884.				
January	11 0	9 3	9 9	5 6
February	10 4	8 9	9 6	7 3
March	11 3	8 6	11 3	8 0
April	11 6	10 0	11 6	10 6
May	12 9	10 10	12 6	11 0
June	11 5	10 9	12 0	11 0

No. 5.

SUPERINTENDENT'S OFFICE,
ST. CATHARINES, 29th September, 1884.

SIR,—I have the honor to submit my Report on the condition of working of the three canals—the Old, the New and the Feeder—under my charge, for the year ending 30th June, 1884.

The canals have been operated satisfactorily throughout the year, and without serious accident, except in three instances, viz., (1) when the large propeller "W. L. Frost," owing to the parting of her snub, carried out the head gates of Lock No. 5, New Canal. (2) On the 1st of October, 1883, when the propeller "Cuba," from the same cause, ran into the head gates of Lock No. 7; and (3) four days afterwards, when the schooner "Prussia," during a gale, failed to get her snub lines on the posts in time to prevent her running into and displacing and partly destroying the head gates of Lock No. 23, all in the New Canal.

The Ogdensburg and Lake Champlain Railway Company have built two additional propellers, of the full length our locks will allow, and have chartered several other very large propellers and schooners, all of which have been making regular trips throughout the season and contributing very largely to our income in toll revenue.

Much inconvenience has been experienced heretofore from vessels giving false reports as to their draft of water when loaded, but I have at last succeeded in establishing a simple and accurate appliance for measuring vessels as they enter the lock at Port Colborne, and I purpose putting a similar arrangement at the Port Dalhousie lock.

The canals were closed on 15th December, 1883, and opened 15th April, 1884.

NEW WELLAND CANAL—DETAILS OF WORK OF REPAIRS AND MAINTENANCE.

DIVISION No. 1.—FROM PORT DALHOUSIE HARBOR TO FOOT OF LOCK NO. 13.

Gate Yard and Shop, Port Dalhousie.

Erected two-storey framed workshop 110 by 26 feet, storehouse 40 by 29 feet, and engine room 26 by 35 feet (fire-proof) on stone foundation; lined the same outside with 4 inch brick and covered roof with Sparham's patent roofing; fitted up shops with requisite powerful machinery to quickly handle heavy gate timbers and castings, plane and fit up same and bridge timbers, &c., and all other descriptions of lock gate and other canal work; laid 680 feet car track through yard to convey heavy gate timbers on trucks; launched twelve spare lock gates and put them in other places on gate berths near Lock No. 2; made twenty-five ladders for locktenders to light and put out gas along canal; made four blocks for fastening railings on protection timbers, also twenty-eight caps for gate posts; built and fitted up two new powerful capstans for hauling lock gates out of water for repairs.

The two head gates of Lock No. 5 that were broken and carried out by propeller "W. L. Frost," were drawn out on the skids and extensive repairs done to them, after which they were launched and placed on the cradle berths, to be used as spare gates when required.

The head gate of Lock No. 7, that was damaged by propeller "Cuba," was drawn out on the skids, thoroughly repaired, launched and placed on the cradle berth for future use.

Made 450 boxes for shafting, also 500 wood wedges for general use; six posts made, painted, lettered and placed in position for adjusting vessels' compasses, as ordered by Commander Boulton.

Several long poles made for examining mitre sills and to remove anything getting between lock gate and sill; six long handles made and put in for lock rakes; 870 stakes made for staking trees; three large bridge ladders made; five split, 250 fence posts; made one door and hung same for house at Lock No. 13; made twenty new extensions for lock gate bridge and painted same; made two lock gate corbels. Fitted up sawmill with machinery complete. Banks graded down to place ways on, so as to allow damaged lock gates to be hauled out for repairs.

Steam Pump.

Built platform into storehouse to haul in and out steam pump, boiler and other appurtenances.

Fitted suction pipe on pump, also put on exhaust pipe.

Lock No. 1, Bridge, No. 1 and Level.

Placed shear legs in lower shutting well hole to guide the cable into shore.

Six hundred feet fencing built to enclose Government property.

Repaired float draw bridge, hooks for snubbing, at intervals put in over-floating tow path. Banks below waste weir fenced with stone, to prevent washout when valves are hoisted.

Lock gates adjusted.

Tightened up truss rods of bridge and repaired same.

Lock No. 2, and Level.

Graded up a large slide in bank; opened up 1,950 feet ditches, both sides; also opened up side ditches during freshets.

Extra strong safety cables put on head gates, to prevent them from being carried out.

Foot gates taken out and track and segment taken up.

Steps raised and gates re-hung.

Grading and hauling earth to make good banks washed out at time of accident to lock gate Lock No. 5.

Ditches opened up during the winter, to prevent spring freshets doing damage.

Lock No. 3, and Level.

Five hundred and forty feet surface ditching made; 300 feet fencing built to enclose Government property. Two new gates made and hung for same. Five hundred feet main ditch opened up.

Banks that were damaged by washout, caused by propeller "W. L. Frost" carrying out head gates Lock No. 5, all repaired and faced up again with stone.

One thousand and seventy-two feet ditches, both sides opened up.

Lock gates, fitted with new steel cables and new shaft bearings, put in thorough working order. Water wheels taken out and dressed up to fit cases.

Ends of binders on lock gates bored and filled with oil. Checks all puttied up and painted to prevent decay.

Planted trees in place of those washed out; foot gates taken out; track and segment taken out; steps raised and gates re-hung.

Bridge No. 2.

Cleaned out snow drift from bridge approach, tow path side. Approach graded up and side ditches dug.

Painted bridge and thoroughly repaired same, and tightened up truss rods, &c.

Lock No. 4, and Level.

Nine hundred feet main ditch opened up; banks of waste weir that were washed out by Lock No. 5 gates being carried out, repaired and faced up with stone.

Waste weir bridge widened 4 feet, so as to allow teams to pass over to Government pit. Banks on both sides repaired and stoned up, that were washed out. Cleared out ice from main ditch; opened up back ditch during freshet. Cut through heavy snow drifts, to allow water to pass. Took out snubbing posts and properly braced them with stronger braces and re-set same.

Foot gates taken out. Track and segment taken out. Steps raised and gates re-hung. Ends of binders on lock gates bored and filled with oil. Checks all puttied up and painted, to prevent decay.

Lock No. 5 and Level.

Two hundred and fifty feet fencing, built to enclose Government property, and two gates made and hung on same. Two new spare lock gates hung in place of two lock gates carried away by propeller "W. L. Frost. Five thousand seven hundred feet main ditch opened up. Put in one scow load of gravel at head of lock. Repaired washout in waste weir bank with stone spalls. Tow path bridge levelled up at each end. Lock gates thoroughly overhauled and put in good working order. Three new turbine wheels. Wheel cases and guards put on. Six new slide valves and one new steel cable put on. Lock cleaned out, and a large quantity of stones taken out from lower sill.

Trees planted in place of those winter-killed.

A large gang of men were employed during the winter to keep main ditch open on this long level; to keep slush, ice and snow from blocking up the culverts, and prevent water backing up into private property. Took out snubbing posts, put in heavier braces and re-set again. Ends of binders filled with oil. Checks puttied up and painted, to prevent decay. Planted trees on north bank, heel path side.

Bridge No. 3, Lake Street.

Bank approaching bridge made 5 feet wider. Tightened up truss rods, &c., &c.

Bridge No. 4 (Railway Bridge.)

Lined up the rollers. Repaired floats with new chain, &c.

Lock No. 6, and Level.

Made three hundred feet surface ditching, south side; raised 1,750 feet roadway two stone culverts, 18 by 20 feet, and put under same, to main ditch, and two sill drains to prevent water backing up. One new fence gate made and hung, and 134 feet fencing built to boundary Government property.

Made one thousand and ninety feet new roadway back of reservoir; opened up 1,955 feet main ditch; built 35 feet stone culvert—size 18 by 20 feet.

Two thousand one hundred and eighty feet surface ditching made and 79 feet 2 inches iron pipe laid through bank, to supply the farmers with water, the original supply having been cut off by the building of the new canal.

Banks of waste weir repaired where washed out, with 300 yards earth.

Trees planted in place of those washed out.

Kept public highway open from drifting snow as far as boundary of Government property.

Cleared ice, slush and snow out of back ditch, to allow water to pass and prevent it backing up on private property.

Took out a large piece of embankment on south side of waste weir, where there was a bad leak. Re-filled up again with clay and puddle, all complete.
Adjusted lock gates.

Bridge No. 5, Geneva Street.

Three hundred and ten feet of road approaching bridge raised and widened. Tightened up truss rods, &c.

Lock No. 7, and Level.

Eight thousand one hundred feet barbed wire and 54 feet board fencing built to enclose Government property. Wing walls of lock pointed.

Eight hundred and eighteen feet board fence. Five fence gates made and hung on south side.

Banks at head of lock raised, and 3,148 feet bank from water's edge graded up with stone spalls. Put in 60 feet stone drain at base of bank under roadway to carry off soakage water.

Six hundred and eighty-eight feet ditches opened up. Planted trees in place of those that died.

Took out snubbing posts and braces and put in larger and stronger ones, and re-set; also re-set safety cable post. Repaired tow path bridge. Hung one new spare lock gate, heel path side, in place of lock gate damaged by propeller "Cuba."

Bridge No. 6, Niagara Street.

Three hundred and ten feet road approaching bridge raised and widened. Re-fastened stop-blocks, and put on doublegear; also put on new railing timber for clearing towlines and painted same.

Lock No. 8, and Level.

Wing walls at head of lock raised, and banks graded up behind them. Ditches opened up at base of banks to allow soakage water to pass off. Pointed up wing walls at head of lock.

Took out old snubbing posts and braces, and put in larger and stronger ones.

Ends of binders filled with oil to preserve the wood. Trees planted in place of those that died.

Lock No. 9, and Level.

One thousand seven hundred and nineteen feet board fence built. Three new fence gates made and hung; also, two sets gate-bars on south side, and 234 feet capped fence built on north side.

Wing walls at head of lock raised, and banks graded up behind them.

Banks, both sides, graded up and levelled.

Took down slope wing wall, north side, at foot of lock, and drove 6 feet oak sheet piling along at foot of same, to prevent sliding into canal. Rebuilt masonry again. Took down a portion of wing wall, also on south side; drove 6 feet oak sheet piling along the foot of same, to prevent sliding into canal. Rebuilt masonry, raising it average of 18 inches higher. Planted trees in place of those that died. Put heavy braces around snubbing posts. Put new railing on lock gate. Lock gates put in good working order.

Bridge No. 7, Queenston Road.

Altered cams and put on double gearing.

Built 307 feet framed fence, and made and put in two large gates. Painted same.

Made and put on new guard rail.
Repaired floats.

Lock No. 10, and Level.

Wing-walls raised at head of Lock, and banks graded up behind them.
Banks, both sides, raised and levelled up.
Stopping serious leak in canal bank, caused by stone drain under the canal not being filled up or removed when canal embankment was first built. Bank opened up to bottom and filled up with clay and puddle, and made all tight and complete.
Planted trees in place of those that died.
Put heavy braces around snubbing posts.

Bridge No. 8, Homer Road.

Put waling on cluster piles at end of rest pier.

Lock No. 11, and Level.

Wing-walls at head of lock raised, and banks both sides raised and levelled up 175 feet. Reservoir bank filled up with stone spalls where washed out. Adjusted lock gates, &c.
Put heavy braces around snubbing post.
Repaired some frost slides in banks.

Lock No. 12, and Level.

Wing-walls raised at head of lock, and bank raised and graded up behind them.
Four scow loads stones put under turnpike bridge to keep water from undermining pier and abutments. Put lock-gates, &c., in working order. Put on new intermediate gear.
Put heavy braces around one snub post. Repaired track and segment under lock gates. Put oil in ends of lock-gate binder. Puttied up and painted same to prevent checking and rotting. Put in new style of valve in lock gates.

DIVISION No. 2.—PROM FOOT OF LOCK No. 23 TO BRIDGE No. 13 (MARLATT'S.)

Lock No. 13, Bridge No. 9, and Level.

Narrow portion of the bank widened and raised. Repaired bad leak through bank at side waste weir wall. Put lock gates in good working order. Put heavy braces around snubbing posts, to prevent them from being pulled out by heavy strains. Repaired bridge across lock.
Removed with crane-scow 25 cubic yards heavy stone work from swing bridge, and brought same to dock at quarry. Digging out old rest piers of bridge and put in two new framed cribs for locking gear of bridge, with post fastenings, &c. Filled around same and laid in drain to carry off soakage water through to canal.

Lock No. 14, and Level.

Put on fasteners to hold lock gate open; also, four new steel cables, four loads gravel put on bank slopes; two new 1½-inch shafts put on lock gate and new hoisting gear put on waste weir for raising valves; six scow loads gravel put on banks of reservoir. Level drawn off and lock gates adjusted. Raised waste weir timbers.

Lock No. 15, and Level.

Level drawn off. Lock cleared out and gates adjusted; two pair sheaves put on capstan for cables to work in; nine new pinions and four set screws put on.

Five scow loads stone put on banks and slopes of reservoir, and four scow loads gravel put on banks of canal.

One new $1\frac{1}{2}$ -inch shaft and nine new steel cables put on.

Put new hoisting gear on waste weir for raising valves; one new water wheel and shaft put on. Lock gates adjusted. Raised water weir timbers.

Lock No. 16, and Level.

Level drawn off. Lock cleaned out and gates adjusted; two new rollers put on turn table; three new $1\frac{1}{2}$ -inch shafts and six new steel cables put on.

Four scow loads stone put on bank slopes. New hoisting gear on waste weir for raising valves.

Lock No. 17, and Level.

Level drawn off and lock gate adjusted. Four new water wheels and seven new $1\frac{1}{2}$ -inch shafts put on. Four scow loads stone put on bank slopes. Two new steel cables put on. Four steel plates put on cannons.

Lock No. 18, and Level.

Level drawn off. Lock gates adjusted. Four new $1\frac{1}{2}$ -inch shafts put on. Four scow loads stone put on bank slopes. Three large brass nuts put on waste weir for raising valves. Waling repaired.

Lock No. 19, and Level.

The new $1\frac{1}{2}$ -inch shafts put on lock gates for turbine wheels. Three steel plates put on cannons. Level drawn off. Gates adjusted. Put on fasteners to hold gates open. Two new steel cables put on. Three scow loads stone put on bank slopes.

Lock No. 20, and Level.

Two steel plates put on cannons. Four new steel cables put on. Four scow loads stone put on bank slopes. Six hundred feet deep stoned drain made to carry off soakage water, 1 by 2 inches. Three large brass nuts put on waste weir for hoisting valves. Four new $1\frac{1}{2}$ -inch shafts put on lock gates for water wheels; also, one new water wheel. Lock gates adjusted and new rollers put on three gates.

Lock No. 21, and Level.

Put on one new bracket for lever. One new foot-board made and put on. Two steel plates put on cannon. Level drawn off. Lock gates adjusted. Put on one new brass matrix and washer. Two pair sheaves put on capstan for cables to work in.

Level drawn off. Lock gates adjusted.

One thousand five hundred feet deep stoned drain, 1 by 2 feet, made to carry off soakage water.

Two new $1\frac{1}{2}$ -inch shafts put on water wheels.

Three scow loads clay put on bank for repairing break, in same.

Lock No. 22, and Level.

Level drawn off. Lock gates adjusted.

Put on fasteners to hold gates open; also one new steel cable. One steel plate put on cannon. Made 227 feet surface ditch, 1 by 5 feet, to carry off water from banks, and filled up same with broken stone. Built 321 feet stone drain, 2 by 7 feet; at Welland Railway station, filled up same with broken stone, to carry off soakage water and keep the banks from sliding.

Made 400 yards of drain back of lock, 6 feet deep, 2 feet at top and 6 feet at bottom, and filled up with broken stone, to carry off soakage water.

Seven new $1\frac{1}{4}$ inch shafts put on for water wheels.

Three scow loads gravel put on banks to repair wash out, and wash out repaired.

Built stairs from railway station up to canal bank, with hand rail each side.

Lock No. 23, and Level.

Level drawn off, and four pieces of gate track taken out. Lock gates adjusted. Four steel plates put on cannons, and two new steel cables. Two new lock gates hung in place of two gates carried out by schooner "Prussia."

Lock No. 24, Bridge and Level.

Level drawn off. Lock gates adjusted. Put on four fasteners to lock gates, to hold them open, and put in four large posts for extra strong steel safety cables, to prevent gates being carried away. Five large brass nuts put on waste weir for hoisting valves.

Three new steel cables put on.

Painted bridge and approaches, *two coats paint*. Repaired break in bank at head of lock, and sodded same.

Put on six $1\frac{1}{4}$ inch shafts, and forty-two new cast-iron boxes for water wheels. Put new gearing on waste weirs.

Bridge No. 11 (Railway Bridge.)

Repaired chain and straps. Put three rag bolts in plates. Lined up rollers. Lamp-post broke by collision, fished same out of canal. Put in new lamp-post, fitted all up complete with new lamps, &c.

Lock No. 25, Bridge No. 12, and Level.

Level drawn off. Lock gates adjusted.

Steel plates put on cannons.

One scow load stone put on bank slopes.

Built 180 feet board fence to enclose Government property at the waste weir. 60 yards of clay put on roadway to widen same. Made bridge over waste weir 5 feet 6 inches wider, covered with 2-inch plank; took down and rebuilt 35 feet railing. Made and put on new protection timber to driving shafts of waste weir, and put on new gearing to waste weir.

Repaired bridge, and painted bridge and waste weir two coats.

Guard Lock and Level.

Adjusted lock gates.

Bridge No. 13 (Marlatt's.)

Painted bridge two coats. Cleared out snow and ice, Davidson and Higgins' culverts, to prevent freshets.

Repaired bridge plates; filled up 150 yards roadway to widen same.

Drove additional cluster piles at each end of rest-piers; put walings around and braces between piles, and bolted all together.

DIVISION NO. 3.—FROM BRIDGE NO. 13 (MARLATT'S) TO AQUEDUCT AT WELLAND.

Bridge No. 14 (Allanburgh.)

Drove additional cluster piles at each end of rest-pier; put walings around and braces between piles, and bolted all together; approach repaired. Put dam across

foot of waste weir; pumped out water; took down remaining portion east wing-walls, the rest having previously fallen down; properly rebuilt same.

Sheet-piled front; renewed dam, and left all completed. Put on copping and new valve gearing.

Repaired banks, both sides, from Bridge No. 13 to Welland.

Took down portion of cellar wall, Collector of Customs' office, Port Robinson; dug foundation lower, and rebuilt same.

Caulked and replanked bottom of ferry boat, Port Robinson.

Repaired new road at Port Robinson, by macadamizing with stone.

Culverts put in several places along canal; put in box culvert to drain pond between dry dock at Port Robinson, and canal; also culvert across tow path, south of Port Robinson, and south Quaker Bridge.

Repaired stationary bridges, south Quaker Bridge, west side of canal, and built new bridge over back ditch.

Repaired fences; made and hung two new fence gates; cleaned out old and made new ditches between Allanburgh and Welland, both sides of canal.

Made ditch both sides road approach, Port Robinson Bridge; cleaned out and opened up ditch below Port Robinson lock.

Repaired cellar floor of stone house at Allanburgh; built drain 80 feet long from cellar of bridgetender's house to canal, and laid 80 feet tile drain; dug out for cellar and cistern to same; converted tavern, purchased by valuator, into a suitable residence for bridgetender, dug well, put in pump, fenced in garden plot and laid in 80 feet drain tile from cellar.

Dug ditch for and put in 237 feet of 10-inch drain tile to drain pond at Port Robinson; put in box 6 feet long, covered with cement, and iron grate set in.

Put down nine snubbing posts on the banks of canal, from Allanburgh to Welland; also twelve at Port Robinson lock and vicinity; painted same.

Put floats across canal at Port Robinson, for winter travel, in lieu of ferry.

Cleaned float and driftwood out of the canal, throughout the division.

Built slope wing-wall south Port Robinson.

Thistles and weeds cut on both sides of the canal throughout the division.

Bridge No. 15 (Port Robinson).

Repaired the approaches, and bridge repaired; also fenders.

Drove additional cluster piles at each end of rest piers; put walings around and braces between piles, and bolted all together.

Bridge No. 16 (Quaker Bridge).

Repaired bridge fenders and bridge. Drove additional cluster piles at each end of rest piers; put walings around and braces between piles and bolted all together.

DIVISION No. 4.—FROM AQUEDUCT (WELLAND) TO PORT COLBORNE HARBOR.

Built W.C. and executed various repairs to overseers' and locktenders' houses; built new front fence 96 feet long and 350 feet side and back fences; made and hung three small and three large gates; painted all.

Set in one hundred new snubbing posts and straightened and re-set fifteen old posts; hauled clay to put around sundry posts, and painted same. Back ditches opened and cleaned out throughout the division.

Took down old and built larger and longer culvert under street near Grand Trunk Railway bridge, Port Colborne.

Built new floats; rock cut and repaired old, and rafted and took old rotten floats out of the contractor's way; rock cut to Junction Pond; repaired approaches each side Air Line ferry.

New fenders placed in position at Bridges No. 19 and No. 21, and Port Colborne lock.

Cleaned out new lock, Port Colborne, by diver and assistant; hung new iron ladders on lock walls; altered pattern for extension of iron guard rail, and put up extension of iron guard rail, Port Colborne lock.

Drilled holes for water gauges and attached same to sides of aqueduct.

Unloaded and loaded freight of the propeller "W. L. Frost," stuck in aqueduct (Welland).

Bridge No. 17 (Welland).

Put double iron gear under bridge; drove additional cluster piles at east end of rest pier; put waling around and braces between piles, and bolted altogether.

Bridge No. 19 (Junction.)

Repaired lamp damaged by collision.

Bridge No. 21 (Humberstone.)

Put double iron gear under bridge.

Bridge No. 23 (Port Colborne.)

Put double iron gear under bridge and re-fastened rack and track.

Four lock-gates brought from Port Colborne and put in pond Lock 20, old canal. Picked up two lock gates at Port Robinson and rebuilt same on bank foot of lock and took them to Welland and hung them in new Welland lock; picked up two lock gates in Chippewa Creek at Welland, brought them to Port Robinson and rebuilt same, and took them to Welland and placed them temporarily at foot of lock; picked up two large lock gates near Port Robinson, took them to Port Colborne and hung same in old lock in place of old head gates taken out, and removed them to Port Robinson and sunk them; picked up two spare gates for new lock, Port Colborne, and put them in front of supply weir adjoining, and sunk them under floats; picked up two new head gates and hung them in lock at Welland, fitted them up with new foot boards, screw attachments, iron railing, and fitted on opening bar to open gates, in lieu of balance beam.

Picked up two span gates near Port Robinson, brought them to yard Lock No. 21, old canal, and re-built them for old Lock, Port Colborne, and old gates removed to Port Robinson and sunk in pond.

Picked up two span gates sunk in front of supply weir, Port Colborne, and took them to junction and sunk same in pond adjoining Feeder lock.

Put new foot boards on old lock gates, re-set iron railing and valve screws, Port Colborne; put iron cables on crabs, also higher railing and screw gear to lock gates, Welland, and made foot board wider.

Repaired and re-planked old swing bridge, Welland.

Put up new semaphore at Welland, 1,700 feet north of aqueduct, tow path side; put up shed and wire cable to work same from aqueduct. Took some large stones and logs out of bottom of harbor, and built stone in wall, east side.

Drew out one 40 feet pile in way of new work, Bridge No. 19 (Junction).

Put new six shaft, bolts and braces in gearing, and new levelled gear on machinery of gate frame of lifting scow.

Banks repaired and thistles and weeds cut throughout the division.

Generally.

The lock gate gearing throughout has been overhauled, kept in good order, as also that of the water weirs and bridges.

The heel posts of nearly all the lock gates have been adzed and reduced to a curve; that we found necessary, to prevent their binding against the hollow quoin. Several of the lock gates have had to be unshipped, and steel plates put under the steps to raise them; several more require to be similarly treated.

The banks throughout have been raised where low, gullies filled up, banks widened where necessary. All thistles have been cut in Government property.

Fines and Damages.

I have collected during the fiscal year from masters and owners of vessels, and others, the sum of \$3,498.20 in fines, for violation of canal regulations, and for damages to the works, which amount has been handed to H. H. Collier, Esq., Collector for the port, and I append a detailed statement herewith marked "A."

I also append a statement, marked "B," showing the greatest and lowest depth of water in the mitre sills at Port Dalhousie and Port Colborne locks, in each month during the year; also, a comparative statement of the average depth for the month of June, 1883 and 1884, which shows the water has been 8 inches higher at Port Dalhousie and 2 inches lower at Port Colborne than for the same month in the year 1883.

OLD WELLAND CANAL.

DETAILS OF REPAIRS AND MAINTENANCE OF WORKS ON THE OLD WELLAND CANAL.

Lock No. 1, Bridge and Level.

Rebuilt heel and toe approach of bridge, and replanked same, also planked bridge with oak plank.

Rebuilt fender work approaches to lock on tow path side, 260 feet long, and drove six piles to stiffen same.

Re-built aprons of floats at Muir's dock, and put on 20 feet 14 by 14 inch oak capping; drove three piles, and put on 40 feet 14 by 14 inch oak capping. Repaired floats various times. Put down three new snubbing posts. One scow load gravel put on tow path.

Lock No. 2, Bridge and Level.

Put four new steps in bottom of lock; hung four new lock gates in position, all complete, and new crabs for working gate; also new foot-boards to all lock gates, and iron railing dismantled on old lock gate, and brought old iron to gate yard, hauled one gate out on tow path, and brought some to gate yard to be overhauled and rebuilt. Raised swing bridge above Lock 2, put in new needle beam, side stringers, handrail and pivot; replaced track, and adjusted rollers; put in new heel-beam, replanked bridge throughout; put in additional diagonal strengthening rods. Painted all, two coats.

Swing Bridge Over Race.

Put in new foundation timber and side stringers full length of bridge; one new stringer from gallows frame to toe of same; new rails both sides; new beams, braces, and five new knees; replanked and painted, two coats.

Waste Weirs, Nos. 1 and 2.

Raised bridges across waste weirs, and took down and rebuilt side walls; lowered bridges to place, fastened same, and put on new plank. Raised swing walls of both waste weirs 2 feet higher. The retaining wall at north weir taken down and rebuilt, and made 2 feet higher. Dug out puddled back of wing walls of waste weirs. Two large scow loads stone and gravel placed at waste weirs.

Repaired portion of bridge with 3-inch pine plank, 12 by 50 feet, opposite Shickluna's shipyard. Dug out and built foundation for lock house; opened up ditches, and put down sundry tile drains; also put in tile drain at abutment for new bridge.

Put in four new snubbing posts near Lock 2. Two scow loads gravel put on tow path. Made and put in box drain, 10 by 10 inches by 16 feet; tow path at Shickluna.

Repaired banks both sides and paved same with stones; also faced banks of waste weirs with stone.

St. Paul Street Bridge.

Put in long bolts through toe approach and new timbers to keep it from sliding into canal; put on some new plank and tightened up rods; took out old rotten floor stringer and replaced with new; replanked bridge throughout with oak plank; put new cap on stringers on top of floor on upper side of bridge, and covered toe approach of same with additional 3-inch oak plank.

Put on new double iron gear under bridges; refastened pivots, &c.

Repaired bank of canal near bridge; put on two new signs, 2 by 4 feet, each end of bridge.

Lock No. 3 and Level.

Put in new balance beam, castings and new clips; broke and spread stones on banks; opened up ditches; put in two new snubbing posts.

Took down old leaky wing walls of waste weir and rebuilt same, and extended the wing walls.

Dug out and puddled back wing walls waste weir.

Repaired floats.

Canal Office.

After Customs and Inland Revenue officers vacated their rooms, the building, previously very inconvenient and insufficient, was rearranged inside, and ample room given to the canal officials. Quarters also were provided for a resident caretaker in the basement. Roof leaked and was partly removed. Substantial steps and fence erected in front of building. Took down old rotten flag pole, made and set in place, tabernacle and flag staff complete, painted three coats.

Laid 80 feet side wall 8 feet wide; took off old iron shutters and put on new blinds; made and put up new office sign; opened up drains and put in new drain pipes; took down old stone walls; removed embankments; cut down trees; dug cistern and post holes for new fence; graded and paved ditches; also took down iron fence from front of building.

Lock No. 4, Bridge and Level.

Put in three new joists in heel of old swing bridge. Replanked same. Repaired floating tow-path and railing. Made and put on two new foot boards, through-bolted and iron-banded. Built new temporary bridge across lock for use of public, 100 by 6 feet. Hand-rail both sides 3 feet high. Took down old rotten and decayed swing bridge, removed same out of way. Built new stone foundation. Erected scaffold and built a new composite swing highway bridge of the best description across lock, in place of rotten one. Painted same three coats and finished all complete. Stone broken, and faced banks of canal with same. Opened up ditches and puddled in tile drain heel path side. Dug out and puddled banks of waste weir. Built new and repaired old fence, lockmaster's house.

Used three scow loads of stone in facing Hydraulic raceway slopes, &c.

Lock No 5, Bridge and Level.

Raised bridge off pivot and put in cross beam and joist. Rebuilt heel and toe approaches. Replanked bridge heel with 2-inch and toe with 3-inch oak plank. Tightened up rods and balanced bridge.

Put in new foundation timbers and reset crab. Put in new snubbing post. Took out old and put in two new foot gates in lock. Brought old gates to gate yard. Also put covers on cellar holes.

Drilled new holes in coping for anchors and put new bolts in foot gates.

Dug out and puddled back of wing walls of waste weir; also dug out for foundation of new bridge across waste weir.

Put new apron in waste weir and filled up with stone.

Three scow loads stone from quarry for repairs to Lock No. 5, waste weir apron and three scow loads gravel for repairs to heel path.

Lock No. 6, and Level.

Built new bridge across waste weir 60 by 12 feet, planked same with 3-inch pine. and put on new slash braces. One new snubbing post put in heel path side. Put in new collar foot gates, heel path side; also new covers on well holes.

Painted wood and iron work of weir bridge, two coats.

One scow load clay for repairs to banks, and one scow load stone for repairs to waste weir apron.

Hydraulic Race.

Built double truss bridge 16 by 42 feet across race on town line, covered same with 3-inch oak plank, with rail both sides 3 feet 6 inches high. Repaired chutes at head of aqueduct. Built new bridge over race at Thorold Road 42 by 26 feet, three stringers 10 by 12 inches, eleven stringers, 8 by 12 inches. Covered the same with 3-inch oak plank. Framed supporting trusses at each end of bridge. Two iron rod trusses under centre of bridge, where street railway cars cross. Heavy railing each side, 112 feet long, the whole painted three coats and built 6-foot sidewalk. Painted bridge town line two coats, also iron work same.

Loosened four tier of plank on Thorold Road bridge and put in lifting rings, so as to take them up to remove anchor ice, &c.

Took out old timber work, foot of chutes near McDermott's foundry, forming bulkhead. Put in new bulkhead 40 feet long 10 feet high, nine new floor timbers, seven new posts 10 by 12 inches, 9 feet high, faced them with 8 by 12 inches. pine on bolted to posts and covered with 2-inch pine, and faced with sheet iron to protect it from floating ice; size of floor, 20 feet by 40 feet, covered with double thickness 2-inch pine plank broken jointed. Built new fences on boundary line. Repaired wire fences. Banks repaired, thistles and weeds cut throughout. Dug out for foundation new bulkhead and chutes near McDermott's foundry. Built dry stone walls in places, and dug out for foundation new bridge across race at Thorold road.

Gate, Yard and Shop, St Catharines.

Rebuilt two hand and two foot gates for Lock No. 2; painted and launched same and took them to Lock No. 2.

Made and put in place four feet boards through bolted and iron banded.

Hauled out and stripped lock gate from Lock No. 2 to be rebuilt.

Made seventeen large snubbing posts iron capped. Repaired twenty-seven wheelbarrows and made eight new ones.

Rebuilt one lock gate for Lock No. 22. Framed toe post, heel post and five girts for head gate Lock 2. Framed six girts for Lock No. 1 gate.

Made two steps for foot walk Lock No. 2 house. Built one land pile driver with leader 32 feet long iron banded. Framed one pair span gates for Lock No. 2.

Finished framing and put together one tow path gate, Lock No. 1. Made new topmast for flag staff complete, and painted, for canal office.

Partly framed one pair post for small lock gates. Made one pair light shear legs for use when required.

Gate, Yard and Shop, Thorold.

Made large sign board for canal office, and eight small ones for bridges new canal; built one new and rebuilt one old derrick; built one new scow for men on repairs, summit level size, 26 by 14 by 2 feet 4 inches with cabin 10 by 9 by 6 feet 4 inches high.

Repaired scows and hull of pile driver. Made two new 10 inch hand pumps 12 feet long. Built two new stone boats.

Stripped old lock gate brought from Lock No. 6. Dressed and ironed off twenty-seven tamarac poles for locktenders. Made eighty new snubbing posts for new canal. Made all requisite gearing for vessel gauge to measure draught of vessels, and put the same in place at Port Colborne lock.

Lock No. 7, Bridge and Level.

Put five new needle-beams, ten new joists and plank in bridge.

Built new bridge across waste weir, 65 by 12 feet, and covered with 3-inch pine plank; capped and put railing on same, and painted three coats; also put on three new slash boards.

Repaired fender work in front of swing bridge; put in one snubbing post; dug out and puddled back of wing-walls of waste weir; faced banks of weir with one scow load stone.

Took down leaking wing-walls of waste weir and rebuilt same.

Lock No. 8, and Level.

Put new timber and re-set foot gates.

Built new bridge over waste weir, 4 by 60 feet; two stringers, 12 by 12 feet, covered with 2-inch pine plank; put on new slash boards; new iron work; repaired rollers.

Took down wing walls and rebuilt same, and raised them 1 foot 6 inches higher, with new stonework; dug out and puddled behind wing walls; put in new apron and filled same up with one scowload stone.

Lock No. 9, and Level.

Put in one snubbing-post.

Lock No. 10, and Level.

Put new siding on kitchen of locktender's house; made, and hung three new doors.

Lock No. 11, and Level.

Built protection house, balloon frame, 5 by 12 feet high, sheeted with rough 1-inch boards, board and battened roof, and one batten door over valves that supply the hydraulic race from canal, to prevent tampering with supply valves; put siding on kitchen of locktender's house, and took up and relaid 1½-inch flooring in main dwelling.

Lock No. 12, and Level.

Put in new concrete between main timbers and bottom of lock; also new mitre sill at foot of lock, and put on five new brasses.

Lock No. 13, and Level.

One scow load stone used in repairing waste weir.

Lock No. 14, and Level.

Made and put on foot-boards; put in new concrete between mitre sill and other timbers, and double planked bottom of lock chamber throughout; put new face-pieces to mitre sill in foot of lock; one scow load of stone used in repairing waste weir.

Lock No. 15, Bridge and Level.

Put in new circle plank on heel and toe of bridge.

Put new slash boards, new iron work, and two new rollers on waste weir and bridge.

Lock No. 16, and Level.

Put in new concrete between main timbers, and double planked bottom of lock chamber, one scow load stone used in repairing waste weir.

Lock No. 17, and Level.

Replanked two bridges at Riordan's paper mills, 25 by 15 feet and 27 by 12 feet, with 3-inch pine plank and 6 by 8 inch cap on same. Put new blocks and connections to valves on waste weir.

Built one new cut stone pier and bridge across waste weir, fitted up with new slash boards, trip dog crab and railing; built new float bridge, 106 by 11 feet, and rebuilt abutment each end of floats; built new shed and tool house at quarry.

Lock No. 18, and Level.

Put new blocks and connections to valves of waste weir, also new bottom to valve frames.

Repaired locktender's house; built new fence and W. C.

Fitted up old storehouse from Lock No. 15 for lockhouse.

Built new centre pier (cut stone) and new bridge across waste weir, fitted up with new slash boards, trip dog crab and railing.

Took down leaking wing walls of weir and rebuilt same.

Lock No. 19, and Level.

In good condition.

Lock No. 20, and Level.

Took down railing of waste weir bridge; counter sunk posts of railing in timbers of bridge, and re-set railing up again. Made and put in place two new slash boards. Put in twelve new wrist pins. Put on new cravat to foot gates. Built new cut stone centre pier and new bridge over waste weir, fitted up with new slash boards; trip dog crab and railing.

Lock No. 21, and Level.

Put new blocks and connections to valves of waste weir. Built new top to abutments of float bridge. Put in twelve new wrist pins.

Lock No. 21, Keefer Bridge and Level

Put on new twin buckle for bridge, tightened up rods, and made new approach and replanked same. Cleared away old rotten wooden abutments east side of bridge, and built new substantial stone abutments of heavy masonry in lieu.

Lock No. 23, and Level.

Put in new concrete, and double planked bottom to lock; also twelve new wrist pins. Built new cut stone centre pier, and new bridge over waste weir, fitted up with slash boards, trip dog crab and railing.

Lock No. 24, Bridge and Level.

Replanked tow path bridge, raised swing bridge, and put new steel plate under; replanked approach, west side; one scow load of gravel, and one of stone, for repairs to waste weir; dug out old puddle between store cellar wall and raceway, 54 by 8 by 4 feet; put in 2 feet concrete next to cellar wall, 54 feet long, and filled up same with puddle, to prevent leaking into cellar.

Lock No. 25, and Level.

Put in new snubbing post, and one new head block in head gate; also twelve new wrist pins; built new bridge across waste weir; put on new railing and slash boards; two scow load stone for repairs to banks; took down leaking wing walls of waste weir, and rebuilt same, and raised walls 2 feet higher; raised and puddled banks behind walls of waste weir.

Guard Lock Thorold, and 3-mile Level.

Made and put in frame and rack in front of Higgin's flume; repaired and replanked swing bridge; put on improved fastening to valve screws, Higgin's flume, to prevent water being wasted into 12-mile Creek.

Allanburgh Bridge, Lift Lock and Guard Lock.

Raised one of the guard lock gates, and tightened up suspension bar; one scow load stone from Government quarry, for cellar, bridgetender's house, and other repairs; and 1 scow load stone to repair Beaver dam Creek weir.

FEEDER JUNCTION TO DUNNVILLE AND PORT MAITLAND—23 MILES.

From Dunnville to Stromness and Port Maitland is $6\frac{1}{2}$ miles, from Stromness to Marshville and junction with main line of canal, $16\frac{2}{3}$ miles.

Upon this division there are three locks, four waste weirs, ten stationary bridges, one toll bridge, twelve piers and aprons, twenty-six flood gates, eight culverts under canal, three locktenders' houses, three lock and bridge shanties, one tollkeeper's house, one overseer's house, two sluice ways, one fish ladder, one dam and embankment 2,328 feet long, two back ditches, and 1,200 feet booms.

The supply of water has been greater this season than last. There was a very limited quantity of timber and firewood hauled out to canal; consequently the traffic through the Feeder has fallen off somewhat.

Waste Weir No. 1, Dunnville.

Twelve old flood gates were taken out and rebuilt; valve rods straightened and screws repaired. Six worn out upright posts, 12 by 14 inches by 10 feet, removed and replaced by new. One new stone pier, 2 by 4 feet by 6 feet high, was built on breast wall to support the top structures, and the top sheeting on bridge was repaired.

Waste Weir No 2, Dunnville.

The whole top structure was renewed and rebuilt. There were also eighteen new flood gates of an improved plan built and placed in position, all the valve rods straightened, screws and winches repaired; the timber and iron work painted three coats.

Waste Weir No. 3, Dunnville.

All the stone piers were raised 15 inches higher, and all the top timbers and flood gates were entirely renewed. Rods, winches and screws were all overhauled and repaired. The timber and iron work thoroughly painted.

Port Maitland.

A new locktender's dwelling, 22 by 30 feet, was built and lot fenced in.

Feeder Junction.

A new swing bridge has been built to carry roadway across junction lock, and will be placed in position soon.

Swing Bridges.

Worn out and defective planks removed and replanked with new. All the swing bridges were raised on their pivots and properly balanced, rods tightened and otherwise put in a good state of repair. A float ferry was made and put in position near Boulton Ditch settlement.

Generally.

The unprecedented spring freshet of Grand River passed off without doing any damage. Extraordinary exertions were used night and day to prevent damage. All the drift wood and rubbish was passed over the dam, and sunken logs were removed from entrance to weirs. The feeder channel between Dunnville and Junction was thoroughly searched; all obstructions removed. The mitre sills of Dunnville and Port Maitland lock were cleaned out, and Feeder banks raised where sunken or undermined by muskrats, to prevent overflow. Canada thistles and obnoxious weeds cut throughout. The Government scows have been employed taking stone from quarry, to fill up the parts of canal banks washed and worn away, or that needed raising, to prevent overflow. All ditches have been kept cleaned throughout the division, and thistle and weeds on Government property cut as usual.

The usual examination and repairs to old lock gates, machinery, face planking, &c., have been attended to when water was drawn off.

WILLIAM ELLIS,
Superintendent.

STATEMENT of Fines and Damages collected from Vessels Contravening Canal Regulations, for the Fiscal Year ending 30th June, 1884.

Date.		Name of Vessels.	Fines.	Damages.	Total.
1883.			\$ cts.	\$ cts.	\$ cts.
May	22	Schooner "Albacon"		21 00	
do	30	do "Snowbird"		17 00	
do	30	do "Prussia"		10 00	
do	30	do "Augusta"		13 50	
do	30	do "H. P. Murray"		10 00	
1884.					
July	1	Tug "Gordon"		21 00	
Aug.	9	Brig "A. Smith"		26 00	
do	13	Schooner "F. Baker"		116 50	
do	13	do "Hoboken"		10 00	
do	27	do "Mary Battle"		18 50	
do	27	Steamer "Canada"	20 00		
Sept.	12	Tug "Bruce"		6 00	
Oct.	15	do "Mitchell"	5 00		
do	12	Propeller "W. L. Frost"		3,000 00	
do	19	Schooner "Penokee"		25 70	
do	22	Steamer "Saginaw Valley"	25 00		
do	22	Schooner "G. B. Sloan"	20 00		
Nov.	6	do "P. M. Rogers"		23 00	
do	6	Tug "R. S. King"	25 00		
do	7	Propeller "Myles"	40 00		
do	12	Brig "Gilmour"		20 00	
do	19	Raft timber		25 00	
Total			135 00	3,363 00	3,498 20

*Handed to H. H. Collier, Esq., Collector, St. Catharines.

STATEMENT showing the Depth of Water on Lower Sill of Lock No. 1, Welland Canal at Port Dalhousie, for Fiscal Year ending 30th June, 1884.

Months.	Lower Sill.		Months.	Lower Sill.	
	Highest.	Lowest.		Highest.	Lowest.
1883.	Ft. In.	Ft. In.	1884.	Ft. In.	Ft. In.
July	14 10	14 6	January	13 6	13 0
August	14 9	14 5	February	14 0	13 4
September	14 7	13 11	March	14 8	13 10
October	14 1	13 4	April	15 1	14 8
November	13 5	13 2	May	15 3	14 10
December	13 6	13 2	June	15 2	14 9

Average, 1883..... Ft. In. 14 3
do 1884..... 13 11

STATEMENT showing the Depth of Water in Upper Sill of Lock 27, Welland Canal, at Port Colborne, for Fiscal Year ending 30th June, 1884.

Months.	Upper Sill.		Months.	Upper Sill.	
	Highest.	Lowest.		Highest.	Lowest.
	Ft. In.	Ft. In.		Ft. In.	Ft. In.
July.....	14 5	13 2	January.....	15 6	11 7
August.....	14 3	12 10	February.....	14 4	11 5
September.....	13 5	12 0	March.....	13 7	11 8
October.....	14 10	12 2	April.....	14 1	12 5
November.....	14 4	12 0	May.....	16 0	12 11
December.....	13 11	11 1	June.....	13 8	13 4

	Ft. In.
Average, 1883.....	13 5
do 1884.....	13 3

WILLIAM ELLIS,
Superintendent.

No. 6.

RIDEAU CANAL.

RIDEAU CANAL OFFICE,
OTTAWA, 20th September, 1884.

SIR,—I have the honor to submit the Annual Report on the state of the works under my charge, for the fiscal year ending 30th June, 1884.

Navigation closed at Ottawa on 27th November, and at Kingston Mills 23th November, and opened at Ottawa and Kingston Mills on 1st and 5th May respectively.

The water in the ascending and descending reaches between Ottawa and Kingston for the first time in the last twelve years maintained full depth required on the sills of the different locks for the whole season of navigation. This year opened with high water on all the reaches, and it was with great difficulty the freshet was cleared without damage to the works.

No delays to navigation occurred.

The principal repairs to the works were as follows :—

Kingston Mills.

The damage to the embankment caused by the storm of May, 1883, was repaired by placing over 600 yards of stone on the embankment.

The wash weir and bridge over it was renewed.

One pair of lock gates and four new sluice frames.

Lower Brewers.

A dam had to be put in and the lower locks pumped out, to renew the foundations for the steps of one of the lock gates. One pair of lock gates renewed.

Upper Brewers.

Dam put in above lock, in order to draw off the water to rebuild the wing wall of upper lock.

Jones' Falls.

Two pair of lock gates renewed and one pair of sluice frames.

Davis' Locks.

One new swing beam and repairs to sluice frames.

Chaffey's.

A new swing bridge built over the locks at this point, to accommodate the settlers living on the west of the canal, has given great satisfaction.

Newboro'.

Repairs to mitre post of lock gates ; high bridge replanked.

Poonamalie.

One pair of new swing beams and repairs to bulkhead.

Smith's Falls.

Swing bridge over lock renewed and repairs to sluice frames.

Old Stys.

Repairs to lock walls and replanking bridges.

Burritt's.

Swing bridge renewed and repairs made to embankment, damaged by high water in the spring.

Bekett's Landing.

Re-planked long bridge over the river and repaired the piers of same.

Manotick.

New stop-logs furnished for bulkhead, repaired bulkhead and piers, and all leakage stopped.

Long Island.

Built new apron above the bulkhead, with new side piers to stop leakage.

Ottawa.

One pair of new lock gates and sundry repairs to sluices and machinery.

The works throughout the canal, with the exception of the Narrows lock, are in good working order; the leakages at several stations have been reduced, and the levels have, in consequence, been better maintained. The leakage under the main dam and the bulkhead at Hog's Back is increasing. Settlements occur, more or less, every year, and will, before long, require a considerable amount of clay filling placed on the up-stream side to stay it. The extent of the leakage coming under the works

Feeder Junction to Dunnville and Port Maitland, 23 miles.

may be judged from the fact that it furnished, during the summer months, the power to drive the New Edinburgh mills.

A contract was made for the erection of a toll collector and lockmaster's office at the head of the combined lock, Ottawa. Work was commenced last September, and it is now nearly completed. It is a substantial stone building, and a great improvement on the old wooden buildings which formerly did duty as offices.

Tay Canal.

Messrs. Manning & Macdonald, the contractors for the canal, have made fair progress during the past year.

The excavation in rock and clay, including the two lock pits, have been nearly completed; the greater part of the stone for the locks has been delivered on the ground, and one lock is expected to be completed this fall.

A commencement has also been made in excavating the bed of the river at Dawson's, as well as at other points; and a dredge is now working at the entrance to the canal.

Surveys were made last summer to test, first, the feasibility of connecting the waters of the Rideau navigation, with the waters descending towards Gananoque, with a connection to Charleston Lake, and to make a continuous navigation to the town of Gananoque; second, the feasibility of connecting a chain of lakes on the "Devil Lake system" by locks and cuttings, with a view to provide a supply of water to the Rideau navigation, together with a navigable channel through these several lakes to connect with the Rideau at Bedford Mills, on Mud Lake. My report of 10th February, 1884, gives in detail the information given by these two surveys.

I have the honor to be, Sir,

Your obedient servant,

FRED. A. WISE.

Superintending Engineer.

A. P. BRADLEY, Esq.,
Department Railways and Canals,
Ottawa.

No. 7.**TRENT CANAL.**

ENGINEER'S OFFICE,

PETERBOROUGH, 23rd October, 1884.

SIR,—I have the honor to enclose you the Annual Report on the works temporarily under my charge, for the fiscal year ending 30th June, 1884.

I have the honor to be, Sir,

Your obedient servant,

RICHARD B. ROGERS,

Acting Superintending Engineer.

A. P. BRADLEY, Esq.,
Secretary Department Railways and Canals,
Ottawa.

TRENT CANAL WORKS,
ENGINEER'S OFFICE,
PETERBOROUGH, 17th October, 1884.

SIR,—I have the honor to submit the Annual Report on the works temporarily under my charge, for the fiscal year ending June 30th, 1884.

From the 1st of July till the close of navigation the water on the several stretches was maintained at a height rather above the usual level. The water commenced to rise earlier in the fall than usual. It was anticipated, from the great depth of snow last winter, that a heavy freshet would follow in the spring, but the water passed off very gradually, and no damage, other than the usual amount, was done to the work under the charge of this Department, except a break in the canal bank at Bobcaygeon, which was temporarily repaired before a great deal of damage was done. The spring height of the water was slightly above the average.

During the autumn months the water falls very rapidly, and the want of such is severely felt by navigation and mill owners. There are immense store reservoirs and feeders to this route, the regulation of which, if assumed by the Government and placed under one control, there need be no scarcity of water during the whole season, even during the driest of seasons.

Navigation closed 28th November, and opened about 26th March.

The total number of lockages on the different canals was 1,240, the greatest number at any one station being 857. This shows a falling off from the figures last year, but this is accounted for from the fact that the contractor for the Fenelon Falls locks, last year, drew the stone for the locks through the Bobcaygeon lock.

The nature and dimensions of the works at the several stations along this route have been described in former reports. I shall proceed to describe the repairs executed at the different points on the works for the year.

Fenelon Falls.

This station is, at present, the northern extremity of the route under control of this Department; but on the completion of the locks and canal, now under construction, navigation will be extended to Balsam Lake. The dam and guide booms, and piers above the dam, are private property, and are in a decayed condition.

The line of boom below, which divides the steamboat channel from the log channel, has been allowed to drift out of position, and many of the anchors have become detached. The boom is at present being put in order, in view of the opening of the new locks and canal next season.

Scugog River.

This river runs through land that has been flooded by the dam at Bobcaygeon. The bottom is soft, and logs from the sides keep working into the channel. A dredge is greatly needed on this stretch. A beacon has been placed at the entrance into Sturgeon Lake. It should have a light placed on it at night, or be painted with luminous paint. The traffic on this stretch, between Lindsay and Bobcaygeon, has greatly increased this season, and two more steamboats have been placed on the route.

Lindsay.

At this station the works consist of a lock and dam. The original lock built in 1839, by the Government at that time, was rebuilt by the Ontario Government in 1870, and has since been controlled by them. The subject of the ownership of both lock and dam has been in dispute, and it is desirable that the question should be finally settled as soon as possible. This point is on the route of the Trent Valley Canal. A question as to what height the water above the dam is allowed to be retained has arisen, and communications have been sent to this Department on the subject.

Bobcaygeon.

The dam at this station is in a very decayed, leaky condition, and it is impossible to retain the water on this account. The mortices and tenons of the frame have completely rotted out, and the only thing that keeps the dam in position is the great amount of stone filling.

This dam retains the water of Sturgeon Lake at navigable height, and furnishes water power to the several mills at this point. It would be a serious loss to the whole of the district, and to the increasing traffic, if this dam were to give out. A new dam could be built, which would be much shorter and cost less money than the present one.

The dam was gravelled and repaired to make it as tight as possible. The swing bridge across the canal was raised to correspond with the grade of the street.

A break occurred in the north wall of the canal during the freshet, and it was feared that part of the village would be flooded; but it was stopped, and temporarily repaired by placing a breast work on the face of the bank. This breast work has been moved and made permanent.

Towards the latter part of June, two drives of logs passed over "Big Bob" channel, contrary to regulations, and wasted so much water that it was impossible to get the water up again to its ordinary height. Logs will be prevented from again coming down this channel, by a line of boom and piers placed at the entrance to the channel. The steamboat channel has a great many boulders on the bottom, which require to be removed. A beacon should be placed at the entrance. A breast work at the lower entrance to the lock, is being placed, to prevent boats influenced by the cross current from the dam, from grounding on the shore. The floor of the canal from the lock requires replanking, as it leaks very badly.

Buckhorn.

The dam at this station, which is under the control of this Department, is in a very good state of repair. There is a slight leak at the south end, which is being repaired.

Bracket boards have always been used on this dam, to retain the water of Pigeon and Mud lakes, for the benefit of navigation during the fall.

From the position of the county bridge, which rests on this dam, it is extremely difficult to place the brackets on at the proper time.

With slight alterations to the cap of the dam, light stop logs could be dropped into position at the proper time.

The new Government works at this station, consisting of a lock and canal, are about completed.

Burleigh.

The works at this station were for the descent of timber, but having received no repairs for years, are in a very dilapidated condition. On the completion of the new works here the booms and piers will have to be renewed.

Young's Point.

The Government having assumed control of the dam at this point, a new dam is being constructed.

The difficulty between the lumbermen and the steamboatmen, which has always existed between this point and Lakefield, on account of the lumbermen blocking the steamboat channel with logs, will be avoided in future, by the construction of a boom to separate the log channel from the steamboat channel. This boom is at present under construction.

Peterboro'

The river at this station, and the lake below, are becoming so filled with sawdust that it will soon stop navigation. It is impossible now for the steamboat to approach Ashburnham wharf, and complaints have been made by the residents of that municipality.

The balance of the appropriation made last year for dredging saw dust, was applied this year, but, though useful for a time, has again filled up with the immense deposits of sawdust that come down daily.

Whitlaw's Rapids.

The dam was tightened and repaired and the lock-chamber cleaned out. The walls of the lock-chamber require pointing, and new gates are needed. Another sluice is required in the dam, to let the spring freshet off more quickly.

Otonabee River.

Work has been done on the obstructions in this river, and navigation is much improved, but more work is still required to be done.

The obstruction at Dangerfield is a bar of sand; those at Yankee Bonnet and Robinson's Island are boulders ranging in size from 6 inches to 2 feet in diameter. These obstructions could be removed much more expeditiously by means of a dredge than by the present means, which is a derrick.

The entrance of this river into Rice Lake is by three mouths. The most easterly mouth, which is the best, and is about $1\frac{1}{2}$ miles shorter, is completely closed by a bank of sawdust. The entire entrance is also almost closed, and can only be raised at high water.

Keene.

The approach to this station is by the Indian River, which is very tortuous between the wharf and its entrance to Rice Lake. It could be much straightened by a short-cut being made, which could be done at a small cost, the material being a floating bog. A dredge is greatly needed at this as well as at many other points on this stretch.

The traffic between this and other points on the lake has much increased.

Hastings.

The original dam at this station was built some forty-four years ago.

The sheeting on the lower part of the bents, which was covered to a great depth with broken flag stone taken from the lock, has given out, and in consequence the whole river runs through the dam instead of over it. The dam requires to be unwatered and sheet piled. This was partly done some years ago, but not completed. The wing dam, which is private property, also leaks very badly. A sluice should be built across the entrance to the head-race to regulate the water used by the mills. The laying-to wharf above the lock was rebuilt.

Heely's Falls.

The dam at this station was slightly injured by the spring freshet, and will require to be repaired this fall. This dam retains the water at navigable height to Hastings.

Chisholm's Rapids.

The gates for the lock were hung and the lock-chamber cleaned out. The dam was gravelled. The waste weir on the south side of the dam is being prepared for a timber sluice, so that the timber in future will be kept on the south side instead of

crossing to the north sluice, and, which was often the case, passing over the dam, which caused great injury to the dam.

It is the intention to have a steamboat on this stretch next season.

I have the honor to be, Sir,

Your obedient servant,

RICHARD B. ROGERS,
Superintending Engineer.

A. P. BRADLEY, Esq.,
Secretary, Department Railways and Canals,
Ottawa.

No. 8.

ST. PETER'S CANAL.

Ottawa, 2nd October, 1884.

SIR,—Navigation through St. Peter's Canal was closed on the 2nd January, and opened on the 20th April, 1884.

The following is a statement of the traffic through this canal during the fiscal year ended 30th June, 1884.

Month.	No. of Ves- sels bound North.	Tonnage.	Amount Collected for Tolls.		No. of Ves- sels bound South.	Tonnage.	Amount Collected for Tolls.	
			\$	cts.			\$	cts.
1883.								
July	93	9,222	204	30	65	5,292	106	34
August	116	14,665	245	86	98	1,234	111	12
September	119	12,724	173	12	67	2,111	121	16
October	136	12,013	234	37	116	7,002	117	34
November	128	8,405	128	30	98	8,201	119	30
December	32	2,214	50	22	23	1,112	20	09
1884.								
January	1	24	0	68	1	102	3	43
April	3	97	2	87	2	82	2	23
May	70	2,606	97	27	52	1,303	84	42
June	160	7,818	194	39	70	3,909	172	42
Totals	798	69,788	1,329	38	592	30,348	857	85

I have to report that the canal was in good working order during the year.

The construction of a retaining wall on the eastern side of the canal, at its northern end was commenced, and, at the close of the year, was well under way. The foundation for this was dredged by a dredge of the Department of Public Works, which also operated on several shoals leading to the Bras d'Or.

The placing of fenders on the rocky sides of the canal, to prevent vessels from being injured, has been proceeded with; and a guard or fender has been constructed at the end of the lock to prevent paddle-wheel steamers from mounting the lock walls and injuring, not only themselves, but the work as well.

I have the honor to be, Sir,

Your obedient servant,

HENRY F. PERLEY,
Engineer in charge.

A. P. BRADLEY, Esq.,
Secretary, Department of Railways and Canals,
Ottawa.

PETERBOROUGH, 1st November, 1884.

SIR,—I have the honor herewith to submit an annual report on the works in my charge for the fiscal year ending 30th June, 1884, and generally to this date.

The works referred to are the Murray Canal and the Galops Rapid improvements on the Upper St. Lawrence River; and the surveys and works of construction as authorized in connection with the Trent Valley Canal.

MURRAY CANAL.

This work is situated in the County of Northumberland, about 75 miles west of Kingston; the canal, or rather artificial "strait," will connect the upper St. Lawrence River, and the Bay of Quinté waters with Lake Ontario by means of a direct channel—without locks—formed through the isthmus of Murray, and terminating opposite the village of Brighton, in the harbour of Presqu'île from whence egress to the lake will be had by enlarging and otherwise improving the channel through the middle ground shoal, dredged in 1871.

This harbour, owing to its capacity and position on the lake, will naturally become the head of extended river navigation, *via* the Bay of Quinté, and with its entrance permanently improved and better understood, cannot fail to be regarded eventually as the chief harbour of refuge on the north shore.

And in this connection, I desire to direct attention to the necessity which exists for immediate steps being taken with a view to the preservation of the standing timber which still remains on the Presqu'île peninsula.

The works which extend over a distance of $9\frac{1}{2}$ miles, consist in a through cut across the isthmus, $4\frac{1}{2}$ miles in length, and of detached stretches of submarine excavation of moderate depth at either end of the canal proper, and also at the entrance to Presqu'île Harbour.

The contract was entered into with Messrs. J. D. Silcox & Co., 24th August, 1882, work was commenced on the 1st of September following, and has since been prosecuted in a most satisfactory manner.

The correctness of the information obtained by survey in relation to the nature of the excavation has now been fully tested and is confirmed.

During the past season the work of excavation has been performed wholly by dredging, and no less than six well equipped dredges employed thereon, are stationed as follows, *viz.*:—

"Ontario" and "Central City" in Bay of Quinté, entrance and east end of through cutting.

"St. Charles," midway of through cutting in the Dead Creek marsh.

"Faugh-a-Ballagh" and "Wolverine" at the Presqu'île entrance and west end of through cutting;—and the "JohnPage" in Presqu'île harbour. With the exception of the entrance to the harbour, dredging and ordinary excavation has been carried on over the whole extent of the section. Short sections of the prism of canal, about 2,000 feet, at each end of the through cut have been completed. The foundations of all piers and abutments for the Trenton road bridge, and which are formed wholly in fine land, have been successfully completed.

The masonry was commenced 25th September last, and will be completed this season. The cribs for the base of the piers at the Presqu'île entrance have been sunk in position.

The high stage of water which prevailed in Lake Ontario during the season of 1883 still continues, and is to some extent favourable for dredging operations,

GALOPS RAPID, IMPROVEMENTS.

This work, situated about 7 miles east of the town of Prescott, and near the head of the Williamsburg Canals, consists in the formation, by sub-marine excavation, of a straight channel through the rapids, 200 feet in width, and adapted to the enlarged scale

of vessels drawing 14 feet. The distance over which the improvements will extend is about three quarters of a mile, in which several detached rocky shoals exist, and require to be reduced to such an extent as will enable vessels descending the rapid to carry with them a depth of at least 16 feet throughout, at low water.

Of these shoals the most extensive and difficult to remove are the "Lower Bar" at the foot of the rapid, and that next above known as the "Island Shoal," lying immediately above the "pitch."

Work in rapid turbulent water, and at a considerable distance from shore, is, it is needless to state, both difficult and dangerous. The reduction to the required grade, or bottom line, of the limestone rock, of which the shoals are composed, has been accomplished by drilling, blasting and dredging in from 10 to 20 feet of water, and in a current of at least 10 miles an hour.

The contractors have displayed great skill and energy in conducting their novel undertaking, and it may now be said that, after an experience of five seasons spent in the work, they have fully succeeded in systematizing their operations. The original contract was entered into with Messrs. William Davis & Sons, 5th August, 1879, and the work commenced 28th September, 1880.

Subsequently, 30th June, 1882, with the consent of the Government, the Messrs. Davis transferred their contract to the present contractors, Messrs. E. E. Gilbert & Sons, by whom the work has been conducted from its commencement in 1879.

The work in "Island Shoal" was begun in 1880, and practically finished at the end of the season of 1883. At "Lower Bar" drilling and blasting commenced 1st October, 1883, and was continued until 28th November following, when all operations were suspended for the season.

SEASON OF 1884.

The work of fitting out was commenced 4th April, and drilling and dredging operations in "Lower Bar" one month later.

The drilling was continued until 11th August, when, owing to a collision which occurred between the Torpedo (or drill boat) and a dump scow, in which the former was temporarily disabled and the latter sunk, the work was stopped until 21st August, since which date, however, drilling and blasting has been carried on very successfully.

Dredging operations were suspended from 21st May to 1st July, and the chain vessel (or dredge) taken to Montreal for repairs. She was, however, able to resume work on the latter date, and except some slight interruptions caused by accidents to her machinery, has since continued to work as usual.

It is the intention of the contractors to again take the chain vessel to Montreal for thorough repair, at the close of the season, which will probably be about the 20th November.

The remainder of the contractor's plant will, as heretofore, be wintered on the work.

TRENT VALLEY CANAL.

A continuous location survey, estimate, &c., for the direct line, as indicated in a previous report, was completed last spring, and its general results given by me to the Honourable the Minister.

This, the most direct and practicable line of those examined, necessarily diverged in many important instances from the route originally projected by Baird, in 1835; for which reason representations were subsequently made by persons locally interested in the undertaking, and acquainted with the character of the country traversed, to the effect that a closer adherence to, and the canalization of all rivers connecting the several lakes was desirable; that, although more circuitous, such a course would, nevertheless, be much cheaper than its adoption by the Government of the line surveyed by me, and would yet be sufficiently direct for all practical purposes, regarded as a natural navigable highway to the west.

Accordingly, in view of such representations, and of the importance attached to the selection of the best location for this extensive work, the Minister directed that additional information in relation to the original project should forthwith be obtained, to enable me to present an estimate therefor, as an alternative line, in the report on surveys, to be submitted to the Chief Engineer of Canals.

The necessary additional information has, in part, been obtained during the past summer, but a more minute examination of the Severn River, and other waters not included in the surveys for the direct line, remains to be accomplished, and as this work can be more satisfactorily performed on the ice, it will be proceeded with during the winter.

TRENT NAVIGATION.

The works on the proposed Trent Valley Canal now authorized and under construction, are confined to the "Back Lakes Division," which extends from Lakefield, at the head of the "Nine-mile Rapids" of the Otonabee River, to Balsam Lake, the summit level, a distance of 60 miles.

This division at present includes the regulating dams at Lakfield and Young's Point, and the Burleigh, the Buckhorn and the Fenelon Falls canals.

LAKEFIELD DAM

is formed of crib-work, and will replace the old "Strickland mill-dam." It is designed to regulate and control the levels on Katchewanoo Lake for the purposes of navigation. The contract was entered into with Mr. Charles Wynn, 19th March, 1884, to be completed 1st December, 1884. Some necessary repairs have been made, under the contract, to the mill-dam, in order to maintain it until the new structure is completed. The foundation has been commenced, and a quantity of materials delivered on the work.

YOUNG'S POINT DAM.

This dam is also of crib-work, similar to that at Lakefield. It is situated below and near the old mill-dam, and will control and maintain the navigable reach extending upwards through Clear and Stony Lakes to Burleigh Falls. The contract was entered into with Mr. Charles Wynn, 23rd January, 1884, to be completed 1st September, 1884. The work is executed in a very substantial manner, and will be completed this season.

BURLEIGH CANAL.

This work covers the interval from Stony to Deer Bay Lake, a distance of about 2½ miles. It includes Big Burley Chute, Lovesick Lake and Lovesick Rapids, and consists in the construction of three lift-locks, of which two at Burleigh Chute are combined; also, the necessary regulating and flat dams, &c., and the abutments for the Colonization Road bridge. The contract was entered into with Mr. George Goodwin, 27th September, 1882, to be completed 1st July, 1885.

In April last a quarry was opened about one mile south of Burleigh Bridge, and a small force has been employed thereat in preparing stone for the locks; and some timber, intended for lock foundations and for the dams, has also been delivered on the section.

The plant from Buckhorn is, it is stated, to be removed to this work, in readiness for next season's operations.

BUCKHORN CANAL,

about one-fourth of a mile in length, occupies the north bank of the upper rapids, which obstruct the channel between Deer Bay and Buckhorn Lakes. The work here consists of a lift-lock, with the necessary piers to form the lower entrance, and a short

reach of canal leading into Buckhorn Lake; also, of the improvement of the Little Buckhorn Rapids, by the removal of some detached rock and boulders.

This contract, also, was entered into with Mr. George Goodwin, 27th September, 1882, to be completed 1st September, 1884.

The work will be completed this season. It is of a very substantial character, and has been conducted in a very satisfactory manner since its commencement in March, 1883, notwithstanding the difficult nature of the excavation, granite work and boulders.

FENELON FALLS CANAL.

is situated on the eastern bank of the outlet of Cameron's Lake, and nearly in the centre of the village of Fenelon Falls. It is about one-third of a mile in length, and is designed to overcome the falls between Sturgeon and Cameron's Lake.

The work consists in the construction of two lift-locks, combined with entrance piers below, and a short reach of canal above them; also, of the requisite pivot and rest piers to form a passage through the existing bridge on the Victoria Railway. The contract was entered into with Messrs. A. F. Manning & Co., 14th October, 1882, to be completed 1st July, 1885.

Work was commenced 16th October, 1882, and has since been continued without interruption, and in a very satisfactory manner, although much difficulty was experienced in connection with the unwatering of the works.

The upper lock, commenced in 1883, is now about half finished, and the lower lock, which was only begun this season, will be completed before its close.

The piers forming the lower entrance are also completed, the channel between them deepened, and the coffer dam in course of removal.

The excavation in prism of canal and stone to complete the upper lock and the bridge piers has been prepared at Bobcaygeon quarry, and is now being delivered on the section. All the work embraced in the contract will, it is anticipated, be fully completed by the end of the season of 1885.

The construction of a raceway for mill purposes has been authorized in connection with this canal, and an arrangement was made with the contractors to undertake this work also, as it to some extent affects the masonry of the upper lock.

I am, Sir, your obedient servant,

JOHN S. RUBIDGE,

Engineer-in-Charge.

No. 10.

Burlington Bay Canal.

SUPERINTENDENT'S OFFICE,

ST. CATHARINES, 29th Sept., 1884.

SIR,—I have the honor to submit my report on the working and condition of the Burlington Bay Canal, for the year ending 30th June, 1884.

The canal was closed on the 17th December, 1883, and opened on the 15th April, 1884.

No interruptions to the passage of vessels has occurred during the year.

I have had soundings taken across the canal at 50 feet distances, for the greater portion east of the H. & V. W. Railway bridge, had them plotted and cross-sections made, showing the present conformation of the bottom, and by the aid of the diver and assistants, have been able to ascertain the depths on both sides, with reference to the above mentioned cross-sections. I left the plans giving the information with the Chief Engineer, on the occasion of my recent visit to Ottawa.

Some considerable improvements and renewals have been made at the ferry landings, and everything throughout is now in excellent order.

Your obedient servant,

A. P. BRADLEY, Esq.,

Department of Railways and Canals, Ottawa.

WILLIAM ELLIS,

Superintendent.

APPENDIX No. 7.

STATEMENT of Claims arbitrated or reported upon by the Official Arbitrators in connection with the Department of Railways and Canals during the Fiscal Year ended 30th June, 1884.

Claimants.	Nature of Claims.	When referred.	To whom referred.	Whether for Award or Report.	Amount claimed.	Amount awarded or recommended.	Date of Award or Report.	Remarks.
Wm. Wagner.....	C. P. R.—Land taken in Manitoba.....	1883.	Wm. Compton & Muma.....	Award.....	\$ cts.	\$ cts.		
W. W. T. Woodhill ...	I. C. R.—Damage to land by cotton factory siding.....	July 16...	Mr. Compton.	do	Not stated	.....		Case withdrawn.
Robert Blair, Est Hugh Blair.....	I. C. R.—Dalhousie Branch—Land taken.....	do 16...	do	do	do	.....		Withdrawn—settled.
Mrs. Vital Couture.....	I. C. R.—St Charles Branch—Land taken.....	do 27...	do	do	do	.....	
Alfred Labrecque.....	.....	Aug. 2...	Full Board.....	do	do	12 80	Nov. 16, '83.	
Mrs. Pierre Pelletier.....	.....	do 2...	do	do	do	135 35	do	
Charles Esnouf.....	.....	do 2...	do	do	do	60 00	do	
Sifroi Turgeon.....	.....	do 2...	do	do	do	17 00	do	
Charles Nadeau.....	.....	do 2...	do	do	do	175 00	do	
Damase Turgeon.....	.....	do 2...	do	do	do	125 00	do	
Bothique Turgeon.....	.....	do 2...	do	do	do	.....		Award included in the other claims below.
Damase Labrecque.....	.....	do 2...	do	do	do	185 00	Nov. 16, '83.	
Nazaire Chabot.....	.....	do 2...	do	do	do	60 00	do	
Honoré Turgeon.....	.....	do 2...	do	do	do	60 00	do	
Johnny Turgeon.....	.....	do 2...	do	do	do	14 00	do	
Damase Turgeon.....	.....	do 2...	do	do	do	84 00	do	
Mrs. Alexandre Monney.....	I. C. R.—St. Charles Branch—Land taken.....	do 2...	do	do	do	200 00	do	
François Labrecque.....	.....	do 2...	do	do	Not stated	7 00	do	
Benoni Roy.....	.....	do 2...	do	do	do	20 00	do	
Tonis Parry.....	.....	do 2...	do	do	do	22 00	do	
Mrs A. H. Murphy.....	.....	do 2...	do	do	do	2,663 00	July 14, '84.	

STATEMENT of Claims arbitrated or reported upon by the Official Arbitrators in connection with the Department of Railways and Canals, during the Fiscal Year ended 30th June, 1884.

Claimants.	Nature of Claims.	When referred.	To whom referred.	Whether for Award or Report.	Amount claimed \$ cts.	Amount awarded or recommended. \$ cts.	Date of Award or Report.	Remarks.
Stephen Tuttle.....	I. C. R.—Damage for a horse killed on the line.....	Jan. 9...	H. Muma.....	Report.	100 00	100 00	April 21, '84.	
Alexander Noble.....	do do	do 9...	do	do	120 00	100 00	do ..	
Alon. Carter.....	do Damage for a cow killed on the line.....	do 10...	do	do	75 00	25 00	do ..	
James McLeod	do Damage for two horses killed and one injured by.....	do	do	do	435 00	Nil.	April 15, '84.	Referred de nova.
J. A. Maurice.....	I. C. R.—St Charles Branch—Land taken for Chamby Canal, "right of way" probably taken for enlargement.....	Feb. 6...	Wm. Compton	do				
Anable St. Laurent.....	I. C. R.—Five sheep killed by.....	Mar. 28...	Jos Simard ...	do	15,000 00	1,250 00	May 8, '84.	
George I. Troop.....	do Dartmouth Branch—Land taken for.....	April 19...	do	do	12 00	12 00	May 12, '84.	
Hon. Alex. James.....	do	do 19...	Full Board...	Award.	2,000 00	300 00	May 23, '84.	
John W. Burton.....	do	do 19...	do	do	Not stated	125 00	do ..	
	do	do 19...	do	do	1,000 00	125 00	do ..	

CHAS. THIBAUT, Secretary to Official Arbitrators.

OTTAWA, 31st July, 1884.

APPENDIX No. 3.

GENERAL STATEMENT SHOWING:

- 1st. Water Power and other Public Property leased on Canals and Railways, during the Fiscal Year ending 30th June, 1884.
- 2nd. Property purchased or damaged by the Department of Railways and Canals, for the Dominion Railways and Canals, and Property sold by the same Department, as not being required for said Railways and Canals, during the Fiscal Year ending 30th June, 1884.
- 3rd. Agreements respecting Subsidies granted by the Dominion Government to aid in the construction of Railways, entered into by certain Railway Companies with the Minister of Railways and Canals, during the Fiscal Year ending 30th June, 1884.

GENERAL STATE

1st. Water Power and other Public Property leased on Canals

Date of Signature.	Term of Lease.	Lessees.	Property Leased.	For what purpose used.
<i>Beauharnois Canal.</i>				
Aug. 18, 1883	Pleasure of Government.	Lake St. Francis Tow-Boat Co. (Limited)	Wharf lot at 230 ft. North of Guard Lock, Valleyfield.	Office, &c.
Sep. 28, 1883	do	Eusebe French	Lot No. 1, in front of official lot 850, above Guard Lock, S. of Canal, Valleyfield.	To deposit cord-wood.
Nov. 20, 1883	do	Adolphe D'Aoust	Canal bank, 370 ft. above bridge, S. of Canal, except 31 ft. for a road, St. Timothée.	Wharf and store.
do 15, 1883	do	Alex'r McFee & Co.	Canal bank, 200 ft. below bridge, S. of Canal, St. Timothée.	do
do 20, 1883	do	Aug. Lespérance	Canal bank, 350 ft. below bridge, S. of Canal, St. Timothée.	do
do 20, 1883	do	Leon Leduc	Lot No. 1, above Guard Lock, N. of Canal, Valleyfield.	Workshops, to repair vessels.
Feb. 22, 1884	do	Moise Lalonde	Lot No. 1, below Guard Lock, N. of Canal, Valleyfield.	Lumber yard
Jan. 22, 1884	do	John Henry Wilson	Lot No. 1, above Guard Lock, N. of Canal, Valleyfield.	Coal yard
July 22, 1884	do	Coll. McFee	Wharf lot at 2,000 ft. above Guard Lock, S. of Canal, Valleyfield.	Wharf
<i>Lachine Canal.</i>				
Jan. 9, 1884	Winter of 1884	Curling Committee, Winter Carnival, 1884.	Bond of A. A. Stevenson <i>et al.</i> , in case of damage by use of Sheds Nos. 1 and 2, near St. Gabriel Locks.	Curling rink
Dec. 29, 1883	do	Thos. Keogh <i>et al.</i>	Bond in case of damage by use of Shed No. 2, at Basin No. 2, near St. Gabriel Locks.	Skating rink
<i>Rideau Canal.</i>				
Dec. 14, 1883	Pleasure of Government.	Corporation of City of Ottawa.	Part of water-way, W. of Canal, at Show Grounds, on Bank street, Ottawa.	½-mile driving track.
July 5, 1884	do	B. E. Chaffey	Part of lot 17, in 8th Concession, South Crosby, W. of Canal.	Grist mill
Mch. 20, 1884	21 yrs., renewable for ever	Estate of late Jas. C. Foster.	Part of lot 21, in 7th Concession, Storrington, W. of Canal.	do
May 17, 1884	Pleasure of Government.	Dey Brothers	Lots 4, 5, 6 and 7, N.E. of Canal, near Maria street bridge, Ottawa.	Boat house, &c.
June 12, 1884	do	J. G. Butterworth & Co.	Lots 1 and 2 do do	Storing coal
<i>Cornwall Canal.</i>				
Aug. 3, 1883	do	Flack Brothers	Lot on south side of Water street, between Amelian and Adolphus streets, Cornwall.	Coal shed

MENT SHOWING :

and Railways, during the Fiscal Year ended 30th June, 1884.

Amount of Water Power Leased.	Area of Property Leased.	Date from which Lease is reckoned	Annual Rental.	Terms of Payment.			Remarks.
				Amount of each Instalment.	When Payable each Year.	When first Instalment was Payable.	
			\$ cts.	\$ cts.			
.....	1,550 ft.....	July 1, 1883	20 00	20 00	July 1....	On delivery of lease.	Payable in advance.
.....	260 x 20 ft.	Sept. 1, 1883	20 00	20 00	Sept. 1....	do ...	do
.....	150 x 70 ft.	May 1, 1883	10 00	10 00	May 1....	do ...	do
.....	150 x 75 ft.	do 1, 1883	10 00	10 00	do 1....	do ...	do
.....	150 x 75 ft.	do 1, 1883	10 00	10 00	do 1....	do ...	do
.....	$\frac{3}{4}$ acre	Sept. 1, 1883	30 00	30 00	Sept. 1....	do ...	do
.....	100 x 70 ft.	do 1, 1883	10 00	10 00	do 1....	do ...	do
.....	150 x 100 ft.	July 1, 1883	40 00	40 00	July 1....	do ...	do
.....	150 x 30 ft.	Nov. 15, 1882	15 00	15 00	Nov. 15....	do ...	do
.....	.....	Winter, 1884	.....	.....	.....	.....	Bond in \$1,000.
.....	.....	.....	10 00	10 00	Paid.....	On delivery of lease.	do \$500.
.....	150 x 50 ft.	Nov. 1, 1883	1 00	1 00	Nov. 1....	do ...	In advance.
Surplus water to pass through flume.	3 r., 18 p..	July 1, 1883	5 00	5 00	July 1....	July 1, 1883	do
40 h. p.	2 a., 2 r., & 4 p.	May 15, 1882	105 00	52 50	Jan. 1 and July 1.	Jan. 1, 1883	This renews lease No. 2,343
.....	396 x 99 ft.	do 1, 1884	80 00	80 00	May 1....	May 1, 1884	In advance.
.....	132 x 99 ft.	June 1, 1884	80 00	80 00	June 1....	June 1, 1884	do
.....	0.40 acre..	July 1, 1883	25 00	25 00	July 1....	On delivery of lease.	do

GENERAL STATEMENT showing : 1st. Water Power and other

Date of Signature.	Term of Lease.	Lessees.	Property Leased.	For what purpose used.
<i>Cornwall Canal—Concluded.</i>				
Dec. 7, 1883		Stormont Cotton Manufacturing Co.	A. F. Gault assigns to this company his lease No. 5,816.	Cotton factory...
do 15, 1883		do	This company assigns to the "Canadian Permanent Loan and Savings Co.," by way of mortgage, their leases No. 5,816, held under A. F. Gault, and No. 5,867, held under P. E. Adams.	do
do 3, 1883		Toronto Paper Manufacturing Co.	The company assign their lease No 6,885 to "Canada Life Insurance Co."	Paper mill.....
<i>Welland Canal.</i>				
May 10, 1883	21 yrs., renewable for ever	J. W. Holmer.....	Mill lot on Grand River, at Dunnville.	Door and sash factory.
Aug. 30, 1883	Pleasure of Government.	H. Jarvis.....	Part of lots 3 and 4, sub-division of lot 16, in 4th Concession, Grantham, St. Catharines.	Sail loft.....
June 27, 1884	do	Lybster Cotton Mills Co.	Part of lots 11 and 12 in 10th Concession, Grantham, at Merritton.	Connected with cotton mill.
July 1, 1882		King & Dolan	Assign their lease, No. 6,664 of 11th July, 1882, to the Merritton Cotton Mills Co. (Limited), Merritton.	do
Nov 25, 1883		Merritton Cotton Mills Co. (Limited).	Company mortgage their lease, No. 6,664, to Canada Life Assurance Co.	
<i>Official Cars.</i>				
an. 11, 1884	10 years	Her Majesty	Lot at Stewarton Station of the "Canada Atlantic Railway Co.," near Ottawa.	Shed for official railway cars.
<i>Intercolonial Railway.</i>				
uly 1, 1883	1 year	Dominion News Co.	License to sell books, etc., on regular passenger trains of Intercolonial Railway—	
do 1, 1883	do	Joseph Fortin	Halifax to Campbelltown; St. John to Pointe du Chêne.	
do 28, 1884	do	do	Pte. Lévis to Campbellton.	
June 28, 1884	Terminable on 6 months' notice.	Northern & Western Railway Co., of New Brunswick.	License to cross Intercolonial Railway on a level at or near Chatham Junction Station.	Crossing
<i>Chambly Canal.</i>				
Dec. 1, 1883		J. A. Maurice et ux.	Will quit house and triangular lot, now Lock No. 7, Chambly Basin, 1st April, 1884, held under lease of 25th June, 1873.	Chambly Canal.

Public Property leased on Canals and Railways, etc.—Continued.

Amount of Water Power Leased	Area of Property Leased.	Date from which Lease is reckoned.	Annual Rental.	Terms of Payment.			Remarks.
				Amount of each Instalment.	When Payable each Year.	When first Instalment was Payable.	
			\$ cts.	\$ cts.			
							Minister's assent, Dec. 26, 1883.
							do Dec. 28, 1883.
							do July 8, 1884.
14 h. p...	0.25 acre.	April 1, 1883	120 00	60 00	Jan. 1 and July 1.	April 1, 1883	This supersedes lease 2,533, H. Miklebergen, \$30 in advance; then, 1st July, 1883, 60; then \$60 semi-annually.
.....	1.29 acres.	July 1, 1883	12 00	12 00	July 1.....	On delivery of lease.	
.....	0.74 acre.	Feb. 1, 1884	50 00	50 00	Feb. 1.....	do ...	Addition to lease No. 6,574, to Gordon & Mackay. * Minister assents, 24th Feb., 1884.
.....							Minister assents, 14th Feb., 1884.
.....	5,100 ft. ...	Jan. 1, 1884	10 00	10 00	Jan. 1.....	Jan. 1, 1885	
.....		July 1, 1883	900 00	75 00	Monthly ...	July 1, 1883	In advance.
.....		do 1, 1883	300 00	25 00	do ...	do 1, 1883	do
.....		do 1, 1884	300 00	25 00	do ...	do 1, 1884	do
.....			20 00				

2nd. PROPERTY purchased or damaged, by the Department of Railways and Canals, and property sold by the same Department as not being required for the Railways and Canals, for the Fiscal Year ended 30th June, 1884.

Date of Signature.	Vendors, &c.	Purchasers.	Property Purchased or Sold, or Damaged.	For what Purpose used, &c.	Area of Land.	Amount Paid.	Remarks.
Nov. 7, 1883	Peter O'Brien.....	Her Majesty	Release for damages, flooding lots 9 and 10, 1st Con. East Hawkesbury	Carillon Dam	22 acres...	\$ 1,600 00	
Dec. 12, 1883	Dolphus Filion.....	do	N.W. part 6	do	2 1/2 do	180 00	
do 6, 1883	John Hodgson.....	do	W 1/2 11	do	5 do	450 00	
do 7, 1883	Arch. McDuff.....	do	W 1/2 3, N.E. part 4	do	1 1/2 do	100 00	
do 8, 1883	Wm. Gray.....	do	W 1/2 12	do	2 1/2 do	300 00	
do 3, 1883	Henry Hughes.....	do	W 1/2 13	do	1 1/2 do	100 00	
do 5, 1883	Robt. McPhaden.....	do	E 1/2 3	do	3 1/2 do	325 00	Alex. St. Denis, mortgagee, as-sensia.
do 11, 1883	John M. Kirby.....	do	E 1/2 8	do	1 1/2 do	50 00	
do 20, 1883	E. S. Bradford.....	do	E 1/2 & E 1/2 br. frt. 13	do	6 do	600 00	
do 17, 1883	A. & H. E. Hartley.....	do	W 1/2 8	do	2 1/2 do	125 00	J. & J. Scott, mortgagee, assent.
do 20, 1883	J. Fitzgerald.....	do	6 and 7, Chatham	do	6 do	300 00	
do 22, 1883	P. Filion.....	do	11	do	5 1/2 do	650 00	
do 23, 1883	John Mullin.....	do	8	do	2 1/2 do	185 00	
do 27, 1883	Jane Nicholson.....	do	20	do	1 do	40 00	
do 30, 1883	Sarah Wilson, wife of John Nicholson.....	do	23	do	Part.....	20 00	
do 30, 1883	Jas. Glaston.....	do	18, or cad. lot 216	do	1 acre	30 00	
Jan. 22, 1884	John Gibson et al.....	do	E 1/2 21, or cad. lot 223	do	0 1/2 do	25 00	
do 15, 1884	Louis Gauthier et al.....	do	E 1/2 11, 1st Con. East Hawkesbury	do	8 do	600 00	
Dec. 31, 1883	W. R. Bradford et al.....	do	E 1/2 7	do	2 do	350 00	
Feb. 22, 1884	W. & S. Cole.....	do	E 1/2 14	do	1 1/2 do	200 00	
Mar. 19, 1884	Thos. Ross et al.....	do	W 1/2 11 and E 1/2 12	do	.....	300 00	
Dec. 21, 1883	J. & T. Gamble.....	do	25	do	.....	100 00	
Jan. 30, 1884	F. O. Noyes.....	do	4	do	.....	450 00	
Dec. 29, 1883	G. Bradford, jun., et al.....	do	1 1/2, 1st Con. Chatham	do	6 acres	1,000 00	
Jan. 23, 1884	J. B. Cushing.....	do	17	do	10 do	675 00	
do 9, 1884	Widow O. Dewar and P. Dewar, et al.....	do	1 and 2	do	.....	1,100 00	
do 9, 1884	Widow O. Dewar and P. Dewar, et al.....	do	10, 12 and 13	do	.....	1,100 00	

2nd. PROPERTY purchased, or damaged, or sold by the Department of Railways and Canals, &c.—Continued.

Date of Signature.	Vendors, &c.	Purchasers	Property Purchased, Sold or Damaged.	For what purpose used.	Area.— Acres.	Amount Paid.	Remarks.
Mch. 19, 1884	Moise Lahue.....	Her Majesty.	As owner of cad. lot No. 93, Ste. Anne.....	Ste. Anne Canal..	.....	\$ 60 00	
do	Nap. Lahue.....	do	do 93 do	do	.....	60 00	
do	J. W. Crevier.....	do	do 97 do	do	.....	60 00	
do	C. Normandeau.....	do	do 97 do	do	.....	60 00	
do	R. Lareute.....	do	do 98 do	do	.....	60 00	
do	G. Leduc.....	do	do 98 do	do	.....	60 00	
do	A. Chanut.....	do	do 99 do	do	.....	60 00	
do	P. Legault.....	do	do 100 do	do	.....	60 00	
do	J. Barrett.....	do	do 106 do	do	.....	60 00	
do	Rev. Geo. Chevrefils.....	do	do 107 do	do	.....	80 00	
do	B. St. Denis.....	do	do 107 do	do	.....	60 00	
do	J. B. St. Denis.....	do	do 107 do	do	.....	60 00	
do	L. Théoret.....	do	do 108 do	do	.....	150 00	
do	Alex. Do'è.....	do	do 126 do	do	.....	50 00	
do	L. Leroux.....	do	do 126 do	do	.....	150 00	
do	P. Brisbois.....	do	do 126 do	do	.....	5 00	
do	C. Duquette.....	do	do 122 do	do	.....	6 50	
do	J. Foubert.....	do	do 122 do	do	.....	80 00	
do	A. Dubreuil, sr. & jr.	do	do 123 do	do	.....	40 00	
do	Mrs. R. Vinette.....	do	do 124 do	do	.....	27 00	
do	A. Dubois.....	do	do 130 do	do	.....	40 00	
do	J. B. Dubois.....	do	do 130 do	do	.....	60 00	
Mch. 19, 1884	C. de Verille.....	do	do 131 do	do	.....	28 66	
do	T. Gravel.....	do	do 133 do	do	.....	60 00	
do	J. B. Daoust.....	do	do 133 do	do	.....	4 00	
do	P. Pilon.....	do	do 135 do	do	.....	40 00	
do	B. Lalonde.....	do	do 136 do	do	.....	40 00	
do	J. Lauzon.....	do	do 137 do	do	.....	25 00	
Mch 20, 1884	P. Sagala.....	do	do 137 ^a do	do	.....	30 00	
Mch. 22, 1884	A. Pilon.....	do	do 139 do	do	.....	40 00	
Mch. 19, 1884	C. Raymond.....	do	do 157 do	do	.....	40 00	
do	A. St. Denis.....	do	do 158 do	do	.....	50 00	

2nd. PROPERTY purchased, or damaged, or sold by the Department of Railways and Canals, &c.—Continued.

Date of Signature.	Vendors, &c.	Purchasers.	Property Purchased, Sold or Damaged.	For what purpose used.	Area. — Acres.	Amount Paid.	Remarks.
May 17, 1884	E. Lavigne	Her Majesty.	<i>St. Anne Canal—Receipts for deprivation of access to Ottawa River—Concluded.</i>	Ste. Anne Canal...		\$ cts.	
do	Isaac Brisebois	do	As owner of cad. lot No. 87, Ste. Anne.....	do	.....	33 00	
do	R. Seguin	do	do 82 do	do	.....	60 00	
do	P. Paquette	do	do 75 do	do	.....	40 00	
do	L. A. H. Hiroux	do	do 123 do	do	.....	40 00	
do	D. Gauthier	do	do 137 do	do	.....	26 00	
do	V. Guérard	do	do 132 do	do	.....	30 00	
do	F. X. Beaubien	do	do 122 do	do	.....	40 00	
May 21, 1884	H. Caron	do	do 155 do	do	.....	75 00	
May 19, 1884	W. Crevier	do	do 122 do	do	.....	17 00	
May 17, 1884	L. Guillard	do	do 95 do	do	.....	40 00	
do	J. B. Lavigne	do	do 166 do	do	.....	50 00	
do	Dr. L. J. V. de Lorimier	do	do 146 do	do	.....	40 00	
June 26, 1884	Pre. Lamarche	do	do 147 do	do	.....	15 00	
May 17, 1884	A. Annais	do	do 166 do	do	.....	40 00	
do	Widow J. B. Pilon	do	do 15 do	do	.....	75 00	
do	O. Perrault	do	do 153 do	do	.....	15 00	
do	A. Moupetit	do	do 164 do	do	.....	40 00	
May 19, 1884	T. Carrier	do	do 147 do	do	.....	10 00	
May 17, 1884	J. Quenneville	do	do 174 do	do	.....	40 00	
June 17, 1884	N. St. Denis	do	do 132 do	do	.....	10 00	
May 21, 1884	P. Portelance	do	do 172 do	do	.....	10 00	
May 17, 1884	A. Brunet	do	do 170 do	do	.....	30 00	
May 19, 1884	J. Boyer	do	do 122 do	do	.....	15 00	
May 17, 1884	Mrs. O. Auger	do	do 171 do	do	.....	20 00	
			do 134 do	do	.....	
			<i>Welland Canal.</i>				
Oct. 17, 1883	F. E. de Jonghe	do	Deed of part of lot No. 9, sub-division of S. 1 of 16, in 4th Concession, Grantham	Welland Canal.....	0.27 acre....	125 00	Per T. Nileau, executor.
Oct. 30, 1883	J. L. Facer, owner S. L. Ross, mort- gagee	do	{ Release, damages by closing Welland Ave., making new road, Facer St., on lot 13 in 5th Concession, Grantham.....	do	.....	600 00	
do	J. A. Midler et al.....	do	{ do do	do	.....	800 00	

2nd. PROPERTY purchased or damaged, or sold by the Department of Railways and Canals, &c.—Continued.

Date of Signature.	Vendors, &c.	Purchasers.	Property Purchased, Sold or Damaged.	For what Purpose used.	Area of Land.	Amount Paid.	Remarks.
Nov. 1, 1883	G. G. Chalmers.....	Her Majesty.	<i>Trent Valley Canal—Continued.</i> Release, damages to lots 36 and 37 in 12th Con., Smith, and lot 26 in 4th Con., Douro.....	Trent Valley Canal	.....	\$ 5,500 00	By dam on Otonabee River.
do 23, 1883	The Canada Co.....	do	do lot 9 in 7th Con., Harvey.....	do	.....	50 00	do
Oct. 18, 1883	Govt. of Ontario.....	do	Order in Council vesting in Dominion Govt. part of lot No. 40 in 17th Con., Smith.....	do	10-00 acres	.....	Free.
Dec. 19, 1883	The Canada Co.....	do	Release, damages to lot No. 9 in 5 Con., Harvey.....	do	.....	50 00	By dam at Lovesick Rapids.
do 20, 1883	Wm. Doogan.....	do	do lots 32, 33 in 10th Con., Smith.....	do	.....	75 00	By dam at Lakefield.
Jan. 3, 1884	Isaac Garbutt.....	do	do lot 27 in 8th Con., Smith, and 4 on Clements St., Lakefield.....	do	.....	2,000 00	do
Dec. 28, 1883	Andrew Miller, jr.....	do	do lot 31 in 10th Con., Smith.....	do	.....	300 00	do
Jan. 11, 1884	H. J. Strickland.....	do	Release, damages to lot 25 in 4th Con. Douro.....	do	.....	160 00	By dam at Lakefield.
Oct. 5, 1883	J. Bianco.....	do	do 33 in 16th Con. Smith.....	do	.....	50 00	do Lovesick.
Jan. 31, 1884	re R. C. Smith.....	do	Deposit into Court re lots on Colborne, May and Water streets, Fenelon Falls, &c., &c.....	do	.....	{ 14,000 00	
Feb. 8, 1884	re Hague Estate	do	Deposit re lots 28 in 8th, 30 in 10th, and 29 and 30 in 9th Con. Smith.....	do	.....	{ 420 00	
Aug. 30, 1883	T. G. Grievie.....	do	Release, damages to lots 21 and 22 in 6th Con. Douro.....	do	.....	{ 2,000 00	
do	do	do	do 23 in 5th do	do	.....	60 00	
Feb. 15, 1884	Minister of Railways and Canals.....	do	Declaration that damages above and below refer to the 43 inches above decree height.....	do	.....	67 00	By waters of Lake Katchewanooka.
Dec. 23, 1883	H. C. Garbutt.....	do	Release, damages to lot 27 in 9th Con. Smith.....	do	.....	433 00	do
Feb. 5, 1884	The Grange Trust (Ltd).....	do	do do	do	.....	300 00	By Lakefield dam.
Oct. 1, 1883	Jos. McArthur et al.	do	Deed of part of block N., near Camerons lot, Village of Fenelon Falls.....	do	.....	1 00	do
				do	1.25 acres	900 00	

Sept. 5, 1883	K. Tully et al., trustees, and H. J. LeFebvre et al.	do	Release, damages to lot 19 in 7th Con. Douro.	do	.....	80 00	By waters of Lake Katchawanooka. By Lakefield dam.
Feb. 1, 1884	A. Wilson	do	do 22 in 5th do	do	.....	350 00	
Dec. 31, 1883	R. O. Strickland et al.	do	Deed of Lakefield dam, slide, flood gates, &c., in Village of Wakefield	do	.....	5,000 00	
do	Jas. Campbell et ux.	do	Deed of part of lot 44 in 16th Con. Smith	do	5 acres	100 00	At Furlough Rurpids.
do	J. Campbell and J. B. McWilliams	do	Release for damages to lots 41, 42, 43, 44 in 16th Con. Smith	do	.....	200 00	do
Feb. 25, 1884	J. B. McWilliams	do	Deed of part of lot 44	do	5 acres	1 00	do (Mining rights)
do	J. B. McWilliams	do	Release, as lessee of lots 41, 42, 43, 44 do	do	.....	1 00	do
Apr. 9, 1884	Geo. Goodwin	do	Release by order of Court of Chancery, re damages to lots 28 in 8th, 29 and 30 in 9th, and 30th in 10th Con. Smith	do	.....	2,000 00	By Lakefield dam.
Mar. 25, 1884	Hague Estate (Infants in Chancery)	do	Release, damages to lot S. E. 26 in 8th Con. Smith	do	.....	100 00	do
June 14, 1884	John Edwards	do	do 28 in 9th do	do	.....	600 00	do (Hamilton Provident and Loan Society, mortgagees, absent.)
Jan. 12, 1884	Matthew Bell	do	do	do	.....	100 00	By Lakefield dam.
July 9, 1884	A. Mc. N. Nichols	do	do 19 in 7th Con. Douro.	do	.....	240 00	By Lake Katchawanooka.
Sept. 5, 1883	K. Tully et al., trustees, and H. J. LeFebvre et ux.	do	do 20 in 7th do	do	.....	80 00	do
do	do	do	do 21 in 7th do	do	.....	100 00	By Lakefield dam.
Feb. 12, 1884	Thos. Gordon et ux.	do	do Esq Park lot 2, N. of George street, Village of Lakefield	do	.....	3,600 00	
<i>Intercolonial Railway.</i>							
Oct. 16, 1883	Her Majesty	R. Macdonald	Bill of sale to him of steamship "Rimouski"	Intercolonial Ry	.....	
May 23, 1884	Nova Scotia Govt.	Dominion Govt.	Transfer of "Eastern Extension" or Nova Scotia Railway, Pictou Branch, rolling stock, &c	do	.....	
do	do	do	Transfer of steamer "Norwegian"	do	.....	1,437,629 00	

2nd. PROPERTY purchased, or damaged, or sold by the Department of Railways and Canals, &c.—Continued.

Date of Signature.	Vendors, &c.	Purchasers.	Property purchased, sold or damaged.	For what Purpose used, &c.	Area. — Acres.	Amount Paid.	Remarks.
			<i>Canadian Pacific Railway.</i>			\$ cts.	
Oct. 17, 1883	Hon. W. J. Almon....	Her Majesty	Deed of lots Nos. 6 to 10, in block 59, Emerson	Canadian Pacific Railway.....	.....	298 60	
Sept. 4, 1883	W. J. Whitley.....	do	do lot 42, Ste. Agathe.....	do	2.76 acres	60 90	
Jan. 7, 1884	G. B. Spencer.....	do	do blocks 73 and 82, Emerson	do .....	.....	1,187 00	
Aug. 7, 1884	Albert Todd.....	do	do lot No. 64, St. Clements.....	do .....	.....	642 20	And release for damages, &c.
Sept. 30, 1884	D. Livingstone.....	do	do S E½ sec. II, Tp. 13, R. 2 E.....	Stonewall Branch.....	1.71 acres	335 25	do
Feb. 8, 1883	John Quaglioth Romano & Thos. Earle	do	Bond to indemnify Govt. in case of claims on cheque No. 5146, of Nov. 1st, 1882, on Bank of British Columbia for \$65 (which was to pay A. A. Hogg's, rodman, for services of Oct., 1882), payable to his order, and which was destroyed by fire at Lytton, B.C.....	Canadian Pacific Railway.....	.....	91 00	
June 30, 1883	Charles Bell <i>et al.</i>	do	Bond of indemnity in case of claim on a lost cheque No. 5917, on Bank of British Columbia.....	do .....	.....	
Sept. 13, 1883	C. & J. Murphy.....	do	Release, for injury to mining property at Union Bar, near Hope, B.C.....	do .....	.....	3,424 00	
Dec. 15, 1883	Peter Fink.....	do	Deed of lot No. 2, groupe 1, Yale, Lytton District, B.C., for station.....	do	119 acres	3,000 00	
			<i>Ottawa River.</i>				
Oct. 10, 1884	Eduard Lefebvre....	do	Release, damages to lots 38, 39, 40 in 2nd Con., Chichester.....	Dam at Oulbute Rapids & Lytton Rapids.....	{ Principal.. Interest 8½ years.....	7,135 00	\$10,668.82 in all (dams completed in 1876.
			<i>Rideau Canal.</i>			3,531 82	
Nov. 15, 1883	R. H. Somerville <i>et al.</i>	do	Deed of part lot 2 in 6th Con., S. Crosby, near Whitefish dam.....	Clay pit.....	1 acre	100 00	

Sept. 16, 1884	John Edwards	do	...	Release, damages to lot 41 in 5th Con., Pitts-	Rideau Canal.....	.....	70 00
do	do	do	do	burgh, by canal waters between Kingston	do	.....	84 00
Sept. 15, 1884	P. Blake.....	do	do	and Lower Brewer's Mills.....	do	.....	200 00
do 27, 1884	J. Tobin.....	do	do	lot 5 in 4th Con.	do	.....	120 00
do 18, 1884	W. Hegland & T. Bur-	do	do	do	do	.....	150 00
do 26, 1884	A. Guild.....	do	do	do	do	.....	82 50
do 18, 1884	W. McFarlane.....	do	do	do	do	.....	120 00
Nov. 24, 1883	W. J. McLean et ux...	do	do	Deed of { W ¹ lot 17 in 7th Con. North Emsley	} Tay Canal.....	{ 17-20 acres	1,000 00
Mar. 11, 1884	W. Beveridge et ux...	do	do	{ E ¹ do 6th do	do	{ 6-50 do	300 00
May 14, 1884	A. McVeitty (widow)	do	do	{ E ¹ lot 18 in 7th do	do	{ 2-00 do	350 00
				{ E ¹ lot 17 in 7th do	do		

3rd.—AGREEMENTS respecting Subsidies granted by the Dominion Government to
with the Minister of Railways and Canals, during

Date of Signature.	Name of Railway Company.	Line of Railway to be Constructed.	Acts of Canada granting Subsidy.
July 28, 1882	The Great American and European Short Line Railway Co.	From Oxford Station of Intercolonial Railway to New Glasgow, N.S., and branches.	45 Vic., c. 14...
do 20, 1883	International Railway Co	Sherbrooke to boundary of United States and connections.	46 Vic., c. 25...
Sept. 4, 1883	Quebec and Lake St. John Railway Co. }	St. Raymond to Lake St. John..... {	{ 45 Vic., c. 14... 46 Vic., c. 25...
Dec. 31, 1883	Napanee, Tamworth and Quebec Railway Co.	Napanee to Tamworth	46 Vic., c. 25 ..
Ap'l 12, 1884	Northern and Pacific Junction Railway Co }	Gravenhurst to Callendar..... {	{ 45 Vic., c. 14... 46 Vic., c. 25...
Aug. 2, 1884	Quebec Central Railway Co.	Beauce Junction to International boundary line.	47 Vic., c. 8...

aid in the construction of Railways, entered into by certain Railway Companies the Fiscal Year ending 30th June, 1884.

Amount of Subsidy.		No. of miles to be subsidized.	Maximum Grade :— Feet to the mile.	Radius of Curvature, not less than—	Width of Clearings, each side.	Width of Cuttings.	Embankments.	Rails.		Line to be completed	Remarks.	
Per mile.	Not exceeding in the whole—							If steel.	If iron.			
\$	\$		Ft.	Ft.	Ft.	Ft.	Ft.	Lbs.	Lbs.			
3,200	224,000	.....	80	955	50	20	16	56	.....	Jan. 1, 1884. Whole line.	Gov'tment to furnish iron rails for branches to Pugwash and Pictou siding to Oxford Village.
3,200	156,800	49	80	955	50	20	16	56	.....	29 miles east of Lennoxville, Aug. 1, 1883; 16 miles east of Lake Megantic, Nov. 1, 1883; 4 miles to Sherbrooke, May 25, 1887.	
3,200	384,000	120	106	717	} 33	20	15	56	.....	To Lake Edward Island, Dec 31, 1885; thence to Lake St. John, May 25, 1887.	Co. transferred \$100,000 of their subsidies to Ross & Co., Sept. 26, 1884.
3,200	80,000	25	118	600								
3,200	89,600	28	92	955	50	20	14	56	.....	Dec. 31, 1884.	
6,000	660,000	{ The Canada Atlantic Railway, between Ottawa and Côteau Station, fixed as a standard. }									} May 1, 1886.	
6,000	660,000											
3,200	211,200												.....	85	819	50	20	14	50	56	3 1/2 years from date hereof.

APPENDIX No. 9.

CANADIAN PACIFIC RAILWAY.

STATEMENT of Contracts entered into between 1st July, 1883, and 30th June, 1884.

Railways and Canals.	Deed, Letter or otherwise under which contract was made.	Name of Contractor.	Date of Contract.	General Description.
Canadian Pacific Railway.....	Letter : 31,830	Canadian Pacific Railway Co	July 3, 1883	Offer to complete road from Fort William to Selkirk, (accepted by O.O. No. 31,913 of 9th July, 1883).
Prince Edward Island Railway.....	Deed No. 7,229	Moss, Bay Homesite Iron and Steel Co. (Limited)....	Aug. 1, 1883	Supply 500 tons steel rails with fish plates, bolts, and nuts, for Prince Edward Island Railway.
do do	do 7,235	Gray & Wheaton.....	Dec. 29, 1883	Construct Cape Traverse Branch of Prince Edward Island Railway, ready to lay rails.
do do	do 7,241.....	Canadian Locomotive and Engine Co. (Limited).	Jan. 25, 1884	Construct 2 narrow gauge locomotive engines for Prince Edward Island Railway.
do do	do 7,503	T. D. & B. & W. H. & C. Archibald and Wm. Purves.....	May 9, 1884	Supply 5,500 tons coal for Prince Edward Island Railway : 2,600 tons at Charlottetown. 2,000 do Summerside. 500 do Georgetown. 500 do Souris.
Intercolonial Railway	O. C. 31,938.....	Geo. Fleming & Sons.....	July 7, 1883	To purchase from them four additional locomotive engines for Intercolonial Railway.
do	Deed No. 7,132.....	J. Harris & Co.....	Aug. 6, 1883	Construct 12 1st class passenger cars for Intercolonial Railway, delivered at St. John, N.B.
do	do 7,270.....	City of Halifax.....	Sept. 1, 1883	Supply water for locomotives, at Richmond, Intercolonial Railway.
do	do 7,303.....	Quebec Central Railway Co.	Feb. 12, 1884	Government, to convey passengers and freight of Company between Point Lewis and St. Henri Station, Intercolonial Railway.
do	do 7,307.....	Halifax Co. (Limited).....	Jan. 10, 1884	Supply 25,000 gross tons of round coal for Intercolonial Railway, from 1st July, 1883, for 12 months (f. o. b.) cars at albion mines or on tenders at coal drop near the track.
do	do 7,312.....	Arcade Lemieux.....	Feb. 11, 1884	Transporting freight at Chaudière Junction, Intercolonial Railway.

STATEMENT of Contracts entered into between 1st July, 1883, and 30th June, 1884.—Continued

Railways and Canals.	Deed, Letter or otherwise under which contract was made.	Name of Contractor.	Date of Contract.	General Description.
Lachine Canal	Deed No. 7,506.....	E. Ouellette & Co	June 4, 1884	Construct a road from Lachine to Côte St. Paul Road, about 9,500 feet long, along Lachine Canal.
St. Peter's Canal.....	do 7,181.....	McDonald & Moffatt.....	Oct. 13, 1883	Retaining wall and earth filling, St. Peter's Canal.
Ottawa River.....	O. C 101,243	Poupore & Co.....	Oct. 20, 1883	Deepen channel above Culbute Lock, Ottawa River.
Trent Valley Canal.....	Deed No. 7,286.....	Charles Wynn.....	Jan. 23, 1884	Construct Young's Point Dam, Otonabee River, Trent Valley Canal.
do	do 7,348.....	Charles Wynn	March 19, 1884	Construct Lakefield Dam, Otonabee River, Back Lake Division, Trent Valley Canal.
Rapide Plat Canal.....	do 7,337.....	Mr. Brodet.....	April 2, 1884	Construct a lock and supply weir, enlarge and deepen upper entrance of Rapide Plat Canal.
Galops Canal	do 7,342.....	Nicholson & Allan.....	March 18, 1884	Deepen, &c., upper entrance, Galops Canal.
Cornwall Canal	do 7,355.....	Jocks & Delorimer.....	April 7, 1884	Construct a lock and supply weir, deepen and enlarge upper entrance, Cornwall Canal—Section 10.
do	do 7,510.....	Breckon & McKenna.....	July 22, 1884	Construct a sewer, at Cornwall, Cornwall Canal.
International Railway.....	Deed No. 7,118.....	GENERAL. International Railway Co.....	July 20, 1883	Agreement re-subsidy to construct railway from Sherbrooke, Province of Quebec, to United States boundary line, and extension through Maine to connect with New Brunswick at Vanceborough or south thereof (49 miles).
Quebec Lake St. John, Railway, Co.	do 7,119.....	Quebec Lake St. John Railway Co	Sept. 4, 1883	Agreement re-subsidy to construct railway from St. Raymond to Lake St. John.
1st. Dean, Westbrook, and Balfour, Contractors, 2nd, Corp. Town of West Lynne, 3rd, Corp. Town of West Lynne, 4th, Thos. Carney, surety.	do 7,154.....	1st. Dean, Westbrook and Balfour, Contractors, 2nd, Corp. Town of Emerson, 3rd, Corp. Town of West Lynne, 4th, Thos. Carney, surety	Feb. 20, 1883	Construct a wrought iron combined railway and traffic bridge across Red River, between Morris Street site, Emerson, (selected by the Canadian Pacific Railway Co.) and West Lynne, and an ice break.
Es quimault and Nanaimo Railway on Vancouver Island, B. C.....	do 7,232.....	Robert Dunsmuir <i>et al.</i>	Aug. 20, 1883	Construct Esquimault and Nanaimo Railway on Vancouver Island, British Columbia.

St. John Bridge and Railway Extension Co.....	do	7,258.....	St. John Bridge and Railway Extension Co.....	Dec. 10, 1883	Agreement and mortgage of bridge, railway &c, to secure advance to Co. under Act 46 Vic., c. 26.
Napanee, Tamworth and Quebec Railway Co.....	do	7,273.....	Napanee, Tamworth and Quebec Railway Co.....	Dec. 31, 1883	Agreement re-subsidy 28 miles, Napanee to Tamworth.
Northern and Pacific Railway Co.....	do	7,453.....	Northern and Pacific Junction Railway Co.....	April 12, 1884	Subsidy for constructing a railway from Gravenhurst to Callander.
Caraquet Railway Co.....	do	7,505.....	Caraquet Railway Co.....	.....	Subsidy for a railway from Intercolonial Railway, at Bathurst to Caraquet, and from Caraquet to Shippegan Harbor.
Quebec Central Railway Co.....	do	7,524.....	Quebec Central Railway Co.	Aug. 2, 1884	Subsidy for a railway from Beauce Junction of their railway to boundary of Maine, United States.

APPENDIX No. 10.

LIST of Contracts entered into in connection with the Canadian Pacific Railway.

No. of Contract.	Names of Contractors.	No. of Contract.	Names of Contractors.
1	Sifton, Glass & Co.	49	Richard Dickson.
2	Richard Fuller.	50	Miller, Brothers & Mitchell.
3	F. J. Barnard.	51	Dominion Bolt Co.
4	Oliver, Davidson & Co.	52	North-West Transportation Co.
5	Joseph Whitehead.	53	Barrow Hematite Steel Co.
5a	Joseph Whitehead.	54	Guest & Co.
6	Guest & Co.	55	West Cumberland Iron and Steel Co.
7	Ebbw Vale Steel, Iron and Coal Co.	56	The Kellogg Bridge Co.
8	Murray Steel and Iron Co.	57	The Truro Patent Frog Co.
9	West Cumberland Iron and Steel Co.	58	W. Hazelhurst.
10	West Cumberland Iron and Steel Co.	59	Whitehead, Ruttan & Ryan.
11	Naylor, Benson & Co.	60	D. O. Mills.
12	Hon. A. B. Foster.	61	D. O. Mills.
12	Sifton & Ward.	62	D. O. Mills.
12	Purcell & Ryan.	63	D. O. Mills.
14	Sifton & Ward.	64	Ryan, Whitehead & Ruttan.
14	Jos. Whitehead (completing contract No. 14).	65	James Crossen.
15	Joseph Whitehead.	66	Bowie & McNaughton.
16	Canada Central Railway Co.	67	Moncton Car Co.
17	Anderson, Anderson & Co.	68	Ontario Car Co.
18	Red River Transportation Co.	69	North-West Transportation Co.
19	Moses Chevette.	70	North-West Transportation Co.
20	Merchants Lake and River Steamship Co.	71	Toronto Bridge Co.
21	Patrick Kenny.	72	Ontario Car Co.
22	Holcomb & Stewart.	73	Toronto Bridge Co.
23	Sifton & Ward.	74	Wm. Gooderham, Jun.
24	Oliver, Davidson & Co.	75	Pillow, Hersey & Co.
25	Purcell & Ryan.	76	Cooper, Fairman & Co.
26	James Isbester.	77	Stubbs, & Co.
27	Merchants Lake and River Steamship Co.	78	Skead & Haycock.
28	Red River Transportation Co.	79	The Truro Patent Frog Co.
29	Cooper, Fairman & Co.	80	James Crossen.
30	Robb & Co.	81	Dunlop & Rannie.
31	Patent Bolt and Nut Co.	82	Ontario Car Co.
32	Cooper, Fairman & Co.	83	James Crossen
32a	LeMay & Blair.	84	Ontario Car Co.
33	Kavanagh, Murphy & Upper.	85	Nobles & Follis
34	North-West Transportation Co.	86	Fairbanks, Morse & Co.
35	Cooper, Fairman & Co.	87	James Crossen.
36	William Robinson.	88	Walter Oliver.
37	Heny, Charlebois & Flood.	89	J. Patterson.
38	Edmond Ingalls.	90	Ferris, Paul & Milwar.
39	John Irving.	91	Canadian Pacific Railway Co.
40	Gouin, Murphy & Upper.	92	Andrew Onderdonk.
41	Purcell & Co.	93	Andrew Onderdonk.
42	Manning, Macdonald, McLaren & Co.	94	Horton & Son.
43	Joseph Upper & Co.	95	Bayliss, Jones & Bayliss.
44	West Cumberland Iron and Steel Co.	96	Guest & Co.
45	Barrow Hematite Steel Co.	97	John McDonald
46	Ebbw Vale Steel, Iron and Coal Co.	98	Colin Nicol Black.
47	Patent Bolt and Nut Co.	99	Canadian Pacific Railway Co.
48	John Ryan.		

APPENDIX No. 11

TABLE of distances of stations between the Cities of Ottawa and Kingston:—

No. of Station.	Name of Station.	Distances from Ottawa.	Locks.		Dams.			Length of Artificial Canal at each Stat. in miles.	
			No.	Lift at Low Water.	No.	Length.	Height.		
				Rise Ft. In.					Feet.	Feet.
1	Ottawa.....	0	8	82 0	3	{ 230 1,320 1,616	{ 18 33 28	4.00	
2	Hartwell's.....	4½	2	22 0	.....	109	28	
3	Hogsback.....	5½	2	13 6	1	320	60		
4	Black Rapids.....	9½	1	10 0	1	300	12		
5	Long Island.....	14½	3	27 0	3	850	68		
6	Burritt's.....	40½	1	10 6	1	240	14		
7	Nicholson.....	43½	2	15 2	1	560	9		
8	Clowes.....	44½	1	10 6	1	481	16		
9	Merrickville.....	46½	3	25 0	1	150	6		
10	Maitland.....	55	1	4 9	1	270	8		
11	Edmunds.....	59½	1	10 10	1	343	8		
12	Old Slys.....	60½	2	15 6	1	259	20		
13	Smith's Falls.....	61½	4	33 9	2	600	24		
14	First Rapids or Poonamalie.....	64	1	7 9	1	260	5		
15	Narrows.....	83½	1	4 0	1	600	9		
Total rise at low water.....			.....	292 3	.....	.....	.....
			Fall.						
16	Isthmus.....	87½	1	4 0	1.25	
17	Chaffey's.....	92	1	12 6	0.13	
18	Davis.....	94½	1	9 0	1	300	15	0.06	
19	Jones' Falls.....	97½	4	60 0	1	300	60	0.25	
20	Brewer's Upper Mills.....	108½	2	19 0	1	200	20	1.75	
21	do Lower Mills.....	110	1	14 2	1	200	12	4.25	
22	Kingston Mills.....	120½	4	46 8	1	6,042	14	0.25	
22	Kingston.....	126½	
Total fall at low water.....			165 4	
Total.....			47	24	15,472	16.46

APPENDIX No. 12.

TABLE showing the dates of the closing of the Canals in the Autumn of 1881 and of the opening in the Spring of 1882.

Canals.	Closing.	Opening.
Lachine Canal.....	1st December, 1883.....	5th May, 1884.
Beauharnois Canal.....	1st do 1883.....	26th April, 1884.
Cornwall Canal.....	8th do 1883.....	29th do
Williamburg Canals.....	16th do 1883.....	1st May, 1884.
Welland Canal—		
New Canal.....	} 15th do 1883.....	15th April, 1884.
Old Canal.....		
Burlington Bay Canal.....	17th do 1883.....	15th do 1884.
St. Anne's Lock and Dam.....	26th November, 1883.....	26th do 1884.
Carillon Canal.....	} 27th do 1883.....	28th do 1884.
Grenville Canal.....		
Culbute Lock and Dam.....		
Chute à Blondeau.....		
Rideau { Kingston Mills.....	28th do 1883.....	5th May, 1884.
{ Ottawa.....	27th do 1883.....	1st do
St. Ours Lock.....	29th do 1883.....	7th April, 1884.
Chambly Canal.....	30th do 1883.....	5th May, 1884.
Erie Canal (New York).....	1st December, 1883.....	1st do
St. Peter's Canal (Cape Breton).....	2nd January, 1884.....	20th April, 1884.
Trent Canal Works.....	25th November, 1883.....	26th March, 1884.

APPENDIX No. 13.

ST. LAWRENCE NAVIGATION.—TABLE OF DISTANCES.—A.

FROM STRAITS OF BELLE-ILE TO PORT ARTHUR, AT HEAD OF LAKE SUPERIOR, BY WATER.

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 Point, Anticosti.....	do 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.....	30	700
Isle Verte (opp. Saguenay)	Quebec.....	do.....	126	826
Quebec.....	Three Rivers.....	do to Tide-water	74	900
Three Rivers.....	Montreal.....	do.....	86	986
Montreal.....	Lachine.....	Lachine Canal.....	8 $\frac{1}{2}$	994 $\frac{1}{2}$
Lachine.....	Beauharnois.....	Lake St. Louis.....	15 $\frac{1}{2}$	1,009 $\frac{1}{2}$
Beauharnois.....	Ste. Cécile.....	Beauharnois Canal.....	11 $\frac{1}{2}$	1,021
Ste. Cécile.....	Cornwall.....	Lake St. Francis.....	32 $\frac{1}{2}$	1,053 $\frac{1}{2}$
Cornwall.....	Dickinson's Landing.....	Cornwall Canal.....	11 $\frac{1}{2}$	1,065 $\frac{1}{2}$
Dickinson's Landing.....	Farran's Point.....	River St. Lawrence.....	5	1,070 $\frac{1}{2}$
Farran's Point.....	Upper end of Croyle's Island	Farran's Point Canal.....	$\frac{3}{4}$	1,071
Upper end Croyle's Island.	Williamsburg or Morrisburg.	River St. Lawrence.....	10 $\frac{1}{2}$	1,081 $\frac{1}{2}$
Williamsburg.....	Rapide Plat.....	Rapide Plat Canal.....	4	1,085 $\frac{1}{2}$
Rapide Plat.....	Point Iroquois Village.....	River St. Lawrence.....	4 $\frac{1}{2}$	1,090
Point Iroquois Village.....	Upper end Presqu'île.....	Point Iroquois Canal.....	3	1,093
Presqu'île.....	Point Cardinal, Edwards- burg.....	Junction Canal.....	2 $\frac{3}{4}$	1,095 $\frac{3}{4}$
Point Cardinal.....	Head of Galops Rapids.....	Galops Canal.....	2	1,097 $\frac{3}{4}$
Galops Rapids.....	Prescott.....	River St. Lawrence..	7 $\frac{1}{2}$	1,105
Prescott.....	Kingston.....	do.....	59	1,164
Kingston.....	Port Dalhousie.....	Lake Ontario.....	170	1,334
Port Dalhousie.....	Port Colborne.....	Welland Canal ..	26 $\frac{1}{2}$	1,360 $\frac{1}{2}$
Port Colborne.....	Amherstburg.....	Lake Erie.....	232	1,592 $\frac{1}{2}$
Amherstburg.....	Windsor.....	River Detroit.....	18	1,610 $\frac{1}{2}$
Windsor.....	Foot of St. Mary's Island...	Lake St. Clair.....	25	1,635 $\frac{1}{2}$
Foot of St. Mary's Island...	Sarnia.....	River St. Clair.....	33	1,668 $\frac{1}{2}$
Sarnia.....	Foot of St. Joseph's Island...	Lake Huron.....	270	1,938 $\frac{1}{2}$
Foot of St. Joseph's Island	Foot of Sault Ste. Marie.....	River St. Mary.....	47	1,985 $\frac{1}{2}$
Sault Ste. Marie.....	Head of Sault Ste. Marie.....	Sault Ste. Marie Canal...	1	1,986 $\frac{1}{2}$
Head of Sault Ste. Marie....	Pointe aux Pins.....	River St. Mary.....	7	1,993 $\frac{1}{2}$
Pointe aux Pins.....	Port Arthur.....	Lake Superior.....	266	2,259 $\frac{1}{2}$
Port Arthur to Lake Shebandowan.....			45	
Lake Shebandowan to North West Angle.....			312	
North West Angle to Winnipeg.....			95	
Pointe aux Pins to Duluth.....			390	

Of the 2,259 $\frac{1}{2}$ miles from the Straits of Belle-Isle to the Head of Lake Superior, 71 miles are artificial navigation, and 2,188 $\frac{1}{2}$ open navigation.

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

The total fall from Lake Superior to Tide-water is about 600 feet.

The Steamboat voyage from Collingwood to Port Arthur is 532 miles.

APPENDIX No 14.

CANADIAN PACIFIC RAILWAY,
OFFICE OF THE ENGINEER-IN-CHIEF,
OTTAWA, 31st December, 1884.

SIR,—For the information of the Honourable the Acting Minister of Railways and Canals, I have the honor to report the progress being made with, and the condition of the works of construction upon the Canadian Pacific Railway, between Callander and Port Moody at this date.

EASTERN SECTION.

Callander to Port Arthur.

Upon the Eastern Division of the Eastern Section extending from Callander to 27 miles east of Mis-inabi or Dog Lake, a distance of 309 miles. There are about 4000 men employed on the works of grading, bridging, tracklaying, &c., and although the weather is not very favourable for the prosecution of such work, good progress is being made.

Upon the Western Division of the Eastern Section, between Missinabi or Dog Lake and Port Arthur, a distance of 348 miles, the work of grading is partially completed, the bridging is being rapidly erected, the rails and sleepers are nearly all delivered on the ground, and the work of tracklaying is in progress. There are in round numbers about 1,500 labourers, carpenters and tracklayers on this section.

The following tables give a general idea of the progress being made with the works upon this section.

GRADING.

		Done.	To be done.
		Miles.	Miles
(Callander)	0 mile to the 248th mile	248	.....
	248 " " 309th " .....	.....	61
	309 " " 657th " (Port Arthur) ..	358	.....
Totals.....		596	61

TRACKLAYING.

	Done.	To be done.
	Miles.	Miles.
(Callander) 0 mile to the 213rd mile.....	243	.....
243 " " 434th "		191
434 " " 471st "	37	.....
471 " " 490th "		19
490 " " 508th "	18	.....
508 " " 535th "		27
535 " " 551st "	16	.....
551 " " 561st "		10
561 " " 583rd "	22	.....
583 " " 590th "		7
590 " " 657th " (Port Arthur)...	67	.....
Totals.....	403	254

BALLASTING AND SURFACING.

	Done.	To be done.
	Miles.	Miles.
(Callander) 0 mile to the 209th mile	209	.....
209th " " " 590th "		381
590th " " " 657th " (Port Arthur).....	67	.....
Totals.	276	381

Considerable progress is being made with the erection of stations and engine houses, &c., as also the water tanks, and it is confidently expected that by May next there will be continuous railway connection over the Eastern and Lake Superior sections to Port Arthur and Red River.

The work of filling in the temporary trestle between Eagle River and Rat Portage has been discontinued for this season in consequence of the severity of the weather; there only remain, however, some two or three trestles to fill, which will be done early in the spring.

The Company are roofing in the 1,000,000 bushel capacity Grain Elevator at Fort William, and there are a large number of carpenters employed upon this building.

The continuous mileage from Callander to Port Arthur is 657 miles, and to the Red River, opposite Winnipeg, 1,085 miles.

CENTRAL SECTION.

Red River to Savona's Ferry.

Upon this section there are about 5,000 men employed on the grading, bridging, tunnelling, &c.; of these about 2,000 are between the Beaver River and the second

crossing of the Columbia River, and 3,000 between that point and Savona's Ferry. Clearing is now in progress over the portion not yet cleared, whilst grading and tunnelling is being carried on between the Beaver and a few miles west of the summit of the Selkirk Mountains as also between the Salmon River, the Schuswap Lake and Savona's Ferry.

The following tables show the progress being made with the works on this section.

GRADING.

	Done.	To be done.
	Miles.	Miles.
(Red River) 1,085th mile to 2,051st mile	966	.....
2,051 " 2,060 "		9
2,060 " 2,130 "	70	.....
2,130 " 2,295 "		165
2,295 " 2,306 "	11	.....
2,306 " 2,327 "		21
2,327 " 2,357 " (Savona's Ferry).....	10	.....
Totals	1,057	195

TRACKLAYING.

	Done.	To be done.
	Miles.	Miles.
(Red River) 1,085th mile to the 2,051st mile.....	966	.....
2,051 " 2,060 "		9
2,060 " 2,123 "	63	.....
2,123 " 2,337 " (Savona's Ferry).....		214
Totals	1,029	223

BALLASTING AND SURFACING TRACK.

	Done.	To be done.
	Miles.	Miles.
(Red River) 1,085th mile to the 2,051st mile.....	966	.....
2,051 " 2,337 " (Savona's Ferry).....		286
Totals.....	966	286

The stations, engine houses and water tanks are provided from the 1,083rd to the 2,047th mile.

I should here state that nine miles of the road have been graded, ironed and surfaced in addition to those which appear above, being the nine miles of temporary line.

WESTERN SECTION.

Savona's Ferry to Port Moody.

The work on this section is drawing to a close. The total distance is 213 miles, upon which the grading is nearly completed, and the track laid over 210 miles. One hundred and forty-eight miles are surfaced and ballasted, and the erection of station houses and water tanks is in progress. It is believed that this section, being the only work remaining to be done by the Government, will be completed by July next. The distance from Callander to Savona's Ferry is 2,337 miles, and to Port Moody, 2,550 miles.

Generally.

It will be observed that there remains to be done before the road throughout will be in a condition for traffic, 256 miles of grading, 480 miles of track laying, and 670 miles of surfacing and ballasting, of which three miles of the latter and of the track-laying are on the Government contract, but as there are now about 11,000 men employed upon the works, which number, the company express an intention of maintaining during the winter season, and to largely increase next spring, this work should be readily completed by September next.

The erection of the building can best be done after the track is laid, as the materials can be transported to the various sites much more expeditiously and economically than in any other way.

It may be interesting to the Honourable Minister of Railways to know how the contract is being carried out, as to the quality and character of the works. Upon a large section of the completed line the works are of a much more permanent character than could have been enforced under the terms of the contract. Iron and steel truss bridges, resting upon abutments and piers of massive masonry, have been introduced at the crossings of the principal rivers, and a large number of substantial masonry culverts afford passage over the smaller streams. Wherever it was considered to be of advantage, the slopes of the cuttings in the prairie have been flattened out, probably to about one in twelve, to prevent the accumulation of snow, and the work on the whole line is up to the contract standard; the station houses throughout being, in my opinion, amply sufficient to accommodate the traffic. The water service will be very efficient when finished. The rolling stock is good, the engines being powerful machines, and the car stock, both passenger and freight, will compare very favourably with that upon any other road in Canada.

I have the honour to be, Sir,

Your obedient servant,

COLLINGWOOD SCHREIBER,

Chief Engineer.

A. P. BRADLEY, Esq.,
Secretary, Railways and Canals.

REPORTS

RAILWAY STATISTICS

OF CANADA,

AND CAPITAL, TRAFFIC AND WORKING EXPENDITURE
OF THE RAILWAYS OF THE DOMINION.

1883-84.

PRINTED BY ORDER OF PARLIAMENT.



OTTAWA:
PRINTED BY MACLEAN, ROGER & Co., WELLINGTON STREET,
1885.

DEPARTMENT OF RAILWAYS AND CANALS,
OFFICE OF THE CHIEF ENGINEER AND GENERAL MANAGER,
CANADIAN GOVERNMENT RAILWAYS,
OTTAWA, 1st February, 1885.

SIR,—I have the honour to submit to you my Statistical Report upon the railways of the Dominion for the year ended the 30th June, 1884, the statements having been, as in former years, compiled from returns made by the railway companies, which, I may remark, have been furnished with much greater readiness than heretofore. I am, in consequence, able to present my Report at an earlier date, and with more completeness than in former years, and, from the promises made by those companies whose returns are not yet up to the mark, I may anticipate that in future these will be much more complete in every respect. It is especially pleasing to note the promptitude displayed in this matter of returns by such a vast corporation as the Grand Trunk Railway Company. When the magnitude of its operations and the extent of its ramifications are considered, it is at once evident that when such a company can furnish its returns with promptitude, there can be no excuse for any shortcomings on the part of any other in the Dominion.

RAPID DEVELOPMENT OF RAILWAYS.

Whether it be regarded as industrial, financial, commercial or speculative, there is probably no material interest which, in Canada and in the world at large, has developed so rapidly and reached such immense proportions as the railway interest. There are thousands of people in Canada whose memories carry them back to the time when the only means of land transit at their disposal, whether for freight or passengers, were the stage coach, the express waggon, or the private conveyance. Men still in their prime have witnessed the growth of railways in Canada, from the first small and humbly equipped line to the vast systems of to-day, with their mileage in operation of 9,575 miles, their solid roadbeds and steel rails, and their costly and luxurious provision for the comfort of the travelling public.

RAILWAYS AS COMPETITORS WITH WATERWAYS.

These means of internal communication are both of the highest importance, and each will predominate according to the nature of the country to be traversed and the trade interests to be served. The extraordinary growth and development of railways, the constantly improving nature of their construction and equipment, and the fact that they are available all the year round, while the waterways of Canada are closed during three or four months of every year, are of course altogether in their favour, while their great comparative speed must secure them the preference on the part of passengers, and for the conveyance of goods whose value is high in

proportion to their weight. Even the bulkier and less valuable goods, under some circumstances, choose the railway channel. Owing to these reasons, and to the steady development of the country's resources, the volume of railway business has grown from year to year, until, in the year under consideration (1883-4) the receipts reached the sum of \$33,422,204.

RAILWAY CONSOLIDATION AND EXTENSION.

The disposition manifested during the past few years on the part of the great trunk lines to absorb, or consolidate with, connecting lines, may, it is contended, prove to be of great service in the development of districts remote from water or other communication, by preparing the way for railway extension into outlying districts, which can only be accomplished by strong and wealthy corporations; and I may remark that this strong desire on the part of the leading railway interests for absorption, consolidation and extension, has probably done more than anything else, during the past few years, towards increasing the railway mileage throughout the country, and thus developing the resources of remote districts, which would otherwise have remained isolated from railways and their civilizing influences. Such is the benefit of competition, for all this may be attributed to the determination of the management of each of the great trunk lines to extend its power and influence beyond the reach of the rest, and thus secure the lion's share of the business, present and future.

It may naturally be supposed that the ultimate result to those who furnish the capital required to carry forward those great enterprises will be favourable. The country is new, is being rapidly populated by immigration, and its trade grows enormously year by year. All these factors in development receive an incalculable impetus from the extension of the railways. Every new route opened, every mile constructed, must aid materially in developing the wealth and resources of the country, both locally and at large.

I may give here a few tables showing the growth of the railway interest of Canada during the nine years in which statistical returns have been furnished. These, I think, cannot fail to interest the public, as they show at a glance the wonderful progress made during so short a period, in supplying cheap and rapid transport to districts which could not otherwise have competed with others more favourably situated in this respect.

Statement showing the mileage in operation on the 30th June in each year undermentioned:—

	Miles built in each year after 30th June, 1876.	Total.
On 30th June, 1876.....		5,157
do 1877.....	417	5,574
do 1878.....	569	6,143
do 1879.....	341	6,484
do 1880.....	407	6,891
do 1881.....	369	7,260
do 1882.....	270	7,530
do 1883.....	1,196	8,726
do 1884.....	849	9,575

Statement showing the amount of Capital Stock paid up on the 30th June in each year from 1876 to 1884:—

	Amount added in each year.	Total.
1876.....		\$333,886,047
1877.....	\$12,064,069	345,950,116
1878.....	14,067,070	360,617,186
1879.....	1,468,951	362,086,138
1880.....	19,618,790	*371,051,192
1881.....	18,234,507	389,285,700
1882.....	26,326,109	415,611,810
1883.....	85,123,825	500,735,635
1884.....	56,879,434	557,615,069

* Not including \$10,653,736, capital of lines in United States erroneously included in former returns.

Statement showing Government Bonuses paid up on 30th June, 1876, and succeeding years:—

	Additions in each year.	Total.
1876.....		\$ 39,592,414
1877.....	\$ 7,102,524	46,694,938
1878.....	18,094,331	64,789,269
1879.....	527,639	65,316,908
1880.....	5,007,875	70,324,783
1881.....	5,225,142	75,549,925
1882.....	592,664	76,142,589
1883.....	15,788,511	91,931,100
1884.....	13,271,498	105,202,598

Statement showing Government Loans paid up on 30th June, 1876, and succeeding years to 1884:—

	Additions in each year.	Total.
1876.....		\$17,524,300
1877.....		15,142,633
1878.....		15,142,633
1879.....		15,142,633
1880.....	\$6,116,956	21,259,589
1881.....		21,259,589
1882.....		21,259,589
1883.....		21,259,589
1884.....	18,334,374	39,593,963

Statement showing amount of Municipal Aid paid up to 30th June, 1876, and each succeeding year to 1884:—

	Additions in each year.	Total.
1876.....		\$6,408,269
1877.....	\$360,746	6,768,943
1878.....	455,635	7,224,578
1879.....	226,400	7,450,978
1880.....	882,966	8,313,944
1881.....	339,000	8,652,944
1882.....	157,000	8,809,944
1883.....	352,608	9,162,552
1884.....	772,004	9,934,556

Statement of Casualties in each year, from 1876 to 1884, inclusive:—

	Killed.	Injured.
1876.....	109	304
1877.....	111	317
1178.....	97	361
1179.....	107	66
1880.....	87	102
1881.....	99	147
1882.....	147	397
1883.....	159	550
1884.....	227	796

Several new lines will be found in the tables appended, but these do not represent the entire railway enterprise now in progress, as they include those only upon which work had begun before the 30th June. The mileage constructed (track laid) has increased by 966.04 miles, and that in operation by 852.77 miles. In the case of the former, 587.75 miles were built by the Canadian Pacific Railway Company, and in the case of the latter, 651 miles. On the 30th June the total railway mileage of the Dominion, constructed and under construction, was 11,514.57 miles, of which 9,932.57 miles were ironed.*

The paid up capital increased from †\$500,735,635.15 to \$557,615,069.39, or 11.48 per cent., giving an increase in the capital per mile of railway, completed and under construction, of 10.02 per cent. The share and bonded liability per mile of railway, completed and under construction, is \$34,250, and that of the roads in operation is, approximately, \$328,117,463.

From the reports current as to the state of trade in the Dominion during the year under consideration, a considerable shrinkage might reasonably have been looked for in the earnings of the railways. The returns, however, show an increase which, though small in comparison with the increases of former years, is sufficient if the railway business may be accepted as a measure of the business of the country to prove that the depression has been very greatly exaggerated. The increase in the receipts during the year was \$177,618, that in the number of passengers carried 402,410, and that in the freight 446,014 tons. The net earnings were \$7,826,872, less by \$726,046 than in 1882-3.

The mileage of steel rails increased during the year by more than 1,000 miles, while the iron rails slightly diminished, and are now only half what they were in 1878, notwithstanding the rapidly growing total mileage. On the other hand, the steel rails have more than doubled in the same period, having increased from 3,583 miles, in 1878, to 8,348, in 1884.

I here submit abstracts from the Tables appended, from which a comparative estimate may be arrived at of the business of the railways during the years 1882-3 and 1883-4.

*Not including 79.44 miles of second track, Great Western division of Grand Trunk Railway from Glencoe to Windsor, erroneously included in last year's Report. The mileage in operation last year was therefore 8,726.18, instead of 8,805.62 as given.

† The capital, as given in last year's report from the returns made by the companies, was \$494,271,264.95. From the returns made this year it is found that it should have been as above.

MILEAGE.

	1883-4.	1882-3.	Increase.	Decrease.
In operation.....	9,575·95	8,726·18	849·77	.....
Completed (rails laid).....	373·60	260·35	113·25	.....
Under construction.....	1,565·20	2,299·08	.....	733·88
Length of line, 5 ft. 6 in. gauge.....	60·00	60·00	.....	.....
do 4 ft. 8½ in. do.....	9,691·07	8,307·47	1,383·60	.....
do 3 ft. 6 in. do.....	198·50	198·50	.....	.....

NOMINAL CAPITAL.

	1883-4.	1882-3.	Increase.	Decrease.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Ordinary share capital.....	212,302,663 89	193,881,052 52	18,421,611 37	.....
Preference do.....	72,775,157 87	73,500,777 87	.....	725,620 00
Bonded debt.....	109,310,962 65	102,134,295 45	7,176,667 20	.....
Aid from Dominion Government.....	124,360,505 89	94,248,986 74	30,111,519 15	.....
do Ontario do.....	3,514,908 02	3,294,611 69	220,296 33	.....
do Quebec do.....	12,562,081 91	12,460,496 11	101,585 80	.....
do New Brunswick Government... ..	3,180,465 00	2,763,665 00	416,800 00	.....
do Nova Scotia do.....	1,578,601 00	1,466,875 00	111,726 00	.....
do Municipalities.....	9,647,526 14	9,222,552 94	424,973 20	.....
Capital from other sources.....	8,382,197 02	7,762,321 83	619,875 19	.....
Total.....	557,615,069 39	500,735,635 15	56,879,434 24	725,620 00

CAPITAL per Mile of Railway Completed and under Construction.

	1883-4.	1882-3.	Increase.	Decrease.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Ordinary share capital.....	18,437 05	17,332 02	1,105 03	.....
Preference do.....	6,318 93	6,513 14	.....	194 21
Bonded debt.....	9,492 82	8,913 11	579 81	.....
Government and Municipal aid.....	13,464 83	10,621 49	2,843 34	.....
Other sources.....	727 89	687 00	40 89	.....
Total.....	48,441 62	44,066 80	4,569 07	194 21

MILEAGE of Steel and Iron Rails, and Equipment.

	1883-4.	1882-3.	Increase.	Decrease.
Mileage of iron rails.....	1,601·37	1,725·30		123·93
do steel do	8,348·18	7,340·67	1,007·51	
do sidings.....	1,165 29	1,099·80	65·49	
Number of grain elevators	17	20		3
do crossings guarded.....	109	103	6	
do do unguarded.....	6,703	6,115	588	
do overhead bridges.....	308	311		3
do crossings of other railways...	135	147		12
do junctions with do	187	178	9	
do do branch lines	87	93		
do engines owned.....	1,455	1,358	97	
do do hired	26	25	1	
do 1st class cars owned.....	674	643	31	
do do hired.....	20	28		8
do 2nd class and immigrant cars owned	453	387	66	
do 2nd class and immigrant cars hired	5	10		5
do baggage, mail and express cars owned.....	398	362	36	
do baggage, mail and express cars hired.....	8	8		
do cattle, box and freight cars owned.....	20,359	20,162	197	
do cattle, box and freight cars hired	1,118	1,237		119
do platform cars owned.....	13,879	12,436	1,443	
do do hired	110	295		185
do coal and dumping cars owned	1,941	1,851	90	
do do do hired.....		44		44

OPERATIONS and Mileage.

	1883-4.	1882-3.	Increase.	Decrease.
Train mileage (miles run).....	29,758,676	30,072,910		314,234
Passengers carried.....	9,982,358	9,579,948	402,410	
Freight carried (tons).....	13,712,269	13,266,255	446,014	

TRAFFIC on Principal Lines.

Name of Railway.	Passengers Carried.		Increase.	Decrease.
	1883-4.	1882-3.		
Canadian Pacific system.....	1,372,825	1,253,981	118,844	
Canada Southern.....	487,865	474,008	13,857	
Grand Trunk system.....	4,994,355	4,902,100	92,255	
Intercolonial.....	920,870	878,600	42,270	
Northern and North-Western.....	518,060	514,942	1,118	
South-Eastern system.....	180,527	103,558	76,969	

FREIGHT Carried on same Railways.

Name of Railway.	Tons.		Increase.	Decrease.
	1883-4.	1882-3.		
Canadian Pacific system.....	1,601,515	1,422,311	179,204	.....
Canada Southern	2,221,144	2,138,369	82,775	.....
Grand Trunk system.....	5,795,014	6,037,450	.....	242,436
Intercolonial	1,001,163	970,961	30,202	.....
Northern and North-Western.....	580,662	596,800	.....	16,138
South-Eastern	213,032	190,795	22,237	.....

EARNINGS of the Railways.

—	1883-4.	1882-3.	Increase.	Decrease.
	\$	\$	\$	\$
Passenger traffic.....	11,204,036	10,538,120	665,916	.....
Freight do	20,763,243	21,320,208	.....	556,965
Mails and express.....	1,155,044	1,168,429	.....	13,385
Other sources	299,881	261,424	38,457	.....
Not stated in detail.....	.....	16,404	.....	16,404
Total.....	33,422,204	33,244,585	704,373	585,754

EARNINGS per Mile of Railway under Traffic.

—	1883-4.	1882-3.	Increase.	Decrease.
	\$	\$	\$	\$
Passenger traffic.....	1,169	1,195	.....	26
Freight do	2,167	2,420	.....	253
Mails and express.....	121	126	.....	5
Other sources	31	29	2	.....
Not classified .....	.....	2	.....	2
Total	3,498	3,772	2	286

OPERATING Expenses.

—	1883-4.	1882-3.	Increase.	Decrease.
	\$	\$	\$	\$
Maintenance.....	5,197,259	4,967,925	229,334	.....
Working and repairs of engines	8,794,970	8,230,877	564,093	.....
do do cars	2,315,949	2,248,164	67,785	.....
General operating expenses.....	9,229,116	9,217,891	11,225	.....
Not stated in detail.....	58,038	26,810	31,228	.....
Total.....	25,595,332	24,691,667	903,665	.....

NET PROFITS.

	1883-4.	1882-3.	Increase.	Decrease.
	\$	\$	\$	\$
Receipts.....	33,422,204	33,244,586	177,618	
Expenses.....	25,595,332	24,691,663	903,664	
Net Profit.....	7,826,872	8,552,918		726,046

ACCIDENTS.

	Killed.		Injured.	
	1883-4.	1882-3.	1883-4.	1882-3.
Fell from cars or engines.....	39	24	81	74
Getting on or off trains in motion.....	17	12	62	39
At work making up trains.....	2	12	29	6
Putting arms or heads out of windows.....				
Coupling cars.....	9	5	252	246
Collisions or trains thrown from track.....	41	9	132	52
Explosions.....			6	1
Striking bridges.....	4	5	4	4
Walking or being on track.....	100	91	87	42
Other causes.....	15	11	143	85
Total.....	227	169	796	550

GOVERNMENT and Municipal Loans, Bonuses, &c., paid and promised, including cost of Government Railways.

	1883-4.		1882-3.		Increase.		Decrease.	
	\$	cts	\$	cts.	\$	cts.	\$	cts.
Dominion Government.....	149,920,120	81	116,636,038	14	33,284,082	67		
Ontario do.....	4,467,149	02	4,467,149	02				
Quebec do.....	14,367,910	02	14,329,324	22	38,585	80		
New Brunswick do.....	3,328,000	00	3,315,500	00	12,500	00		
Nova Scotia do.....	1,906,875	00	1,906,875	00				
Municipalities in Ontario.....	8,325,446	85	8,390,541	78			65,094	93
do Quebec.....	4,259,000	00	4,253,000	00	6,000	00		
do New Brunswick.....	316,500	00	296,500	00	20,000	00		
do Nova Scotia.....	250,000	00	250,000	00				
do Manitoba.....	525,000	00	475,000	00	50,000	00		
Total.....	187,666,001	70	154,319,928	16	33,346,073	54		

AMOUNTS still to be paid to Railways on completion.

	Total Subsidy.		Paid.		To be Paid.	
	\$	cts.	\$	cts.	\$	cts.
Dominion Government.....	149,920	120 81	124,360	505 89	25,559	614 92
Ontario do	4,467	149 02	3,514	908 02		952,241 00
Quebec do	14,367	910 02	12,562	081 91	1,805	828 11
New Brunswick do	3,328	000 00	3,180	465 00		147,535 00
Nova Scotia do	1,906	875 00	1,578	601 00		328,274 00
Municipalities.....	13,675	946 85	9,647	526 14		4,028,420 71
Total.....	187,666	001 70	154,844	087 96	32,821	913 74

I have the honour to be, Sir,

Your obedient servant,

COLLINGWOOD SCHREIBER,

Chief Engineer and General Manager.

A. P. BRADLEY, Esq.,

Secretary, Department of Railways and Canals.

TABLE showing Locations of the Railways of the Dominion of Canada, 30th June, 1884.

Name of Railway.	Description.	Gauge.	Distances.	
			Miles.	Total.
Albert	Sailsbury Station, I.C.R., to Hopewell on Chignecto Bay, N.B.....	Ft. in.		
Atlantic and North-West.....	Mile End to Lachine, P.Q. (Not in operation. Will cross the St. Lawrence near Lachine. Surveys made to Chambly and St. John).....	4 8½		50·00
Bay of Quinté and Navigation Co.....	Deseronto to Deseronto Junction, G.T.R., O. Canada Atlantic.....	4 8½		7·00
Canada Southern	Ottawa to Coteau under traffic. (56 miles under construction Located from St. Lawrence to Vermont Boundary. Further location but partially determined. Connects at Ottawa with C.P.R., and at Coteau with G.T.R.).....	4 8½		3·50
do Leased.....	Main Line—Windsor to Suspension Bridge... Amherstburg Branch—Essex Centre to Amherstburg.....	4 8½	226·18	80·00
	St. Clair Branch—St. Clair Junction to Courtright.....		15·70	
	Fort Erie Branch—Fort Erie to Welland Junction.....		62·63	
	Erie and Niagara—Fort Erie to Niagara.....		17·50	
	Sarnia, Chatham and Erie—Oil City to Patrolia. (Connections with New York Central, Lake Erie, Western, Great Western, Hamilton and North-Western).....		30·60	
			7·00	359·61
Canadian Pacific.....	Main Line—Montreal to Port Moody.....	4 8½	2,893·00	
	Branches constructed and under construction in the North-West.....		395 00	
	Branches in operation in Ontario and Quebec.....		194·00	3,482·00
	Main Line in operation—			
	Miles.			
	Montreal to end of track..... 534			
	Nepigon to St. Stephen (summit of Rocky Mountains)... 1,459			
	----- 1,993			
	Branches in operation—			
	St. Thérèse to St. Jérôme..... 13			
	St. Lin Junction to St. Lin... 13			
	St. Thérèse to St. Eustache... 8			
	Aylmer to Hu'l..... 7			
	Carleton Junction to Brockville..... 45			
	Smith's Falls to Perth..... 12			
	Sudbury Junction to Algoma. 96			
	Emerson to Winnipeg Junction..... 65			
	Winnipeg to West Selkirk..... 22			
	Winnipeg to Stonewall..... 19			
	Winnipeg to Manitou..... 102			
	Gretna to Rosenfeld..... 14			
	Emerson to Pembina Mountain 22			
			438	
	Total in operation.....		2,431	

TABLE showing Locations of Railways, &c.—Continued.

Name of Railway.	Description.	Gauge.	Distances.		
			Miles.	Total.	
		Ft. in.			
Canadian Pacific—Leased	Credit Valley Railway, Toronto to St. Thomas	4 8½	121·00		
	Branch—Streetsville Junction to Orangeville		34·90		
	Branch—Church's Falls to Elora		27·50		
	Ontario and Quebec, Toronto to Perth... Toronto, Grey and Bruce	4 8½		183·40 199·17	
	Main Line—Toronto to Owen Sound		122·00		
	Branch—Orangeville to Teeswater		69·00		
	do To Cardwell Junction, Hamilton and North-Western Railway (Connects at Toronto with Grand Trunk and Credit Valley Railways, at Weston with Grand Trunk, and at Orangeville with Credit Valley, and at Cardwell Junction with Hamilton and North-Western)	4 8½	0·50	191·50	
Carillon and Grenville	Carillon to Grenville, P.Q. (Connecting at both termini with Ottawa River Navigation Co.)	5 6		13 00	
Central Ontario (late Prince Edward County)	Picton to Wellston. (Connects with Grand Trunk at Trenton)	4 8½		104·00	
Chatham Branch	Chatham, Chatham Junction, I.C.R., to Chatham, N.B.	4 8½		9·00	
Cobourg, Peterboro' and Mar- mora	Cobourg to Chambliss, Ont	4 8½	36·50		
	Branch—Trent River to Blairton		8·50		
	do Union line to saw mills		2·00		
Cumberland Coal and Railway Co. (late Spring Hill, Parrs- boro')	Spring Hill Mines to Parrsboro', N.S.	4 8½	27·00	47·00	
	Branch—Spring Hill Junction to Mines		5·00	32·00	
Eastern Extension (late Hali- fax and Cape Breton)	New Glasgow to Gut of Canso, N.S.			80·00	
Elgin, Petitecodiac and Have- lock (late Petitecodiac and Elgin)	Petitecodiac Junction, I.C.R., to Elgin, N.B.			14·00	
Erie and Huron	Rondeau to Wallaceburg, Ont			41·50	
Grand Southern	St. John to St. Stephen, N.B.			82·50	
Grand Trunk— Grand Trunk Division	Main Line—Sarnia to Point Lévis and Island Pond	4 8½	735·25		
	Sarnia Extension—Port Edward to Great Western		2·50		
	Branch—Montreal to wharves		2·00		
	Three Rivers Branch—Arthabaska to Doucet's Landing		35·25		
	Kingston Branch—Main Line to Kingston ..		2·25		
	Galt and Waterloo Branch—Waterloo and Berlin to Galt		14·50		
	London Branch—St. Mary's to London		22·00		
	Champlain Branch—St. Lambert to Rouse's Point, Montreal to Lachine, St. Isidore to Province Line		73·50		
	Carried forward			887·25	

TABLE showing Locations of Railways, &c.—Continued.

Name of Railway.	Description.	Gauge.	Distances.	
			Miles.	Total.
		Ft. in.		
Grand Trunk—Continued.	Brought forward		887 25	
Leased and Operated.....	Buffalo and Lake Huron—Goderich to Fort Erie		162 00	
	Georgian Bay and Lake Erie—Port Dover to Warton		171 50	
	Montreal and Champlain Junction—Brossseau to Dundee.....		62 25	
Great Western Division.	Main Line—Niagara Fall to Windsor.....		229 63	
	Toronto Branch—Hamilton to Toronto.....		38 50	
	Guelph do Harrisburg to Guelph.....		28 98	
	Brantford do Harrisburg to Brantford.....		8 00	
	Sarnia do Komoka to Sarnia.....		50 85	
	Petrolia do Wyoming to Petrolia.....		4 75	
	Loop Line—Fort Erie to Glencoe.....		145 50	
	Allanburg Branch—Allanburg to Clifton Junction		8 32	
Leased and Operated	Welland—From Port Colborne to Port Dalhousie, Ont.....	4 8½	25 00	
	Wellington, Grey and Bruce—Guelph and Palmerston to Southampton and Kincardine		168 35	
	London and Port Stanley—London to Port Stanley		23 66	
	London, Huron and Bruce—Hyde Park to Wingham Junction		68 89	
	Brantford, Norfolk and Port Burwell—Brantford to Tilsonburg Junction.....		34 74	
	NOTE.—The Georgian Bay and Lake Erie Railway includes the former Georgian Bay and Wellington, Port Dover and Lake Huron, and Stratford and Huron Railways.			
Leased—Midland Division....	Midland. (Port Hope to Midland on Georgian Bay).....		141 75	
	Toronto and Nipissing (including former Lake Simcoe Junction Railway).....		105 50	
	Grand Junction (from Belleville to North Hastings and Peterboro')		87 75	
	Whitby and Haliburton (including former Victoria and Whitby, Port Perry and Lindsay Railways).....		99 75	
	Toronto and Ottawa (composed of several links connecting the several divisions from Toronto to Bridgewater)		30 00	
	Medonte Tramway.....		8 50	
				2,591 42
Great Northern.....	From near W. Andrew's, on Ottawa River, to Quebec (8 miles under construction)			170 00
Intercolonial.....	Main Line—Halifax to Quebec.....	4 8½	686 00	
	Branch—Moncton to St. John		89 00	
	do Truro to Pictou		52 00	
	do Painsec to Pointe du Chêne.....		11 00	
	do Rivière du Loup to wharf.....		2 00	
	do Dalhousie Junction to Dalhousie.....		7 00	
				847 00
International.....	Lennoxville, P.Q., to Boundary Line.....	4 8½		81 66
Jacques Cartier Union.....	Grand Trunk, near Lachine, to Canadian Pacific, near Sault au Recollet.....			6 50
Kent Northern.....	Richibucto, N.B., to Intercolonial Railway..	4 8½		27 00

TABLE showing Locations of Railways, &c.—Continued.

Name of Railway.	Description.	Gauge.	Distances.	
			Miles.	Total.
Kingston and Pembroke	Kingston to Renfrew.....	Ft. in 4 8½	105 00	112 00
	Iron Junction Branch—Bedford to Glen- dower.....		4 00	
	Robertville Branch—Mississippi to Robert- ville.....		2 00	
	Wilbur Branch—Lavant to Wilbur.....		1 00	
NOTE.—This railway runs from the Grand Trunk at Kingston to the Canadian Pacific at Renfrew, connecting with the Ontario and Quebec Railway at Sharbot Lake. Ninety-one miles are under traffic. It is to be continued to Pembroke.				
Manitoba and North-Western	From Portage la Prairie, on C. P. R., to Minnedosa			78 54
Manitoba South-Western Col- onization	From Winnipeg to Headingly. Thence south-westerly to present end of track			50 70
Massawippi Valley.....	Stanstead to Sherbrooke, P.Q. (Connects with Connecticut and Passumpsic, In- ternational, Grand Trunk and Quebec Central Railways)	4 8½		34 00
Montreal and Sorel.....	Armstrong, opposite Sorel, to St Lambert, opposite Montreal. (Connects with South-Eastern and Grand Trunk)	4 8½		46 00
Montreal and Vermont Junc- tion.....	From Stanstead, Shefford and Chambly Railway, near St. Johns, P.Q., to Ver- mont and Canada Railway at Boundary Line	4 8½		23 60
Napanee, Tamworth and Que- bec.....	Napanee and Tamworth, Ont. (Not in op- eration).....	4 8½		28 50
Napierville Junction and Quarry Co.....	From Grand Trunk to the Company's quar- ries.....	4 8½		2 50
New Brunswick.....	Gibson (opposite Fredericton, N. B.) to Edmundston.....	4 8½	164 00	174 00
	Branch—Aroostook to Boundary.....		4 00	
	do Woodstock to Newbury.....		6 00	
Leased—N. B. & Canada.....	St. Andrews to Woodstock, N.B.....			127 00
	Branch—Houlton to Debec.....	4 8½	93 00	
	do St. Stephen to Watts.....		8 00	
	do McAdam to Vanceboro'.....		19 00	
	Fredericton (Fredericton Junction on St. John and Maine Railway to Fredericton)		7 00	
	St. John and Maine			22 50
	St. John, N. B., to St. Croix, on Boundary Line. (Connects with Intercolonial, Grand Southern and Fredericton Railways).....	4 8½		92 00
Northern and North-Western.	Combined Northern Railway of Canada and Hamilton and North-Western:—	4 8½		94 96
	Main Line—Toronto to Collingwood.....		161 00	
	do Port Dover to Collingwood.....		1 34	
	Branch—Lefroy to Bell Ewart			
Carried forward			247 30	

TABLE showing Locations of Railways, &c.—Continued.

Name of Railway.	Description.	Gauge.	Distances.	
			Miles.	Total.
	Brought forward.....	Ft. in.	247'30	
Northern and North-Western.	Branch—Allandale to Gravenhurst.....		50'94	
	do Beeton to Allandale.....		25'30	
	do Collingwood to Meaford.....		20'50	
	do Colwell to Penetanguishene		33'50	
	Flos Tramway—Elmvala to Hillsdale. (Connections with Grand Trunk, Great Western, Credit Valley, Toronto, Grey and Bruce.....)		8'50	
North Shore	Quebec to Montreal (St. Martin Junction) ..	4 8½	159'00	386'04
	Piles Branch—Piles Branch Junction to Grande Piles.....		27'50	
	Joliette Branch (formerly St. Lawrence and Industry) —Joliette to St. Felix.....		17'00	
	Berthier Branch—Berthier Junction to Berthierville.....		2'00	
	Loop Line—Three Rivers to Town of Three Rivers. (Connections at Quebec with Grand Trunk and Intercolonial and Quebec Central).....		3'50	
Northern and Western of New Brunswick.	Gibson (opposite Fredericton) to Chatham Junction on Intercolonial Railway. Connects also with New Brunswick Railway at Gibson. (50 miles under construction. Location of balance not decided on.)....			209'00
Pontiac and Pacific Junction.	Aylmer, P.Q., to Pembroke, Ont. 80 miles. 20½ miles constructed.....		80'00	
Prince Edward Island.....	Main Line—Alberton to Georgetown.....	3 6	147'00	
	Branch—Mount Stewart to Souris.....		38'40	
	do Alberton to Tignish.....		13'10	
Quebec and Lake St. John. ..	Main Mine—Quebec to Lake St. John.....		180'00	198'50
	Branch—Lake Edward to La Tuque.....		30'00	
	do Lake St. John to Chicoutimi. (52 miles constructed; 36 miles in operation).....		60'00	
Quebec Central.....	Main Line—Sherbrooke to Lévis, Que.....	4 8½	139'00	270'00
	Chaudière, Branch—Beauce Junction to St. Joseph.....		11'00	
	St. Henri to Harlaka Junction.....		5'00	
	East Angus to Angus Mills. (45 miles under construction from beyond St. Joseph to Boundary. 156 miles under traffic. Connects with Grand Trunk, Intercolonial and Passumpsic. This railway includes former Lévis and Kennebec, purchased in March, 1881.).....		1'00	
Stanstead, Shefford and Chambly	From near St. John's Que., to East Waterloo. (Connects with South-Eastern and Champlain and St. Lawrence Junction.).....			156'00
South-Eastern	Main Line—West Farnham to Boundary line	4 8½	44'00	43'00
	Northern Division—Sutton Junction to Sorel		96'00	
	Branch—Drummond to L'Avenir.....		12'00	
	Carried forward		152'00	

TABLE showing Locations of Railways, &c.—*Concluded.*

Name of Railway.	Description.	Gauge.	Distances.	
			Miles.	Total.
	Brought forward	Ft. in.	152'00	
South-Eastern—Continued.				
Leased Lines.....	Montreal, Portland and Boston—St Lambert to Farnham		36'00	
	Branch—Marieville to St Césaire		9'00	
	Lake Champlain and St. Lawrence Junction—Stanbridge to St. Guillaume. (Connects with Connecticut and Passumpsic Railway, Grand Trunk, and Stanstead, Shefford and Chambly)	4 8½	63'00	260'00
St. Lawrence and Ottawa.....	Ottawa to Prescott.....	4 8½	51'00	
	Branch—Chaudière Junction to Chaudière. (Connects with Grand Trunk and St. Lawrence Steamers at Prescott, and with Canadian Pacific Railway at Chaudière, Ottawa.).....		5'00	
				59'00
St. Martin's and Upham.....	Hampton Junction, Intercolonial Railway, to St Martin's, on Bay of Fundy			30'00
Thousand Islands.....	Gananoque to Gananoque Station, G.T.R.....	4 8½		3'76
Waterloo and Magog.....	Magog to Waterloo, Que. (Connects with Stanstead, Shefford and Chambly, and also with South-Eastern. The Missisquoi Valley Railway, so far as constructed—10·10 miles—is operated by the Waterloo and Magog; it is to extend from Richmond to Masonville, 57·10 miles.)	4 8½		23'00
Western Counties.....	Yarmouth to Digby, N.S. (Connects at Yarmouth with Nova Scotia Steamship Company's steamers for Boston, and at Digby with same Company's steamers for Annapolis, St. John and Boston.).....	4 8½		67'00
Windsor and Annapolis.....	Windsor to Annapolis, N.S.....	4 8½	81'00	
Leased	Windsor Branch—Windsor to Windsor Junction; also running powers over trunk line of Intercolonial Railway, Windsor Junction to Halifax, 14 miles.)		32'00	116'00

No. 1.—SUMMARY STATEMENT ON CAPITAL.

Table with columns: NAME OF RAILWAY, LENGTH OF LINE (Completed, Under Construction), ORDINARY SHARE CAPITAL (Authorized, Subscribed, Paid Up), PREFERENCE SHARE CAPITAL (Authorized, Subscribed, Paid Up), BONDED DEBT (Authorized, Subscribed, Paid Up, Rate of Interest), GOVERNMENT AID (Name of Government, Loan, Bonus, Subscription to Shares or Bonds, Paid up), MUNICIPAL AID (Loan, Bonus, Subscription to Shares or Bonds, Paid up), CAPITAL FROM OTHER SOURCES (Subscribed, Paid up), TOTAL CAPITAL (Subscribed, Paid up), FLOATING DEBT (Amount, Rate of Interest), Total Cost of Railway and Rolling Stock, REMARKS.

SUMMARY STATEMENTS

No. 2—SUMMARY STATEMENT of

Number.	Name of Railway.	Length of Line.				Length of Siding.	Weight per Yard.		Number of Ties to Mile.
		Completed. (Rails laid)	Under Construc- tion.	Iron Rails.	Steel Rails.		Iron Rails.	Steel Rails.	
1	Albert.....	51'00		51'00		2'25	56	2,240	
2	Atlantic and North-West.....	7'00			7'00		56	2,640	
3	Bay of Quinté & Navig'tn Co.	3'50			3'50	3'00		3,000	
4	Canada Atlantic.....	82'00	52'00		82'00	10'18	56	2,200	
5	Canada Southern.....	359'61		82'31	277'39	116'00	60	60 & 65	
6	Canadian Pacific... 2491'50	3065'67	946'70	69'10	2422'40	185'50	56	56 & 60	
	Credit Valley..... 183'50				183'50	32'00		56	
	Ontario & Quebec 199'17				199'17			60	
	Toronto, Grey & Bruce..... 191'50			4'00	187'50	20'09		60	
7	Carillon and Grenville.....	13'00		13'00		'07	65	2,200	
8	Central Ontario.....	104'00			104'00	10'00		42 & 56	
9	Chatham Branch.....	9'03		2'00			56	56½ & 60	
10	Cobourg, Peterboro' and Mar- mora.....	47'00		47'00			56	2,650	
11	Cumberland Railway & Coal Co.....	32'00			32'00	7'00	56	2,000	
12	Eastern Extension.....	80'00			80'00	3'00		56	
13	Erie and Huron.....	41'50			41'50	2'50	50	2,240	
14	Elgin, Pettitcodiac & Havelock	14'00		14'00			60	2,240	
15	Grand Southern.....	82'50			82'50		80	50	
16	Grand Trunk (Grand Trunk Division) 887'25								
	Buffalo and Lake Huron..... 162'00								
	Georgian Bay and Lake Erie..... 171'50								
	Montreal & Cham- plain Junction... 62'25								
	(Great West. Div.) Great Western... 539'53								
	London and Port Stanley..... 23'66								
	Wellington, Grey and Bruce..... 168'35	2591'42		435'49	2155'93	487'61	66	65 & 66	
	London, Huron & Bruce..... 68'89								
	Brantford, Norfolk & Port Burwell. 34'74								
	(Midland Division) Midland..... 141'75								
	Toronto and Nipis- sing..... 105'50								
	Grand Junction... 87'75								
	Whitby & Halibur- ton..... 99'74								
	Toronto & Ottawa. 30'00								
	Medonté Tramway 8'50								
17	Great American & European Short Line.....		90'00						
18	Great Northern.....		8'00						
	Carried forward.....	6583'20	1096'70	717'90	5865'30	880'11			

Characteristics of Roads, &c.

Nature of Rail Fastening.	No. of Grain Elevators.		No. of Level Crossings.		No. of overhead Bridges.	Height of overhead Bridges above rail level.	Level Crossings of other Railways.	Number of Junction with other Railways.	Number of Junctions with Branch Lines.	Radius of sharpest curve.	Number of feet per mile of heaviest gradient.	Gauge of Railway.		Remarks.
	Guarded.	Not Guarded	Feet.	Number.										
Fish plates.....		93					2			76	4'8"	1		
do		11					1		1433	52'80"	4'8"	2		
do		4	54	3			2		400	90	4'8"	3		
do		2	346	10	19	9	11	4	2865	35	4'8"	4		
Joints spliced.....		8	386	6	21	1	11	11	1432	15	4'8"	5		
Angle bars and fish plates	1	5	263	5	21	9	9		1092	79	4'8"	6		
Fish plates.....		2					8		955	70	4'8"			
Angle fish plates.....		2					8		1433	52'80"	4'8"			
Fish plates.....	2	2	179	7	16to20	6	4		500	110	4'8"			
do		1	7	1	16				1910	100	5'6"			
do			91			4	2		955	105	4'8"			
do			5				1		955	52'80"	4'8"			
Chairs and fish plates.....		1	31			3	4		273	96	5'6"	10		
Fish plates.....			13				1				4'8"	11	Late Springhill & Parrsboro'.	
do			60	9	18to21		1		6°	79½	4'8"	12	Late Halifax & Cape Breton.	
Fish plates and bolts.....			48	1	19'4	2	2		1901	45	4'8"	13		
Chairs.....							1				4'8"	14	Late Petitec- diac & Elgin.	
Fish plates.....							2	3	717	80	4'8"	15		
Fish and angle plates....	9	63	2402	203	{ 16'6 to 28'4 }	47	57	44	1110	52'80"	4'8"	16		
.....											4'8"	17		
.....											4'8"	18		
.....	12	88	3989	245		93	118	59						

No. 2—SUMMARY STATEMENT OF

Number.	Name of Railway.	Length of Line.				Length of Siding.	Weight per Yard.		Number of Ties to Mile.
		Completed. (Rails laid.)	Under Construc- tion.	Iron Rails.	Steel Rails.		Iron Rails.	Steel Rails.	
						Lbs.	Lbs.		
	Brought forward.....	6583·20	1096·70	717·90	5865·30	880 11			
19	Intercolonial.....	847·00			847·00	115·80		56, 57½, 67	2,640
20	International.....	81·66			81·66			56	2,260
21	Jacques Cartier Union.....	7·33			7·33			56	2,640
22	Kent Northern.....	27·00		27·00		1·00			2,640
23	Kingston and Pembroke.....	91·00	21·00		91·00	12·00			2,640
24	Manitoba and North-Western	78·54			78·54	4·94		45 & 56	3,000
25	Manitoba South-Western Co- lonization.....	50·70			50·70	4·28		56	
26	Massawippi Valley.....	34·00		2·00	32·00	1·00	56	50	2,400
27	Montreal and Vermont Junc- tion.....	23·60			23·60	2·00		60	2,600
28	Montreal and Sorel.....	46·00			46·00	2·00		56	2,640
29	Napanee, Tamworth and Que- bec.....	28·50			28·50	2·00		56	3,000
30	Napierville Junction Railway and Quarry Co.....	2·50		2·50				56	2,500
31	New Brunswick & New Brunswick & Canada..... 127 00	415·50		79·50	336·00	35·00	56 & 52	56 & 52	2,641
	St. John & Maine. 92·00								
	Fredericton..... 22·50								
32	Northern and North-Western	386·04		136·50	249·54		58	56 & 60	2,640
33	orthern and Western of New Brunswick.....		50·00						
34	North Shore.....	209·00		30·75	178·25	26·25	56	56	2,640
35	Nova Scotia, Nictaux and At- lantic.....		75·00						
36	Pontiac and Pacific Junction.....	20·50	59·50		20·50			56	2,640
37	Prince Edward Island.....	198·50		160·25	38·25	14·55	40	50 & 52	2,640
38	Quebec and Lake St. John.....	52·00	218·00		52·00	2·00		56	2,640
39	Quebec Central.....	156·00	45 00	87·00	69·00	10·00	56	56	2,640
40	Stanstead, Shefford & Cham- bly.....	43·00		37·00	6·00	5·25	60	60	2,400
41	St. Martin's and Upham.....	29·12		29·12			56		2,240
42	South Eastern..... 152·00								
	Lake Champlain & St. Lawrence 63·00	260·00		139·50	120·50	29 00		57½ & 60	3,000
	Montreal, Portland & Boston..... 45·00								
43	St. Lawrence and Ottawa.....	59·00		9·00	50·00	9 00	56	56 & 75	2,640
44	Thousand Islands.....	3 76			3·76	·61	56		3,000
45	Waterloo and Ma- gog..... 23·00	33·10		18 10	15·00		56	56	2,400
	Missisquoi Valley 10·00								
46	Western Counties.....	67·00		67·00		4·00	56		2,600
47	Windsor and Anna- polis..... 84·00	116·00		58·25	57·75	4·50	50 & 67	56	2,640
	Windsor Branch.. 32 00								
	Total.....	9949·55	1565·20	1631·37	8348·18	1165·29			

Characteristics of Roads, &c.—*Concluded.*

Nature of Rail Fastening.	No of Grain Elevators.		No. of Level Crossings.		No. of overhead Bridges.	Height of overhead Bridges above rail level.	Level Crossings of other Railways.	Number of Junctions with other Railways.	Number of Junctions with Branch Lines	Radius of sharpest curve.	Number of feet per mile of heaviest gradient.	Gauge of Railway.		Remarks.
	Guarded.	Not Guarded.	Guarded.	Not Guarded.								Number.		
	12	88	3989	245	Feet.	93	118	59						
Angle, fish plates and scabbards	1	8	429	28	18½, 35	1	15	12	694	65	4' 8½"	19		
Fish plates			27				2		1146		4' 8½"	20		
do			3				2		800	50' 28"	4' 8½"	21		
do			6			1	1		1433	60	4' 8½"	22		
do	2		43	1	17	2	3		955	79	4' 8½"	23		
do			64				1		955	77	4' 8½"	24		
Fish plates			20	1	19				442	76	4' 8½"	25		
do and bolts			51	1	17.5	2				52	4' 8½"	26		
Angle fish plates			24				1		882	88	4' 8½"	27		
Chairs							1		13		4' 8½"	28		
Fish plates			170	3	18	1	4	5	540	85	4' 8½"	29		
do and bolts	3	5	303	16		10	11		603	74	4' 8½"	30		
Fish plates		2	134	1	19	12	2	3	800		4' 8½"	31		
Fish and angle plates			5				1		1433	52' 80"	4' 8½"	32		
do			955	2	17.3				396	90	3' 6"	33		
Fish plates			19				1		574	132	4' 8½"	34		
do			26			1	5	1	882	76	4' 8½"	35		
Chairs and fish plates			42			3	4			60	4' 8½"	36		
Sleeves and do			22				1		717	129' 50"	4' 8½"	37		
Fish plates	1		229	1	20.6	7	8	5	637	80' 00"	4' 8½"	38		
Fish plates and scabbards	1	2	65	8	18	1	3	1	1146	52' 80"	4' 8½"	39		
Angle plates			8				1		660	84' 4"	4' 8½"	40		
Fish plates and chairs	1					1	1	1	382	90	4' 8½"	41		
do									600	84	4' 8½"	42		
do			69	1	32		1		693	75' 50"	4' 8½"	43		
	17	109	6703	308		135	187	87				44		

No. 3—SUMMARY STATEMENT of the different

Number.	Name of Railway.	Length of Line.		Number of Engines.		Number of 1st Class Cars.	
		Completed.	Under Construction.	Owned.	Hired.	Owned.	Hired.
1	Albert.....	51·00		3		3	
2	Atlantic and North-West.....	7 00					
3	Bay of Quinté Navigation Co.....	3 50		1		1	
4	Canada Atlantic.....	82 00	52 00	5	4		2
5	Canada Southern.....	359 61		125		36	
6	Canadian Pacific.....	2491 50	946 70	245		78	
	Credit Valley.....	183 40		9	8	15	
	Ontario and Quebec.....	199 17					
	Toronto, Grey and Bruce.....	191 50		12	10	4	
7	Carillon and Grenville.....	13 00		3		2	1
8	Central Ontario.....	104 00		10		3	
9	Chatham Branch.....	9 00		2		1	
10	Cobourg, Peterboro' and Marmora.....	47 00		5		3	
11	Cumberland Railway and Coal Co.....	32 00		4		1	
12	Eastern Extension.....	80 00		9		6	
13	Erie and Huron.....	41 50		4		7	
14	Elgin, Petricodiac and Havelock.....	14 00		2		1	
15	Grand Southern.....	82 50		5			
16	Grand Trunk (Grand Trunk Division).....	887 25					
	Buffalo and Lake Huron.....	162 00					
	Georgian Bay and Lake Erie.....	171 50					
	Montreal and Champlain Junction.....	62 25					
	(Great Western Division) Great Western.....	539 53					
	London and Port Stanley.....	23 66					
	Wellington, Grey and Bruce.....	168 35					
	London, Huron and Bruce.....	68 89	2591 42	632		334	
	Brantford, Norfolk and Port Burwell.....	34 74					
	(Midland Division) Midland.....	141 75					
	Toronto and Nipissing.....	105 50					
	Grand Junction.....	87 75					
	Whitby and Haliburton.....	99 74					
	Toronto and Ottawa.....	30 00					
	Medonté Tramway.....	8 50					
17	Great American and European Short Line.....		90 00				
18	Great Northern.....		8 00				
19	Intercolonial.....	847 00		163		68	
20	International.....	81 68		3		2	
21	Jacques Cartier Union.....	7 33					
22	Kent Nor thern.....	27 00		2		1	
23	Kingston and Pembroke.....	91 00	21 00	9		5	
24	Manitoba and North-Western.....	78 54		2	1	2	
25	Manitoba South-Western Colonization.....	50 70					
26	Massawippi Valley.....	34 00					
27	Montreal and Vermont Junction.....	23 60					
28	Montreal and Sorel.....	46 00					
29	Napanee, Tamworth and Quebec.....	28 50		1		1	
30	New Brunswick.....	174 00					
	New Brunswick and Canada.....	127 00					
	St. John and Maine.....	92 00	415 50	31		16	
	Fredericton.....	22 50					
31	Northern and North-Western.....	386 04		47		26	
32	Northern and Western of New Brunswick.....		50 00	2			
33	North Shore.....	209 00		21		9	
	Carried forward.....	8911 57	1167 70	1357	23	625	3

No. 3—SUMMARY STATEMENT of the different

Number.	Name of Railway.	Length of Line.		Number of Engines.		Number of 1st Class Cars.	
		Completed.	Under Construction.	Owned.	Hired.	Owned.	Hired.
	Brought forward.....	8911·57	1167·70	1357	23	625	3
34	Nova Scotia, Nictaux and Atlantic.....		75·00				
35	Pontiac and Pacific Junction.....	20·50	59·50				
36	Prince Edward Island.....	198·50		20		16	
37	Quebec and Lake St. John.....	52·00	218 00	5	1	2	
38	Quebec Central.....	156·00	45·00	10		6	
39	Stanstead, Shefford and Chambly.....	43·00		6		4	
40	St Martin's and Upham.....	29·12		1	1		1
41	South Eastern.....	152·00					
	Lake Champlain and St. Lawrence.....	63·00					
	Montreal, Portland and Boston.....	45 00					
	}.....	260·00		30		9	15
42	St. Lawrence and Ottawa.....	59 00		11		4	
43	Thousand Islands.....	3·76		1		1	
44	Waterloo and Magog.....	23·00					
	Missisquoi Valley.....	10 10			1		1
45	Western Counties.....	67·00		4		2	
46	Windsor and Annapolis.....	84·00					
	Windsor Branch.....	32·00		10		5	
	}.....	116·00					
	Total.....	9919·55	1565·20	1455	26	674	20

descriptions of Rolling Stock—Concluded.

	Number of Second Class and Eminent Cars.		Number of Baggage, Mail and Express Cars.		Number of Cattle and Box Freight Cars.		Number of Platform Cars.		Number of Hopper and Dumping Cars.		Number.	REMARKS.
	Owned.	Hired.	Owned.	Hired.	Owned.	Hired.	Owned.	Hired.	Owned.	Hired.		
412	5	371	2	19855	737	13077	.....	1871	.....	.....	34	
.....	35	Under construction.....
14	4	.....	178	.....	125	.....	.....	.....	.....	36	
2	2	.....	8	.....	87	.....	.....	.....	.....	37	
6	5	.....	78	.....	172	.....	.....	.....	.....	38	
.....	39	
.....	1	.....	.....	.....	.....	.....	.....	.....	40	
8	6	4	61	371	248	100	50	.....	.....	41	Also 2 drawing room cars.
4	3	.....	97	.....	40	.....	.....	.....	.....	42	
.....	1	.....	.....	.....	.....	.....	.....	.....	.....	43	
.....	1	.....	10	.....	10	.....	.....	.....	44	
2	2	.....	19	.....	58	.....	.....	.....	.....	45	
5	4	.....	63	.....	72	.....	20	.....	.....	46	
453	5	398	8	20359	1118	13879	110	1941	.....	.....	.....

No. 4.—SUMMARY STATEMENT of the

Number.	Name of Railway.	Mileage.	Train Mileage.			
			Passenger Trains.	Freight Trains.	Mixed Trains.	Total Train Mileage.
1	Albert.....	51-00	726	7,485	29,846	38,057
2	Bay of Quinté & Navigation Co.....	3-50	7,623	5,962	fr't & mixed.	13,586
3	Canada Atlantic.....	82-00	98,470	68,235	.....	166,705
4	Canada Southern.....	359-61	943,116	1,580,236	101,282	2,624,634
5	Canadian Pacific..... 2431-00	2,805-90	1,060,721	2,683,590	1,534,231	5,278,542
	Credit Valley..... 183-40					
	Toronto, Grey & Bruce. 191-50					
6	Carillon and Grenville.....	13-00	4,000	.....	1,500	5,500
7	Central Ontario.....	104-00	10,000	10,500	fr't & mixed.	20,500
8	Chatham Branch.....	9-00	.....	.....	.....	19,836
9	Cobourg, Peterboro' and Marmora.....	15-00	.....	.....	8,200	8,200
10	Cumberland Railway and Coal Co.....	32-00	.....	.....	.....	26,000
11	Eastern Extension.....	80-00	51,422	26,579	.....	78,001
12	Erie and Huron.....	41-50	.....	.....	.....	.....
13	Elgin, Petritcodiac and Havelock.....	14-00	.....	.....	8,764	8,764
14	Grand Southern.....	82-50	.....	.....	.....	.....
15	Grand Trunk..... 887-25	2,591-42	4,216,355	6,774,133	2,288,363	13,278,851
	Buffalo & Lake Huron..... 162-00					
	Georgian Bay & Lake Erie 171-50					
	Montreal & Champlain J'n 62-20					
	Great Western Division—					
	Great Western..... 539-53					
	London & Port Stanley... 23-66					
	Wellington, Grey & Bruce 168-35					
	London, Huron & Bruce.. 68-89					
	Brautford, Norfolk & Port					
	Burwell..... 34-74					
	Midland Division—					
	Midland..... 141-75					
	Toronto & Nipissing..... 105-50					
	Grand Junction..... 87-75					
	Whitby & Haliburton..... 99-74					
	Toronto & Ottawa..... 30-00					
	Medonté Tramway..... 8-50					
16	Intercolonial.....	847-00	907,245	2,746,716	fr't & mixed.	3,653,961
17	International.....	81-66	.....	9,800	43,400	53,200
18	Kent Northern.....	27-00	.....	.....	8,574	8,574
19	Kingston and Pembroke.....	91-00	.....	.....	.....	135,500
20	Manitoba and North-Western.....	78-54	538	1,983	16,015	18,536
21	Manitoba South-Western Colonization	50-70	.....	.....	.....	.....
22	Massawippi Valley.....	34-00	68,765	85,651	4,500	158,916
23	Montreal and Vermont Junction.....	23-60	66,282	131,288	597	198,287
24	Montreal and Sorel.....	46-00	.....	.....	.....	.....
25	New Brunswick..... 174-00	415-50	.....	.....	.....	.....
	New Brunswick & Canada 127-00					
	St. John & Maine..... 92-00					
	Fredericton..... 22-50					
26	Northern and North-Western.....	386-04	424,461	389,411	205,360	1,019,232
27	North Shore.....	209-00	228,845	149,255	56,752	434,852
28	Prince Edward Island.....	198-50	71,674	166,456	fr't & mixed.	238,130
29	Quebec and Lake St. John.....	36-00	.....	.....	.....	76,766
30	Quebec Central.....	156-00	79,796	93,256	fr't & mixed.	192,587
31	Stanstead, Shefford and Chambly.....	43-00	37,113	26,770	12,982	76,865
32	St. Lawrence and Ottawa.....	59-00	27,943	761	41,034	69,738
33	St. Martin's and Upham.....	29-12	.....	.....	13,150	13,150
	Carried forward.....	9096-09	.....	.....	.....	28,874,728

Operations of the Year and Mileage.

Engine Mileage.	Total Number of Passengers Carried.	Tons of Freight of 2,000 lbs. Handled.	Average Rate of Speed of Passenger Trains. Miles per Hour.	Average Rate of Speed of Freight Trains. Miles per Hour.	Number.	Remarks.
38,745	13,641	22,027	15	12	1	
13,585	38,058	15,328	15	10	2	
167,160	74,637	91,724	30	15	3	
3,790,689	487,865	2,221,144	35	15	4	
6,228,390	919,263	1,244,476	24 to 45	15 to 20	5	
611,703	283,681	200,708	30	20	6	
544,204	169,881	156,331	25	15	7	
5,700	14,579	1,950	25	20	8	
20,500	30,759	15,083	20	.....	9	
19,836	11,174	9,259	18	.....	10	Late Springhill & Parrsboro'.
8,400	3,635	17,508	15	.....	11	Late Halifax and Cape Breton.
26,000	11,967	143,135	15	15	12	
81,020	47,532	16,149	23	18	13	Late Petitcodiac and Elgin.
.....	31,317	16,250	24	16	14	Operated by contractor.
8,800	1,855	6,097	.....	.....	.....
.....	
17,246,707	4,991,355	5,795,014	27	12	15	
.....	
4,407,655	920,870	1,001,163	25	15	16	
53,200	22,690	30,121	14	10	17	
8,574	.....	.....	15	.....	18	For six months.
135,500	31,775	85,946	20	20	19	
18,693	3,347	4,085	18	15	20	
.....	
158,916	56,874	92,704	22	10	21	Operated by contractor.
198,287	117,122	668,340	30	12	22	
.....	21,502	3,203	.....	.....	23	
.....	.....	.....	.....	.....	24	For seven months.
.....	169,943	211,258	25	12	25	
.....	
1,293,918	516,060	580,662	30	18	26	
608,210	298,123	174,044	35	15	27	
291,760	118,988	51,841	20	14	28	
76,766	50,388	44,700	20	12	29	
203,798	80,376	80,067	25	15	30	
76,865	72,512	361,382	23	12	31	
124,429	35,001	34,547	24	14	32	
13,150	6,050	3,410	.....	15	33	
36,481,160	9,655,820	13,399,563	.....	.....	.....

No. 4.—SUMMARY STATEMENT of the

Number.	Name of Railway.	Mileage.	Train Mileage.			
			Passenger Trains.	Freight Trains.	Mixed Trains.	Total Train Mileage.
	Brought forward.....	9,096.09				28,874,728
34	South Eastern.....	260.00	264,735	327,633	47,171	639,539
	Lake Champlain & St. Lawrence Montreal, Portland & Boston....					
35	Thousand Islands.....					
36	Waterloo and Magog..... 23.00	3.76	3,189		2,126	5,315
	Missisquoi Valley..... 10.10	33.10	14,500	12,466		26,966
37	Western Counties.....	67.00			45,558	45,558
38	Windsor and Annapolis.....	116.00	81,380		85,190	166,570
	Windsor Branch.....					
	Totals.....	9,575.95				29,758,676

Operations of the Year and Milcage.

Engine Milcage.	Total Number of Passengers Carried.	Tons of Freight of 2,000 lbs. Handled.	Average Rate of Speed of Passenger Trains. Miles per Hour.	Average Rate of Speed of Freight Trains. Miles per Hour.	Number.	Remarks.
36,481,160	9,655,820	13,399,563	.....	.....
639,539	180,527	213,032	30	22	34	
5,315	4,060	4,435	10	10	35	
28,498	9,305	17,748	20	14	36	
50,845	30,956	17,013	20	.....	37	
185,490	101,690	60,478	22	14	38	
37,390,874	9,982,358	13,712,269	.....	.....

No. 5—SUMMARY STATEMENT OF

Number.	Name of Railway.	Mileage.	Flour.		Grain.	
			Barrels.	Tons.	Bushels.	Tons.
1	Albert.....	51·00	4,633	463	10,428	183
2	Bay of Quinté & Navigation Co.....	3·50	4,480	448	106,452	3,094
3	Canada Atlantic.....	82·00		3,600		3,540
4	Canada Southern.....	359·61	1,847,617	184,672	14,104,925	403,338
5	Canadian Pacific.....	2431·00				
	Credit Valley.....	183·40				
	Toronto, Grey and Bruce.....	191·50				
6	Carillon and Grenville.....	13·00		25		
7	Central Ontario.....	104·00	7,200	720	110,000	3,000
8	Chatham Branch.....	9·00	23,065	2,306	600	10
9	Cobourg, Peterboro' and Marmora.....	15·00			22,721	668
10	Cumberland Railway and Coal Co.....	32·00	4,124	412		
11	Eastern Extension.....	80·00		2,996		77
12	Elgin, Petittcodiac and Havelock.....	14·00		30		2
13	Erie and Huron.....	41·50	6,562	656	64,679	1,995
14	Grand Southern.....	82·50	6,851	685	5,456	109
15	Grand Trunk.....	887·25				
	Buffalo and Lake Huron.....	162·00				
	Georgian Bay and Lake Erie.....	771·50				
	Montreal and Champlain Junction.....	62·25				
	(Great Western Div.) Great Western.....	539·53				
	London and Port Stanley.....	23·66				
	Wellington, Grey and Bruce.....	168·35				
	London, Huron and Bruce.....	68·89				
	Brantford, Norfolk and Port Burwell.....	34·74				
	(Midland Division) Midland.....	141·75				
	Toronto and Nipissing.....	105·50				
	Grand Junction.....	87·75				
	Whitby and Haliburton.....	99·75				
	Toronto and Ottawa.....	30·00				
	Medonté Tramway.....	8·50				
16	Intercolonial.....	817·00	815,641	81,564	654,635	13,200
17	International.....	81·66	10,450	1,045	19,000	304
18	Kent Northern.....	27·00	3,808	380	305	5
19	Kingston and Pembroke.....	91·00	200	20	107,200	3,484
20	Manitoba and North-Western.....	78·54		118	110,491	2,487
21	Manitoba South-Western Colonization.....	50·70				
22	Massawippi Valley.....	34·00	3,400	340	67,000	1,870
23	Montreal and Vermont Junction.....	23·60				
24	Montreal and Sorel.....	46·00		382		5
25	New Brunswick.....	174·00				
	New Brunswick and Canada.....	127·00				
	St. John and Maine.....	92·00				
	Fredericton.....	22·50				
26	Northern and North-Western.....	396·04	181,644	18,164	3,619,387	102,028
27	North Shore.....	209·00	95,640	9,564	224,799	6,744
28	Prince Edward Island.....	198·50	25,789	2,579	513,425	8,804
29	Quebec and Lake St. John.....	36·00				
30	Quebec Central.....	156·00	48,260	4,826	18,148	544
31	Stanstead, Shefford and Chambly.....	43·00				
32	St. Lawrence and Ottawa.....	59·00	12,910	1,291		5,828
33	St. Martin's and Upham.....	29·12	400	40	350	1
34	South-Eastern.....	152·00				
	Lake Champlain and St. Lawrence.....	63·00				
	Montreal, Portland and Boston.....	45·00		17,485		14,369
35	Thousand Islands.....	3·76	1,830	183	1,386	42
36	Waterloo and Magog.....	23·00				
	Missisquoi Valley.....	10·10		260	29,038	493
37	Western Counties.....	67·00	6,456	646	773	14
38	Windsor and Annapolis.....	84·00				
	Windsor Branch.....	32·00	45,334	4,533		

Description of Freight Carried.

Live Stock.		Lumber of all kinds, except Firewood.		Firewood.		Manu- factured Goods.	All other Articles.	Total Weight Carried.	Number.	Remarks.
No.	Tons.	Feet.	Tons.	Cords.	Tons.	Tons.	Tons.	Tons.		
1,154	412	9,793,600	12,242	1,479	2,271	745	5,710	22,027	1	
43	22	4,288,000	5,360	91	65	3,492	2,847	15,328	2	
	1,200		47,360		2,600	27,500	5,924	91,724	3	
	74,442		325,668			20,000	1,212,934	2,221,144	4	
51,491	24,522	285,938,029	415,619	42,577	69,941	267,657	287,455	1,244,476	5	
	45					117	2,000	2,187	6	
	324	1,480,000	2,160	89,088	120	840	4,140	11,304	7	
267	134	461,000	580				6,229	9,269	8	
		13,000,000	17,508	280	560		29	18,765	9	
		10,104,000	11,724				130,999	143,135	10	Late Springhill
	786		2,468		3,234	2,925	3,663	16,149	11	& Parrsboro'
10	15	4,800,000	6,000	18	30		30	6,097	12	Late Halifax &
437	157	5,501,600	6,956	162	262	248	5,976	16,250	13	Cape Breton.
296	71		1,430		90	108	2,382	5,850	14	Late Petiteco- diac & Elgin
317,648	150,883	727,841,100	1,039,773	143,177	238,628	284,744	2,507,108	5,795,014	15	
62,090	12,575	131,120,948	163,901	7,294	14,588	233,592	481,743	1,001,163	16	
	144	15,220,000	21,757			2,455	4,416	30,121	17	
42	24		1,430	518	863		1,636	4,338	18	
340	270	23,670,000	28,404	10,235	18,865	15,043	19,860	85,946	19	
145	84	115,000	172				1,224	4,085	20	
									21	
9,900	460	19,500,000	22,820			7,650	28,464	92,704	22	
								668,340	23	
	13		131			999	1,676	3,203	24	
								211,258	25	
35,926	17,963	207,360,500	243,930	30,969	51,615	142,398	4,564	580,662	26	
8,692	4,346	11,583,370	22,022	79,096	35,048	29,055	67,265	174,044	27	
4,957	1,179	4,415,987	7,131	2,808	5,329		26,819	51,841	28	
		11,130,000	22,528		17,144		5,028	44,700	29	
	1,065	32,868,000	41,243			5,027	27,362	80,067	30	
								361,362	31	
	444		7,776			7,196	12,012	34,647	32	
30	12		4,938	50	55	14	360	5,410	33	
	3,475		61,422				116,284	213,031	34	
146	84	400,000	608			2,211	1,307	4,435	35	
		3,716,000	5,575	1,310	1,965	5,345	4,110	17,748	36	
335	155	7,679,725	10,669	1,639	2,660	2,869		17,013	37	
14,962	3,103	11,062,993	13,905	1,564	2,246	13,806	22,885	60,478	38	

No. 6.—SUMMARY STATEMENT of Earnings.

Number.	Name of Railway.	Mileage.	Passenger Traffic.		Freight Traffic.		Mails and Express Freight.		Other Source.		Total.	Remarks.	
			\$	cts.	\$	cts.	\$	cts.	\$	cts.			
1	Albert	51.00	7,163	44	12,504	78	1,115	16	1,455	40	22,238		
2	Bay of Quinté and Navigation Co.	3.50	2,001	20	7,652	39	1,359	31	632	17	11,645	07	
3	Canada Atlantic	82.00	76,028	43	91,007	13	6,107	00	.....	.....	173,142	56
4	Canada Southern	359.61	950,333	06	2,776	868	91	86,727	99	3,156	79	3,817,066	75
5	Canadian Pacific	2431.00	{ 1,562,213	98	3,390,708	87	137,241	57	86,951	70	5,177,016	12	
	Credit Valley	183.40	{ 188,923	87	300,200	66	.....	.....	19,643	17	508,767	70
	Toronto, Grey and Bruce	191.50	{ 154,272	53	224,283	06	20,006	97	.....	.....	398,562	56
6	Carillon and Grenville	13.00	3,523	44	1,749	72	.....	.....	1,052	63	6,325	79
7	Central Ontario	104.00	15,366	74	24,494	17	.....	.....	.....	.....	40,486	45
8	Chatham Branch	9.00	2,234	72	9,726	30	1,216	45	2,393	25	15,570	72	
9	Cobourg, Peterboro' and Marmora	15.06	1,201	15	11,083	68	.....	.....	.....	.....	12,284	83
10	Cumberland Railway and Coal Company	32.00	5,766	28	17,885	41	.....	.....	20,316	00	44,758	97
11	Eastern Extension	80.00	42,217	63	23,160	17	10,620	86	.....	.....	75,988	66
12	Elgin, Petitecodiac and Havelock	14.00	500	00	3,400	00	350	56	362	44	4,113	00	
13	Erie and Huron	41.50	15,630	23	12,849	89	1,551	75	266	75	30,298	62	
14	Grand Southern	82.50	13,764	40	9,999	92	.....	.....	.....	.....	23,763	32
15	Grand Trunk	887.28	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Buffalo and Lake Huron	162.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Montreal and Champlain Junction	62.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Great Western Division—												
	Great Western	539.53	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	London and Port Stanley	23.66	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Wellington, Grey and Bruce	168.35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	London, Huron and Bruce	63.89	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Branford, Norfolk and Port Burwell	34.74	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Midland Division—												
	Midland	141.75	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Toronto and Nipissing	105.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Grand Junction	87.75	.....	.....	.....	.....	.....	.....	80,891	11	16,291,435	23
		2591.42	5,752,698	45	9,877,112	84	580,732	83	.....	.....	.....	.....

Late Halifax and Cape Breton.
Late Petitecodiac and Elgin.

17	International.....	81-66	16,647 63	16,124 10	23,511 63	56,293 26
18	Kent Northern.....	27 00	2,040 63	2,354 78	1,340 34	5,930 37
19	Kingston and Pembroke.....	91-00	34,577 35	46,440 30	16,981 06	106,324 02
20	Manitoba and North-Western.....	78-54	9,149 23	9,983 10	11,336 81	31,639 69
21	Manitoba South-Western Colonization.....	50-70	.....	.....	.....	.....
22	Massachusetts Valley.....	34-00	25,978 91	30,305 35	35,222 93	107,757 83
23	Montreal and Vermont Junction.....	23 60	14,819 36	54,446 97	28,718 56	121,455 85
24	Montreal and Sorel.....	46 00	9,478 33	4,724 50	263 56	18,875 85
25	New Brunswick.....	174-00	.....	.....	.....	.....
	New Brunswick and Canada.....	415-50	126,375 43	153,419 67	123,319 59	437,604 91
	St. John and Maine.....	127-00	.....	.....	.....	.....
	Fredericton.....	22-50	.....	.....	.....	.....
26	Northern and North-Western.....	386-04	233,029 13	217,478 52	352,453 64	840,307 55
27	North Shore.....	209-00	84,528 05	125,472 35	129,402 74	368,784 17
28	Prince Edward Island.....	198-50	80,223 07	65,402 87	66,632 61	236,428 13
29	Quebec and Lake St. John.....	36-00	6,840 00	17,718 73	15,699 00	40,256 73
30	Quebec Central.....	156-00	51,515 37	31,069 87	35,891 31	130,326 43
31	Stanstead, Shefford and Chambly.....	43-00	29,193 28	16,321 22	13,100 27	67,233 02
32	St. Lawrence and Ottawa.....	59-00	28,917 62	28,104 82	4,671 00	89,417 32
33	St. Martin's and Upham.....	29-12	3,419 20	2,799 00	1,769 26	8,110 46
34	South-Eastern.....	152 00	.....	.....	.....	.....
	Lake Champlain and St. Lawrence.....	260-00	120,910 98	158,041 74	160,530 89	472,040 21
	Montreal, Portland and Boston.....	45-00	.....	.....	.....	.....
35	Thousand Islands.....	3 76	1,389 20	2,096 93	49 87	5,745 41
36	Waterloo and Magog.....	33-10	6,721 02	4,016 59	1,578 57	15,734 73
	Missisquoi Valley.....	10-10	.....	.....	.....	.....
37	Western Counties.....	67-00	23,371 71	10,145 44	2,986 81	49,243 90
38	Windsor and Annapolis.....	116-00	70,127 85	28,814 88	12,971 10	153,210 45
	Windsor Branch.....	32-00	.....	.....	.....	.....
		9575-95	5,197,269 03	8,794,969 55	2,315,948 91	25,695,341 73

No. 8.—SUMMARY

Number.	Name of Railway.	Mileage.	Passengers, Employés or others.	Fell from Cars or Engines.		Jumping on or off Trains or Engines when in motion.		At work on or near Track making up Trains		
				Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	
1	Albert.....	51-00								
2	Bay of Quinté and Navigation Co.....	3-50								
3	Canada Atlantic.....	82-00	Employés.....							
4	Canada Southern.....	359-61	Passengers.....	1		1				
			Employés.....	5		1	4	1		
			Others.....	1			1			
5	Canadian Pacific..... 2431-00	2805-90	Passengers.....				1			
			Employés.....	7	16	2	14	1	6	
			Others.....	1		1	2			
	Credit Valley..... 183-40		Employés.....		1				2	
	Toronto, Grey and Bruce..... 191-50		Passengers.....	1	1					
			Employés.....							
			Others.....							
6	Carillon and Grenville.....	13-00								
7	Central Ontario.....	104-00								
8	Chatham Branch.....	9-00								
9	Cobourg, Peterboro' and Marmora.....	15-00								
10	Cumberland Railway and Coal Co.....	32-00								
11	Eastern Extension.....	80-00								
12	Elgin, Petittcodiac and Havelock.....	14-00								
13	Erie and Huron.....	41-50								
14	Grand Southern.....	82-50								
15	Grand Trunk.....	887-25								
	Buffalo and Lake Huron.....	162-00								
	Georgian Bay and Lake Erie.....	171-50								
	Montreal and Champlain J'n.....	62-20								
	Great Western Division—									
	Great Western.....	539-53								
	London and Port Stanley.....	23-66								
	Wellington, Grey and Bruce.....	168-35								
	London, Huron and Bruce.....	68-89								
	Brantford, Norfolk and Port Burwell.....	34-74	2591-42	Passengers.....	2	6	5	10		
	Welland.....			Employés.....	8	39	2	17		18
	Midland Division—			Others.....	7			1		
	Midland.....	141-75								
	Toronto and Nipissing.....	105-50								
	Grand Junction.....	87-75								
Whitby and Haliburton.....	99-75									
Toronto and Ottawa.....	30-00									
Medonté Tramway.....	8-50									
16	Intercolonial.....	847-00		Passengers.....		1	1	2		
				Employés.....	2	9		3		
				Others.....		2		2		
17	International.....	81-66								
18	Kent Northern.....	27-00								
19	Kingston and Pembroke.....	91-00		Others.....						
20	Manitoba and North-Western.....	78-54								
21	Manitoba South-Western Colonization.....	50-70								
22	Massawippi Valley.....	34-00	Employés.....				1			
23	Montreal and Vermont Junction.....	23-60	Others.....				1			
24	Montreal and Sorel.....	46-00								
	Carried forward.....	7563-93		34	76	14	59	1	27	

No. 8.—SUMMARY

Number.	Name of Railway.	Mileage.	Passengers, Employés or others.	Fell from Cars or Engines.		Jumping on or off Trains or Engines when in motion.		At work on or near Track making up Trains	
				Killed.	Injured.	Killed.	Injured.	Killed.	Injured.
	Brought forward			34	76	14	59	1	27
25	New Brunswick	174 00	415 50	{ Employés					
	New Brunswick and Canada	127 00		{ Others					
	St. John and Maine	92 00							
	Fredericton	22 50							
26	Northern and North-Western	386 04	{ Passengers						
			{ Employés	4		2		1	
			{ Others			1			
27	North Shore	209 00	{ Passengers			1			
			{ Employés	1					
			{ Others						
28	Prince Edward Island	198 50	{ Employés						
			{ Others						
29	Quebec and Lake St. John	36 00	Employé						
30	Quebec Central	156 00	Passenger			1			
31	Stanstead, Shefford and Chambly	43 00							
32	St. Lawrence and Ottawa	59 00							
33	St. Martin's and Upham	29 12							
34	South Eastern	152 00	260 00	{ Passengers					
	Lake Champlain & St. Lawrence	63 00		{ Employés	2	1	1	1	1
	Montreal, Portland and Boston	45 00		{ Others					
35	Thousand Islands	3 76							
36	Waterloo and Magog	33 10							
37	Western Counties	67 00	{ Employés	2					
			{ Others						
38	Windsor and Annapolis	116 00							
	Totals	9578 95		39	81	17	62	2	29

OF ACCIDENTS—*Concluded.*

Putting Arms or Heads out of Window.		Coupling Cars.		Collisions, or by Trains thrown from Track.		Walking standing, lying or being on Track.		Explosions.		Striking Bridges.		Other Causes.		Totals.		Number.	Remarks.
Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.		
.....	9	241	38	114	88	84	...	6	4	4	15	140	203	751		
.....		1	1	.....	4	.....	.....	.....	.....	.....	.....	.....	1	1	25	
.....		7	1	1	.....	.....	.....	.....	.....	.....	.....	.....	1	14	26	
.....		1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	2		
.....		1	.....	.....	3	.....	.....	.....	.....	.....	.....	.....	1	1	27	
.....		1	.....	.....	1	1	.....	.....	.....	.....	.....	.....	3	1	28	
.....		1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	3	29	
.....	1	1	30	
.....	31	
.....	32	
.....	1	13	.....	.....	.....	.....	.....	.....	.....	.....	1	13	34	
.....	3	.....	.....	.....	.....	.....	.....	.....	.....	4	5		
.....	1	4	1	.....	.....	.....	.....	.....	.....	4	2		
.....	35	
.....	36	
.....	2	.....	
.....	1	.....	.....	.....	.....	.....	.....	.....	1	37	
.....	38	
.....	9	252	41	133	100	87	...	6	4	4	15	143	227	796		

No. 9.—LINES of Railway owned by Coal and Iron Mines.

Name.	Length of Rail-way.	Gauge.	No. of Engines.	No. of Waggons.	Remarks.										
NOVA SCOTIA.															
Granton Line	7·00	4·8½	} 2	88	Late Intercolonial.										
Stellarton Branch.....	3·00	4·8½													
Nova Scotia Coal Co.....	6·75	5·6	2	76	Cars furnished by Intercolonial Railway.										
Vale Coal and Iron Co.....	6·00	4·8½	2											
Acadia Coal Co.....	3·00	4·8½	2	2											
Steel Company of Canada	14·00	4·8½ & 3	5	72											
Albion Mines	6·00	4·8½	6	320											
	45·75		19	558											
<table style="margin-left: auto;"> <tr> <td>Gauge.</td> <td>Miles.</td> </tr> <tr> <td>5 ft. 6 in.</td> <td>6·75</td> </tr> <tr> <td>4 " 8½ "</td> <td>36·00</td> </tr> <tr> <td>3 " 0 "</td> <td>3·00</td> </tr> <tr> <td></td> <td style="border-top: 1px solid black;">45·75</td> </tr> </table>						Gauge.	Miles.	5 ft. 6 in.	6·75	4 " 8½ "	36·00	3 " 0 "	3·00		45·75
Gauge.	Miles.														
5 ft. 6 in.	6·75														
4 " 8½ "	36·00														
3 " 0 "	3·00														
	45·75														
CAPE BRETON.															
New Campbellton.....	1·25	3·6	1	45	Also one passenger car.										
Glace Bay.....	·37	4·8½	1	235											
Sydney.....	4·80	4·8½	2	184											
Victoria.....	4·70	4·8½	1	20											
Sydney and Louisburg	45·00	3·0	3	170											
Gowrie.....	2·00	3·6	1	120											
International	13·00	4·8½	2	142											
Lingan	1·00	3·6	1	50											
Caledonia	2·25	4·8½	1	70											
	74·37		13	1,036											
<table style="margin-left: auto;"> <tr> <td>Gauge.</td> <td>Miles.</td> </tr> <tr> <td>4 ft. 8½ in.</td> <td>25·12</td> </tr> <tr> <td>3 " 6 "</td> <td>4·25</td> </tr> <tr> <td>3 " 0 "</td> <td>45·00</td> </tr> <tr> <td></td> <td style="border-top: 1px solid black;">74·37</td> </tr> </table>						Gauge.	Miles.	4 ft. 8½ in.	25·12	3 " 6 "	4·25	3 " 0 "	45·00		74·37
Gauge.	Miles.														
4 ft. 8½ in.	25·12														
3 " 6 "	4·25														
3 " 0 "	45·00														
	74·37														

No. 10.—*STATEMENT of Aid granted to Railways by Government.*

Name of Railway.	Loan.	Total.	Bonus.	Total.	Subscrip- tion to Shares or Bonds.	Total.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
DOMINION GOVERNMENT.						
Canada Central			1,440,600 00			
Canadian Pacific	29,880,912 00		53,156,528 00			
Eastern Extension			1,257,929 77			
Grand Trunk	15,142,633 33					
Great American and European Short Line.....			460,000 00			
Great Northern			32,000 00			
Intercolonial			42,582,231 71			
International			144,000 00			
Kingston and Pembroke			48,000 00			
Napawee, Tamworth and Quebec			89,600 00			
Pontiac and Pacific Junction.....			256,000 00			
Prince Edward Island.....			3,653,356 00			
Quebec and Lake St. John			464,000 00			
Quebec Central.....			144,000 00			
Toronto, Grey and Bruce.....			2,656 00			
Windsor and Annapolis			1,089,674 00			
		45,023,645 33		104,896,575 48		
ONTARIO GOVERNMENT.						
Canada Atlantic.....			270,000 00			
Canada Southern			147,868 65			
Central Ontario			126,800 00			
Cobourg, Peterboro' and Marmora			44,740 00			
Credit Valley			532,600 00			
Erie and Huron.....			83,000 00			
Grand Junction			182,500 00			
Georgian Bay and Lake Erie			336,000 00			
Hamilton and North-Western			568,020 00			
Kingston and Pembroke.....			453,522 50			
London, Huron and Bruce.....			178,630 08			
Midland			168,350 20			
		45,023,645 33	3,089,621,43	104,896,575 48		
			Carried forward			

No. 10.—STATEMENT of Aid granted to Railways by Government—*Concluded.*

Name of Railway.	Loan.	Total.	Bonus.	Total.	Subscription to Share or Bonds.	Total.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Brought forward.....	45,023,545 33		3,088,621 43	104,896,575 48		
ONTARIO GOVERNMENT—Continued.						
Northern.....			196,800 00			
Toronto and Nipissing.....			105,212 00			
Lake Simcoe Junction.....			53,000 00			
Toronto, Grey and Bruce.....			375,282 00			
Victoria.....			312,000 00			
Wellington, Grey and Bruce.....			241,276 00			
Whitby, Port Perry and Lindsay.....			94,957 59	4,467,149 02		
QUEBEC GOVERNMENT.						
International.....			391,122 02			
Lake Champlain and St. Lawrence.....			380,000 00			
*Levis and Kennebec.....						
Missisquoi Valley.....			228,000 00			
Montreal, Portland and Boston.....			197,882 00			
North Shore.....	3,500,000 00					
Pontiac and Pacific Junction.....			480,000 00			
Quebec and Lake St. John.....			850,000 00			
Quebec Central.....			861,280 00			
Quebec, Montreal, Ottawa and Occidental.....	2,616,956 00		4,227,000 00			
South-Eastern.....			444,000 00			
Waterloo and Magog.....		6,116,956 00	92,000 00	8,150,954 02	100,000 00	100,000 00
NEW BRUNSWICK GOVERNMENT.						
Albert.....			455,000 00			
Chatham Branch.....			32,000 00			

Fredericton.....	.....	.....	.....	.....	230,000 00
Grand Southern.....	.....	.....	.....	.....	426,000 00
Kent Northern.....	.....	.....	.....	.....	135,000 00
New Brunswick.....	.....	.....	.....	.....	76,000 00
New Brunswick and Canada.....	.....	.....	.....	.....	575,000 00
Petitcodiac and Elgin.....	.....	.....	.....	.....	70,000 00
St. Martins and Upham.....	.....	.....	.....	.....	150,000 00
St. John and Maine.....	.....	.....	.....	.....	180,000 00
					3,028,000 00
NOVA SCOTIA GOVERNMENT.					
Halifax and Cape Breton Railway and Coal Company.....	.....	.....	.....	.....	643,545 00
Nova Scotia, Nictaux and Atlantic.....	.....	.....	.....	.....	440,000 00
Spring Hill and Parrsboro'.....	.....	.....	.....	.....	144,230 00
Western Counties.....	.....	.....	.....	.....	679,100 00
					1,906,875 00
					122,449,553 52
					51,140,501 33
					1300,000 00
					300,000 00
					400,000 00

† Granted to late European and North American Railway.

* Included in Quebec Central.

No. 10.—STATEMENT of Aid granted to Railways by Municipalities, &c.

Municipalities.	Name of Railway.	Loan.	Total.	Bonus.	Total.	Subscription to Shares or Bonds.	Total.
		\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
ONTARIO.							
Township of Deseronto.....	Bay of Quinté and Navigation Company.....	.....	.....	5,000 00	5,000 00	.....	.....
do Cambridge.....	Canada Atlantic.....	.....	.....	20,000 00	.....	.....	.....
do Russell.....	do.....	.....	.....	10,000 00	.....	.....	.....
City of Ottawa.....	do.....	.....	.....	100,000 00	.....	.....	.....
Renfrew.....	Canada Central.....	.....	.....	.....	130,000 00	30,000 00	.....
Norton.....	do.....	.....	.....	.....	.....	7,000 00	.....
Adamstown.....	do.....	.....	.....	.....	.....	5,000 00	42,500 00
County of Elgin.....	Canada Southern.....	.....	.....	200,000 00	.....	.....	.....
Township of Townsend.....	do.....	.....	.....	30,000 00	.....	.....	.....
do Durham.....	do.....	.....	.....	15,000 00	.....	.....	.....
do Anderson.....	do.....	.....	.....	15,000 00	.....	.....	.....
Town of St. Thomas.....	do.....	.....	.....	25,000 00	.....	.....	.....
Township of Malden.....	do.....	.....	.....	15,000 00	.....	.....	.....
Town of Amherstburg.....	do.....	.....	.....	15,000 00	.....	.....	.....
South Norwich.....	do.....	.....	.....	7,500 00	.....	.....	.....
Northumberland and Durham Savings Bank.....	Cobourg, Peterboro' and Mar-mora.....	.....	.....	113,500 00	322,500 00	.....	.....
Trenton Village.....	Central Ontario.....	.....	.....	10,000 00	113,500 00	.....	.....
Wellington Village.....	do.....	.....	.....	2,500 00	.....	.....	.....
Town of Picton.....	do.....	.....	.....	21,000 00	.....	.....	.....
County of Prince Edward.....	do.....	.....	.....	60,000 00	.....	.....	.....
do Oxford.....	Credit Valley.....	.....	.....	200,000 00	.....	.....	.....
do Wellington.....	do.....	.....	.....	135,000 00	.....	.....	.....
do Waterloo.....	do.....	.....	.....	110,000 00	.....	.....	.....
do Peel.....	do.....	.....	.....	75,000 00	.....	.....	.....

do	Haiton	70,000 00			
City of Toronto	do	350,000 00			
do	St. Thomas	50,000 00			
Town of Milton	do	30,000 00			
do	Brampton	20,000 00			
do	Ingersoll	10,000 00			
do	Orangeville	15,000 00			
Village of Streetsville	do	20,000 00			
do	Elora	15,000 00			
do	Fergus	15,000 00			
County of Kent	Erie and Huron	1,165,000 00			
Town of Chatham	do	155,000 00			
Village of Dresden	do	30,000 00			
do	Blenheim	18,000 00			
do	Wallaceburg	11,000 00			
do	Wallaceburg	11,000 00			
Township of Woodhouse	Georgian Bay and Lake Erie	15,000 00			
Town of Simcoe	do	10,000 00			
Township of South Norwich	do	10,000 00			
do	North do	40,000 00			
Town of Woodstock	do	25,000 00			
Township of East Oxford	do	25,000 00			
do	Woodstock	60,000 00			
Town of Woodstock	do	120,000 00			
do	Stratford	40,000 00			
County of Perth	do	10,000 00			
Township of Mornington	do	15,000 00			
do	Elma	10,000 00			
Town of Listowel	do	30,000 00			
Township of Wallace	do	25,000 00			
Town of Palmerston	do	20,000 00			
Township of Minto	do	50,000 00			
Town of Harriston	do	65,000 00			
Township of Normanby	do	20,000 00			
do	Bentwick	20,000 00			
do	Brant	45,000 00			
do	Elderslie	45,000 00			
do	Arran	43,000 00			
do	Amabel	32,000 00			
do	Kippel	10,000 00			
do	Albermarle	22,000 00			
Town of Mount Forest	do	60,000 00			
Township of Egremont	do	20,000 00			
do	Glengig	32,000 00			
Town of Durham	do	32,000 00			
Carried forward				929,000 00	42,500 00
				2,983,500 00	

No. 10.—STATEMENT of Aid granted to Railways by Municipalities, &c.—Continued.

Municipalities.	Name of Railway.	Loan.	Total.	Bonus.	Total.	Subscrip- tions to Shares or Bonds.	Total.
		\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
ONTARIO—Continued.							
	Brought forward.....				2,983,500 00		42,500 00
City of Belleville.....	Grand Junction.....			150,000 00			
Village of Stirling.....	do.....			5,000 00			
Township of Rawdon.....	do.....			15,000 00			
do Seymour.....	do.....			35,000 00			
Township of Percy.....	do.....			8,000 00		50,000 00	
do Asphodel.....	do.....						
County of Frontenac.....	Kingston and Pembroke.....			170,000 00	213,000 00		50,000 00
City of Kingston.....	do.....			318,000 00	488,000 00		
do Hamilton.....	Hamilton and North-Western.....			99,733 00			
County of Halton.....	do.....			75,791 00			
Village of Georgetown.....	do.....			11,289 00			
County of Peel.....	do.....			30,974 00			
do Simcoe.....	do.....			354,007 00			
Town of Collingwood.....	do.....			12,084 00			
Township of Innisfil.....	do.....			22,692 00			
do Woodhouse.....	do.....			20,740 00			
do Adjala.....	do.....			2,500 00			
do Essa.....	do.....			2,500 00			
do Tossoronto.....	do.....			10,000 00			
do Mulmur.....	do.....			5,000 00			
Village of Alhiston.....	do.....			8,800 00			
City of Hamilton.....	do.....					100,000 00	
Township of Nottawasaga.....	do.....			20,386 00	675,596 00		100,000 00
do East Gwillimbury.....	Lake Simpson Junction.....			45,000 00			
do North.....	do.....			20,000 00			
do Georgina.....	do.....			20,000 00			
do Whitechurch.....	do.....			15,000 00			
do London.....	London, Huron and Bruce.....			15,000 00			
do Stephen.....	do.....			17,500 00			

do Osborne.....	do	do	25,000 00
do Hay.....	do	do	15,000 00
do Goderich.....	do	do	15,000 00
do E. Warrnosh.....	do	do	25,000 00
do Hallet.....	do	do	25,000 00
do Tuckersmith.....	do	do	10,000 00
do Turnberry.....	do	do	5,000 00
do Morris.....	do	do	10,000 00
do Stanley.....	do	do	10,000 00
Village of Clinton.....	do	do	20,000 00
do Exeter.....	do	do	10,000 00
do Kincardine and Wigan.....	do	do	9,000 00
County of London.....	do	do	100,000 00
Thorah.....	Midland	do	50,000 00
Port Hope.....	do	do	30,000 00
Orillia and Matchedash.....	do	do	12,500 00
Town of Orillia.....	do	do	12,500 00
Tay.....	do	do	21,310 85
do Omamee.....	do	do	2,000 00
Mara.....	do	do	12,500 00
Peterborough.....	do	do	4,000 00
Town of Napanee.....	Napanee, Tamworth and Quebec	do	30,000 00
Village of Newburgh.....	do	do	7,500 00
Township of Camden.....	do	do	30,000 00
do Sheffield.....	do	do	15,000 00
City of Toronto.....	Northern	do	100,000 00
County of Simcoe.....	do	do	30,000 00
Town of Barrie.....	do	do	12,500 00
do Orillia.....	do	do	12,500 00
Townships of Collingwood, Euphrasia and St. Vincent.....	do	do	99,480 00
Town of Gananoque.....	Thousand Islands	do	150,000 00
City of Toronto.....	Toronto and Nipissing.....	do	10,000 00
Township of Scarborough.....	do	do	30,000 00
do Markham.....	do	do	50,000 00
do Uxbridge.....	do	do	10,000 00
do Scott.....	do	do	50,000 00
do Brock.....	do	do	44,000 00
do Eidon.....	do	do	15,000 00
do Bexley.....	do	do	15,000 00
do Somerville.....	do	do	15,000 00
Townships of Luxton, Digby and Langford.....	do	do	12,500 00
Carried forward.....			386,500 00
			5,250,946 85
			311,500 00
			144,870 85
			82,500 00
			190,000 00
			200,000 00
			390,000 00
			241,880 00
			10,000 00

No. 10—STATEMENT of Aid granted to Railways by Municipalities, &c.—Continued.

Municipalities.	Name of Railway.	Loans.	Total.	Bonus.	Total.	Subscription to Shares or Bonds.	Total.
		\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
ONTARIO—Continued.							
Town of Uxbridge.....	Brought forward.....			386,500 00	5,250,946 85		5,637,447 85
Albion.....	Toronto and Nipissing.....			2,000 00	388,500 00		
Caledon.....	Toronto, Grey and Bruce.....			40,000 00			
Mono.....	do do.....			45,000 00			
Amaranth.....	do do.....			45,000 00			
Arthur.....	do do.....			30,000 00			
Arthur Village.....	do do.....			35,000 00			
Orangeville.....	do do.....			5,500 00			
Mount Forest.....	do do.....			15,000 00			
Toronto.....	do do.....			20,000 00			
County of Grey.....	do do.....			350,000 00			
Owen Sound.....	do do.....			300,000 00			
Minto.....	do do.....			5,000 00			
Howick.....	do do.....			15,000 00			
Corrie and Wroxeter.....	do do.....			35,000 00			
Teeswater.....	do do.....			9,000 00			
Culross.....	do do.....			5,000 00			
Turnberry.....	do do.....			38,000 00			
Luther.....	do do.....			5,000 00			
Melancthon.....	do do.....			3,000 00			
Town of Lindsay.....	Victoria.....			85,000 00	1,003,500 00		1,088,500 00
Village of Fenelon Falls.....	do.....			25,000 00			
Verulam and Somerville.....	do.....			22,000 00			
County of Haliburton.....	do.....			54,000 00			
Fergus.....	Wellington, Grey and Bruce.....			10,000 00			
Peel.....	do do.....			40,000 00			
Elora.....	do do.....			10,000 00			
Maryboro'.....	do do.....			40,000 00			
Nichol.....	do do.....			10,000 00			
Wallace.....	do do.....			35,000 00			

Minto.....	do	.....	.....	.....	65,000 00
Bruce.....	do	.....	.....	.....	278,000 00
Howick.....	do	.....	.....	.....	20,000 00
Listowell.....	do	.....	.....	.....	15,000 00
Grey.....	do	.....	.....	.....	35,000 00
Elms.....	do	.....	.....	.....	30,000 00
Morris.....	do	.....	.....	.....	30,000 00
W. Wawanosh.....	do	.....	.....	.....	18,000 00
Asfield.....	do	.....	.....	.....	10,000 00
Turnbury.....	do	.....	.....	.....	28,000 00
Kincardine.....	do	.....	.....	.....	8,000 00
Town of Whitty.....	Whitty, Port Perry and Lindsay.	.....	.....	.....	70,000 00
Township of Whitty.....	do	.....	.....	.....	15,000 00
do Reach.....	do	.....	.....	.....	30,000 00
do Scugog.....	do	.....	.....	.....	2,000 00
County of Victoria.....	do	.....	.....	.....	85,000 00
Village of Port Perry.....	do	.....	.....	.....	20,000 00
QUEBEC.						
Parish of St. Sophie.....	Great Northern.....	.....	.....	.....	4,000 00
Village of New Glasgow.....	do	.....	.....	.....	2,000 00
County of Compton.....	International.....	.....	.....	.....	.....
St. Pie.....	Lake Champlain & St. Lawrence.	.....	.....	.....	20,000 00
L'Ange Garden.....	do	.....	.....	.....	10,000 00
St. Paul.....	do	.....	.....	.....	6,000 00
Philipsburg.....	do	.....	.....	.....	15,000 00
Ascot.....	Massawippi Valley.....	.....	.....	.....	.....
Hatley.....	do	.....	.....	.....	.....
Township of Melbourne & Bromp-	Missisquoi & Black River Valley.	.....	.....	.....	.....
ton Gore.....	do	.....	.....	.....	.....
Township of Ely.....	do	.....	.....	.....	.....
do North Studley.....	do	.....	.....	.....	.....
do Bolton.....	do	.....	.....	.....	.....
Chambly Canton.....	Montreal, Portland and Boston.....	.....	.....	.....	15,000 00
do Basin.....	do	.....	.....	.....	10,000 00
County of Pontiac.....	Pontiac and Pacific Junction.....	.....	.....	.....	.....
Parish of Sherbrooke.....	Quebec Central.....	.....	.....	.....	50,000 00
do Podswell.....	do	.....	.....	.....	25,000 00
do Weedon.....	do	.....	.....	.....	25,000 00
Carried forward.....						
				682,030 00	10,000 00	10,000 00
				222,000 00
				7,732,946 85	592,500 00
				6,000 00
				225,000 00	225,000 00
				51,000 00
				40,000 00
				25,000 00
				25,000 00
				20,000 00
				20,000 00
				20,000 00
				20,000 00
				25,000 00
				100,000 00
				182,630 00	375,000 00

No. 10.—STATEMENT of Aid granted to Railways by Municipalities, &c.—Continued.

Municipalities.	[Name of Railway.	Loan.	Total.	Bonus.	Total.	Subscription to Shares or bonds.	Total.
		\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
MANITOBA.							
City of Winnipeg.....	Canadian Pacific.....	.....	.....	200,000 00	.....	.....	.....
County of Selkirk.....	.....	.....	.....	35,000 00	.....	.....	.....
Township of St. Andrews.....	.....	.....	.....	35,000 00	.....	.....	.....
Town of Morris.....	.....	.....	.....	100,000 00	.....	.....	370,000 00
Westbourne.....	Manitoba and North-Western.....	.....	.....	75,000 00	.....	.....	.....
Portage la Prairie.....	.....	.....	.....	50,000 00	.....	.....	.....
St. Minnedosa.....	.....	.....	.....	30,000 00	.....	.....	155,000 00
							525,000 00

No. 10.—STATEMENT of Aid granted to Railways by Governments and Municipalities—Concluded.

SUMMARY.

	Loan.		Total.		Bonus.		Total.		Subscription to Shares or Bonds.		Total.		Grand Totals.		
	\$	cts.	\$	cts.	\$	cts.	\$	cts.	\$	cts.	\$	cts.	\$	cts.	
<i>Governments.</i>															
Dominion.....															
Ontario.....	45,023,545	35			104,896,575	48							149,920,120	81	
Quebec.....					4,467,149	02							4,467,149	02	
New Brunswick.....	6,116,956	00			8,150,954	02			100,000	00			14,367,910	02	
Nova Scotia.....					3,028,000	00			300,000	00			3,328,000	00	
			51,140,501	33			122,449,553	52			400,000	00		173,990,054	85
<i>Municipalities, &c.</i>															
In Ontario.....															
Quebec.....	2,424,000	00			7,732,946	85			592,500	00				8,325,446	85
Nova Scotia.....					472,000	00			1,353,000	00				4,259,000	00
New Brunswick.....	3,000	00			150,000	00			100,000	00				250,000	00
Manitoba.....					253,500	00			60,000	00				316,500	00
			2,427,000	00			9,133,446	85			2,105,500	00		13,675,946	85
			53,577,501	33			131,583,000	37			2,505,500	00		187,666,001	70

REPORT

OF THE

SECRETARY OF STATE

OF

CANADA,

FOR THE

YEAR ENDED 31ST DECEMBER,

1884.

PRINTED BY ORDER OF PARLIAMENT.



OTTAWA:

PRINTED BY MACLEAN, ROGER & Co., WELLINGTON STREET,
1885.

REPORT
OF THE
SECRETARY OF STATE

FOR THE
YEAR ENDED 31ST DECEMBER, 1884.

*To His Excellency the Most Honourable the Marquess of Lansdowne G. C. M. G.,
Governor General of Canada.*

MAY IT PLEASE YOUR EXCELLENCY:—

I have the honour most respectfully to submit, for Your Excellency's information, and in order that the same may be laid before Parliament, the Report of the Secretary of State of Canada for the year 1884.

Accompanying the report are the following appendices, viz.:—

- A. Report of the Deputy Registrar-General of Canada.
- B. Report of the Queen's Printer of Canada.
- C. 1. Report on Government Printing Office by the Queen's Printer.
- C. 2. do do do by J. Blackburn.
- D. Report of the Clerk in charge of the Stationery Branch of the Department.
- E. Report of the Keeper of the Records of Canada.
- F. Schedules of Returns to Addresses passed by the Senate and House of Commons of Canada, during the Session of 1884, which have been prepared by the Department, and presented through the Secretary of State.
- G. Synopsis of Returns to Addresses, &c., passed by the House of Commons during the Session of 1884, prepared by the Department, and presented through the Secretary of State.

H. Key to the above synopsis.

I. Addresses and Orders of previous Sessions, Returns to which were prepared by the Department, and presented through the Secretary of State, during the Session of 1884.

J. Table of Charters of Incorporation, issued under "The Canada Joint Stock Companies Act 1877," during the year 1884.

K. Supplementary Letters Patent, issued under the said Act during the year 1884.

L. Statement showing the number of counties and cities in the several Provinces of the Dominion, in which elections have been held under "The Canada Temperance Act, 1878," since the passing of the Act, giving the total number of duly qualified electors, and the number of votes polled for and against the Act in each county and city.

M. A List of the Officers, Clerks and Servants of the Department, on the 31st December, 1884, with the date of appointment, rank and salary, in each case.

The Report of the proceedings of the Board of Civil Service Examiners, required by sub-sec. 2, of sec. 55, of "The Canada Civil Service Act, 1882," is being prepared, and will be presented as a separate report.

From the appendices above enumerated, may be obtained a knowledge of the work of the Department, and of its several branches, during the past year.

The total number of letters, petitions and other documents received by the Department during the year was 18,588. The total number of letters sent during that period was 10,958,—an increase over the last year of 5,739, and 2,072 respectively.

REVENUE AND EXPENDITURE.

The total revenue of the Department during the year 1884, was made up as follows :

Fees on Charters of Incorporation.....	\$	4,775	25
“ Exemplifications of Patents.....		112	00
“ Commissions.....		1,039	25
“ Supplementary Charters of Incorporation....		605	00
“ Copies of Documents.....		94	85
“ Licenses.....		26	00
“ Passports.....		43	95
“ Certificates of Legalization		51	10
“ Searches.....		11	45
Receipts sale of Statutes.....		1,297	40
Fees, Subpœna		20	00
Receipts from <i>Canada Gazette</i> , viz., for copies, sub- scriptions and advertising.....		2,072	79
Stationery supplied.....		108,327	31
Total.....	\$	118,476	35

The total expenditure was as follows:

Salaries.....	\$ 47,797 77
Contingencies.....	9,783 84
Stationery.....	105,667 03
Printing <i>Canada Gazette</i>	3,805 40
Printing Statutes.....	8,799 75
Departmental printing and binding.....	69,119 15
Confidential printing.....	2,258 72
Other printing.....	59,571 31
Lithographing	5,002 46
Advertising in newspapers	39,401 48
Total.....	\$ 351,206 91
Stock of stationery on hand, 30th June, 1884.....	\$ 24,080 07

Under an Order of Your Excellency's predecessor in Council, dated the 12th July, 1882, the services of the Honourable Hector Fabre, who had previously been appointed by the Government of the Province of Quebec to represent their interests at Paris, France, were made available by this Government, for the purpose of calling the attention of intending emigrants, capitalists and others in France, to the superior advantages offered to them by Canada,—Mr. Fabre being required to report to the Secretary of State from time to time on the operations of his office.

The undersigned feels it his duty to bear testimony to the value of Mr. Fabre's services to the Dominion in the capacity above referred to, his energy and activity in promoting the interests of the Dominion, not only at the French Capital, but elsewhere on the continent of Europe, having been very conspicuous. In the performance of his ordinary duties, in reporting to the undersigned and to the High Commissioner in London on subjects respecting the trade and commerce of France in as far as they relate to Canada, and on the subject of emigration and otherwise, Mr. Fabre has been zealous and painstaking. During the past year he has established a library of reference composed of books and publications relating to Canada, for the use of persons desirous of information regarding the Dominion; he has also founded a journal, *The Paris-Canada*, especially devoted to Canadian affairs, and he has, in addition, delivered able lectures upon the resources of Canada and the desirability of this country as a field for enterprise and emigration.

Through the energy and ability which Mr. Fabre has displayed, he has largely increased the duties pertaining to the position he occupies and has given it an importance which cannot be too highly appreciated.

As stated in my last Annual Report the desirability of changing the system under which the public printing has been heretofore executed has been considered

during the past year. Information has been procured from the principal European capitals and the United States of America, respecting the systems pursued in those countries; and the Queen's Printer, assisted by Mr. J. Blackburn, of London, was commissioned to visit Washington and some of the State capitals, to gather further information on the subject there. The results of their study of the subject have been embodied in reports which have recently been brought under the consideration of your Government. They will be found appended to this report.

The whole respectfully submitted,

J. A. CHAPLEAU,

Secretary of State.

APPENDIX A.

DEPARTMENT OF THE SECRETARY OF STATE OF CANADA,
REGISTRAR'S BRANCH,

OTTAWA, 15th January, 1885.

To the Honourable
The Secretary of State, &c., &c.,
Ottawa.

SIR,—Herewith I have the honour to submit for your information a Statement of the work performed in this Branch of the Department of the Secretary of State during the year 1884.

A CONDENSED STATEMENT, showing the work done in the Registrar's Branch of the Department of the Secretary of State, from 1st January, 1884, to 31st December, 1884.

Documents.	Engrossed.	Recorded.	Total.
Commissions.....	130	130	260
Writs of Election.....		10	10
Writs of Supersedeas.....	4	4	8
Letters Patent, summoning to Senate.....		6	6
do granting an Annuity.....	2	2	4
Charters.....	40	40	80
Warrants.....	36	36	72
Bonds (An Annual Return under 31 Vic., cap. 37, sec. 15, is prepared for Parliament).....		223	223
Board of Trade Certificates.....	2	2	4
Exemplifications.....	9	9	18
Cancellations.....		17	17
Surrenders.....		130	130
Releases.....		3	3
Agreement.....		1	1
Decrees of Courts.....		5	5
Powers of Attorney.....		1	1
Proclamations.....	51	57	108
Leases.....	1	1	2
Quit Claims.....		5	5
Transfers.....		2	2
<i>Land Patents.</i>			
Indian Land Sales.....	188	188	376
Ordinance do.....	53	53	106
Special Grants ...	2	2	4
<p>(A Quarterly Return of these lands is sent to the Registrar of each City and County in the Province of Ontario, and to the Secretary-Treasurer of the Cities and Counties of the Province of Quebec, in which Patents have been issued; a copy of the several Returns of Ontario is also sent to the Provincial Secretary.)</p>			
Total.....	518	927	1,445

There have also been copied during the year 3,960 pages of manuscript. All of which is respectfully submitted.

L. A. CATELLIER,
Deputy Registrar-General of Canada.

APPENDIX B.

To the Honourable J. A. CHAPLEAU,
Secretary of State of Canada, &c., &c., &c.

SIR,—I have the honour to submit my Report respecting the printing and other services performed under my superintendence during the year ending 30th June, 1884, and quarter ending 30th September last:—

CANADA GAZETTE.

The cost of publication for the financial year ending 30th June last, was as follows:—

For paper used.....	\$1,428 16
“ printing and distribution.....	2,229 00
“ translations.....	148 24
	<u>\$3,805 40</u>

The income for the same period was:—

From subscriptions and sales.....	\$ 414 67
“ advertising.....	1,658 12
Total.....	<u>\$2,077 92</u>

In order to more nearly equalize the receipts and expenditure, I submit that it will be expedient to increase the rates charged for advertisements, which are now very low, never having been increased, while the rates for advertising in other publications have been repeatedly raised in the past few years.

THE STATUTES, &c.

The numbers which were printed of the several volumes of the Statutes passed in the Session of 1884, were:—

English, Vol. 1.....	17,750	
“ “ 2.....	3,350	
		21,100
French, Vol. 1.....	4,500	
“ “ 2.....	1,000	
		5,500
Making a total of.....		<u>\$26,600</u>

Of these, there were bound together for the use of Members of the Government of the two Houses of Parliament, and of the Judges, &c., 2,850 copies of the English edition, and 999 of the French, making 3,849 in all, leaving to be separately bound:—

Vol. 1, English.....	14,900
“ 2 “.....	150
“ 2 “ (in sheets folded and gathered).....	350
	<u>15,400</u>

Vol. 1, French.....	3,500
“ 2 “	1
	<u>3,501</u>
	<u>18,901</u>

Thus making 18,901 bound volumes, and 350 copies of Vol. 2 in sheets.

I beg leave to refer to the Annual Statutory Return to Parliament, for particulars of the distribution.

The cost was:—

For paper.....	\$3,542 29
“ printing.....	1,365 95
“ translation and revision of Orders in Council, &c....	155 50
“ binding and packing.....	2,942 92
“ distribution.....	793 09
Total.....	<u>\$8,799 75</u>

The question of the very great numbers of Statutes now issued, and the attendant cost, has been matter of consideration. The distribution to the great Departments of the Governments—Dominion and Provincial—and to judicial functionaries and officials cannot, of course, be dispensed with. But the very great increase in the commissions of the peace of the several Provinces, over which the Federal Government has no control, renders it, perhaps, advisable to enquire whether that Government may not select a certain number of these, to be of the quorum, as in the olden time in Britain, and distribute the Statutes of Canada to them alone, or to go further and furnish them only to a chairman of Petty Sessions, or *custos rotulorum* in each town, village, township or parish, and to the clerk of Petty Sessions to be appointed by the resident justices of the peace.

DEPARTMENTAL PRINTING AND BINDING, &c.

The usual tables are subjoined, showing the cost of these services during the financial year, and for the past quarter of the current year.

The number of requisitions issued during the year were as follows:—

On the Printing Contractor.....	3,243
do Binding do	1,849
do Stationery Office.....	3,860
Total.....	<u>8,952</u>

Or 361 more than during 1882-1883, and 1,043 more than in 1881-1882.

ADVERTISING.

The number of requisitions upon this office for advertising issued by the several Departments was 173,—2,400 orders to the newspapers being issued thereon. The accounts audited, passed and entered, numbered 4,092, or 235 more than in the previous year. As before a certain proportion of those presented and examined were rejected and not included above.

The table appended gives a summary of the year's transactions.

The printing contract of Messrs. McLean, Roger & Co., and that for binding, of Mr. A. S. Woodburn, expired on the 30th November last; but have been continued provisionally under letters of instruction to that effect. The paper contract of Messrs. Barber Bros., Georgetown, expired at the same date.

Before calling for new tenders under the present law, it was determined to examine the question of the expediency of changing the system, in order to secure greater efficiency in this branch of the public service.

I was directed in consequence, to procure such information as was to be had, respecting the systems pursued in other countries, during the past summer and autumn. The result of my investigations will be found subjoined in a report—(C 1). In seeking for information respecting the methods of Government printing, etc., in the neighbouring country, I was afforded the valuable assistance of Mr. J. Blackburn, of London, Ont., whose report, (C 2), is also appended.

The whole respectfully submitted,

B. CHAMBERLIN,

Queen's Printer.

OTTAWA, January, 1885.

Cost of Departmental Printing, &c., by Departments, for the Year ending 30th June, 1883, and 30th June, 1884.

Department.	Printing and Binding.		Stationery for same.	
	1882-83.	1883-84.	1882-83.	1883-84.
<i>At Contract Rates.</i>				
	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Agriculture.....	3,672 55	3,907 96	1,588 21	1,034 67
Auditor-General.....	236 22	255 47	135 86	112 83
Clerk of Crown in Chancery.....	17 75	20 14	16 93	26 50
Customs.....	3,993 06	4,742 10	4,220 25	4,485 77
Finance.....	4,890 36	3,109 85	2,191 85	1,612 07
Governor General's Secretary.....	64 81	235 86	21 98	90 42
Inland Revenue.....	3,924 01	10,215 14	2,368 17	5,615 09
Indian Affairs.....	1,033 99	1,122 60	844 26	1,006 85
Interior.....	5,565 67	7,773 40	4,047 48	5,137 51
Justice.....	572 60	601 04	335 41	533 45
Library of Parliament.....	14 92	25 11	24 41	9 37
Marine and Fisheries.....	1,826 97	2,737 69	1,524 44	1,483 38
Militia and Defence.....	1,618 51	3,948 58	732 12	1,804 61
Post Office.....	23,916 61	23,746 06	24,949 83	22,168 42
Privy Council.....	412 21	724 80	589 89	106 68
Public Works.....	1,756 62	2,121 73	1,001 58	1,417 18
Railways and Canals.....	1,937 51	1,186 82	840 66	602 63
Secretary of State.....	559 52	693 87	438 88	354 56
do Civil Service Board of Examiners.....	111 76	70 72	190 92	102 36
Supreme Court.....	1,772 65	1,856 73	1,742 67	1,589 82
Departments Generally.....	17 45	23 48	1 70	3 62
Total.....	57,915 75	69,119 15	47,807 50	49,297 79
<i>At Confidential Rates.</i>				
Agriculture.....	124 29	.....	.....	.....
Finance.....	21 63	1,466 78	.....	.....
Inland Revenue.....	132 10	94 66	.....	.....
Interior.....	4 20	121 60	.....	.....
Justice.....	587 09	337 30	.....	.....
Marine and Fisheries.....	5 75	0 56	.....	.....
Militia and Defence.....	812 05	127 50	.....	.....
Post Office.....	38 00	.....	.....	.....
Privy Council.....	663 64	.....	.....	.....
Railways and Canals.....	448 11	13 99	.....	.....
Secretary of State, Civil Service Board of Examiners.....	483 78	96 33	.....	.....
Total.....	3,320 64	2,258 72	.....	.....

Cost of Departmental Printing, &c., by Quarters, for the Year ending 30th June, 1883, and 30th June, 1884.

Quarter.	Printing and Binding.		Stationery for same.	
	1882-83.	1883-84.	1882-83.	1883-84.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.
<i>At Contract Rates.</i>				
September Quarter	12,060 26	16,686 28	13,032 51	12,671 11
December do	13,311 89	16,832 58	11,133 60	15,992 09
March do	14,633 98	17,842 18	11,175 10	10,395 37
June do	17,909 64	17,758 11	12,466 29	10,239 22
Total	57,915 75	69,119 15	47,807 50	49,297 79
<i>At Confidential Rates.</i>				
September Quarter	372 50	192 34		
December do	618 41	1,085 95		
March do	1,480 48	761 70		
June do	849 25	218 73		
Total	3,320 64	2,258 72		

Cost of Departmental Printing, &c., by Departments, for three months ending 30th
September, 1883 and 1884.

Department.	Printing and Binding.		Stationery for same.	
	1882-83.	1883-84.	1882-83.	1883-84.
<i>At Contract Rates.</i>				
	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Agriculture	260 09	650 16	374 82	281 69
Auditor-General.....	66 88	82 81	37 50	30 89
Clerk of Crown in Chancery.....		2 70		3 29
Customs	1,497 34	1,694 06	1,456 61	1,783 23
Finance	728 36	1,434 67	500 12	740 12
Fisheries.....		65 77		109 97
Governor General's Secretary	44 80	14 80	19 66	1 30
Inland Revenue.....	4,854 29	1,113 98	2,143 77	689 64
Indian Affairs	179 59	199 02	199 02	224 95
Interior.....	2,088 85	1,716 77	1,785 55	1,844 89
Justice	159 01	199 22	117 62	111 85
Library of Parliament	17 53	8 81	4 48	22 22
Marine and Fisheries.....	302 11	1,497 37	338 50	343 31
Marine		110 41		114 70
Militia and Defence	455 73	340 10	609 10	380 27
Post Office.....	4,950 45	4,217 86	4,544 35	4,454 98
Privy Council		364 58		17 66
Public Works	507 96	709 83	352 18	477 60
Railways and Canals.....	424 41	777 05	87 58	520 39
Secretary of State	169 63	152 54	100 25	65 51
do Civil Service Board of Examiners.....		183 86		66 25
Supreme Court		207 66		18 49
Departments Generally		3 59		2 77
Total.....	16,705 03	15,747 61	12,671 11	12,505 97
<i>At Confidential Rates.</i>				
Inland Revenue.....		2 50		
Justice	173 59			
Militia and Defence		435 50		
Railways and Canals		254 31		
Secretary of State		4 00		
do Civil Service Board of Examiners....		219 28		
Total	173 59	915 59		

Cost of Lithographic work, &c., Printing and Stamping ordered through the Office
of the Queen's Printer during the Fiscal Year ending 30th June, 1884.

Department.	Amount.
	\$ cts.
Agriculture	286 10
Auditor-General	12 20
Customs	111 00
Finance	355 39
Governor General's Secretary	4 50
Inland Revenue.....	2,212 30
Indian Affairs	142 50
Interior	1,112 95
Justice	82 95
Marine and Fisheries.....	95 20
Militia and Defence	217 77
Post Office	36 00
Privy Council	19 50
Public Works.....	105 90
Railways and Canals	112 20
Secretary of State.....	96 00
Total	5,002 46

Cost of Lithographic work, &c., Printing and Stamping ordered through the Office
of the Queen's Printer for three months ending 30th September, 1884.

Department.	Amount.
	\$ cts.
Agriculture	149 10
Auditor-General.....	12 20
Customs	72 50
Finance	97 50
Governor General's Secretary	1 50
Inland Revenue	58 50
Indian Affairs	61 00
Interior	378 55
Justice	48 00
Marine	7 50
Militia.....	19 80
Post Office.....	179 50
Public Works	66 00
Railways and Canals	27 00
Secretary of State	9 00
Total	1,187 65

STATEMENT of Accounts for Printing work, &c., done by others than the Contractors,
but sent to this Office for Audit, for the Year ending 30th June, 1884.

Date.	Department.	Amount.
		\$ cts.
1883.		
July.....	Agriculture.....	8,663 45
do	Inland Revenue.....	762 00
do	Post Office.....	18 00
August.....	Interior.....	9 00
do	Post Office.....	124 85
do	Railways and Canals.....	13 00
September.....	Agriculture.....	7,727 46
do	Public Works.....	276 00
do	Railways and Canals.....	17 40
October.....	Agriculture.....	3,439 29
do	Indian Affairs.....	10 00
do	Justice.....	117 80
do	Post Office.....	71 30
do	Railways and Canals.....	31 60
November.....	Agriculture.....	4,183 45
do	Marine and Fisheries.....	16 00
do	Post Office.....	47 00
do	Railways and Canals.....	185 30
December.....	Justice.....	43 00
do	Marine and Fisheries.....	1 50
do	Post Office.....	8 00
do	Privy Council.....	2 00
do	Public Works.....	349 00
do	Railways and Canals.....	68 49
1884.		
January.....	Agriculture.....	2,836 99
do	Inland Revenue.....	7 50
do	North-West Mounted Police.....	30 50
do	Post Office.....	16 00
do	Public Works.....	140 25
do	Railways and Canals.....	55 95
do	Secretary of State.....	7,688 74
February.....	Agriculture.....	3,866 78
do	Interior.....	2,850 89
do	Post Office.....	101 00
do	Privy Council.....	12 00
do	Public Works.....	78 15
do	Railways and Canals.....	36 83
March.....	Interior.....	725 55
do	Post Office.....	284 65
April.....	Agriculture.....	2,090 74
do	Finance.....	30 00
do	Inland Revenue.....	96 00
do	Militia and Defence.....	16 00
do	Post Office.....	40 00
do	Railways and Canals.....	476 37
May.....	Agriculture.....	5,890 19
do	Finance.....	36 00
do	Inland Revenue.....	48 00
do	Indian Affairs.....	4 00
do	Post Office.....	170 65
do	Railways and Canals.....	39 70
June.....	Agriculture.....	5,378 34
do	Inland Revenue.....	82 50
do	Post Office.....	40 00
do	Public Works.....	236 15
Total.....		59,571 31

STATEMENT of Accounts for Printing work done by others than the Contractors, but sent to this Office for Audit, for three months ending 30th September, 1884.

Month.	Department.	Amount.
1884.		\$ cts.
July.....	Agriculture.....	3,656 14
do	Inland Revenue.....	75 00
do	Militia and Defence	865 58
August.....	Agriculture.....	691 02
do	Customs	35 70
do	Governor General.....	13 25
do	Indian Affairs	6 00
do	Post Office.....	143 05
	Total.....	5,485 72
September.....	Nil.	

ADVERTISING in Newspapers receiving Government Patronage, from 1st January to 31st December, 1884.

Department.	Ontario.	Quebec.	Nova Scotia.	New Brunswick.	Manitoba.	British Columbia.	P. E. Island.	N.-W. Territories.	Total.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Agriculture.....	68 20								105 64
Customs.....	214 64	96 62	158 34	89 20	138 90			37 44	138 90
Finance.....	123 70	13 55							604 23
Governor General.....	1,523 68	557 67				13 78		31 80	136 25
Indian Affairs.....	327 56	379 19							2,227 47
Inland Revenue.....	266 75	148 84			108 32		22 70	7 60	745 93
Interior.....	21 50	257 02	19 99	19 19	1,665 86			1,842 25	3,946 90
Justice.....	500 81	5 9 29	25 92	101 82	74 00				480 26
Marine and Fisheries.....	620 64	1,004 22	277 45	278 89	5 60	176 33	2 20		1,810 57
Militia and Defence.....	1,323 01	867 61	18 70	71 73	45 00				1,760 29
Post Office.....	349 95	182 84	1,165 10	1,338 40	852 10	163 56	27 65	72 96	5,810 39
Privy Council.....	5,269 84	4,269 11	447 71	848 51	310 00			211 48	1,086 01
Public Works.....	4,668 57	1,851 08	751 92	560 00	409 17	280 56	21 05	133 31	11,679 26
Railways and Canals.....	279 28	350 93	22 40	79 91	165 34	53 31	3 80	23 12	7,911 21
Secretary of State.....									978 12
Total.....	15,546 97	10,547 97	2,904 03	3,433 59	3,774 29	706 47	128 20	2,359 96	39,401 48

TO THE HONORABLE J. A. CHAPLEAU,

Secretary of State of Canada,

SIR,

Having been instructed to examine the methods pursued by different governments in procuring the execution of public printing, binding and work of a like nature, with a view to possible improvement of the Canadian system,—I have devoted some time to the investigation and have the honor to report thereupon.

In almost all cases about which I have procured the necessary information, this work is done, either under contracts with persons engaged in the business, or in government establishments under the control of government officials and carried on at the government expense. The system of procuring separate jobs as needed, to be executed by tradesmen, in the open market, as individuals buy their clothes or their food, is not recognized, though in some cases, as in France and here in Canada, it has not been unknown in practice. There is a third way which has been partially in use in Britain and I believe elsewhere, viz.: to distribute work at certain fixed prices, among such private establishments as the several Departments may, from time to time, select. This system was, I know, advocated by so high an authority as the late Hon. Joseph Howe. But the fact that the supervision and control of work, now so difficult and imperfect, would, upon that plan, be simply impracticable, seems to me more than to counterbalance any advantages which it would possess.

THE CONTRACT SYSTEM.

The contract system has been adopted in Great Britain, in Canada and in all the larger—in so far as I can learn, in all—States of the North American Union. But that which obtains in Britain as yet differs from the others in this,—that it has never hitherto been open to public competition, though that is now in contemplation. For years, all the printing was done by and stationery, etc., purchased from parties who held patents from the Crown for these supplies. And the two Houses of Parliament appointed each its own printer. Some of these patents have only recently expired, and the work is being done under special contracts at revised prices, for the most part with the firms who held the patents or appointments. Nearly a century has elapsed since, by the appointment of a controller of stationery, an attempt was made to reform the abuses of the old time,—an attempt always since persisted in, but bringing very slow results. A joint committee of the two Houses of Parliament in 1881 reported in favor of basing contracts upon open competition after the expiry of existing contracts, in the present year and 1886. And there seems to be no doubt that this recommendation will be acted on, the rather because opinion, based on settled tradition, in Britain is still so much opposed to any government competition with private enterprise, notwithstanding the somewhat important exceptions established, in the postal and telegraph services, etc.

In the several States about which I have procured information, viz.: Massachusetts, New-York, Pennsylvania, Ohio and Indiana, open competition for printing work is established for contracts of from two to five years, and for paper, from one to two years. Nor can I find that, in any of these States, there is any movement to follow the example set at Washington, and set up government establishments for the better performance of the work. Yet there, as well as here, in a greater or less degree,—

 THE DRAWBACKS INCIDENT TO THE CONTRACT SYSTEM

are apparent. They are not, by any means, confined to contracts for printing, binding and stationery. In his report to the Joint Printing Committee of our own Parliament one of its officers said with a great deal of truth,—“a government printing contractor cannot have the interest of the government at heart, but is working all his might and main in the contrary direction to make the most he can of his contract,—knowing full well he has, while his contract lasts, to recoup himself for the large capital invested in his printing plant, not being certain he will be awarded the next contract.” But this is also true of almost all contracts,—for public works as well as for printing.

The evils which have made themselves apparent in the contract system for public printing in Canada, (some or all of which, crop up in the execution of the state printing among our neighbors) are :—

1. The tendering, under stress of competition, at prices not remunerative for really good work or material ;
2. The consequent, constant endeavor, almost always attended with some success, to secure the acceptance of inferior work ;
3. The attempt in order to execute the work cheaply, to do it with insufficient plant or labor or both, leading to delays detrimental to the public service ;
4. The attempt, by indirect methods, to make unprofitable work profitable ; or to keep down or keep back portions of work which are unprofitable and secure a greater proportion of that which is profitable.

If I am rightly informed, none of these devices for securing profit to contractors are unknown to other branches of the public service, and are only to be met by the most active and vigilant surveillance of the officials charged with that duty. Nay, it has been urged by a zealous public officer that it is hopeless to look for the literal fulfilment or honest carrying out of “any contract that can be written.”

With respect to the first ground, it seems inseparable from open competitions. It might be lessened, and the other evils consequent on it also minimized, if no one were allowed to tender except those possessed of plant sufficient or nearly sufficient to do the work, (exacting security that within a certain time it would be made and kept adequate), and the right were given to the government to renew the contract for another term or as many as are deemed advisable, if the work has been satisfactorily executed for the preceding term, upon, in each case, revised prices. One thing is certain, that under the mixed system now in use in Britain very good work has been obtained, as well as under the ordinary contract system, in Albany and Boston, for reasons referred to further on.

And one of the chief grounds of complaint against our present system in Canada is that the work sent out is not creditable to the Government and people of the Dominion. The fact is undeniable. The printing of the reports of the several departments and other documents laid before and printed by order of Parliament, not having been executed under my superintendence, I cannot speak as to all the causes which have contributed to this. But it has seemed to me that upon the failure of a contractor for Parliamentary printing some years before Confederation, and the assumption by others (under what was deemed almost desperate circumstances) of the responsibility of carrying the contract through, it was deemed fair, nay, perhaps necessary in order to prevent an entire collapse, that the standard of work should be lowered. It has never since been raised so as to render it first class. When, after the destruction of Mr. Desbarats' establishment here, a change to the contract system was made in respect of the departmental work, and the two contracts fell into the same hands (which has ever since been the case,) the Parliamentary standard came gradually—almost inevitably—to be applied to both. To raise it again is a most difficult matter except under some decided change of system, either through such a revision of contracts as will give the contractors greater interest in

doing their best, or their abandonment in favor of a government establishment. The rejection of work turned out by one contractor such as has been accepted from his predecessor, or under one contract such as would be accepted under another, would, in any case, give rise to a charge of favoritism, injurious to any official attempting it. Perchance his decision would be overruled; persisted in, it is not unlikely to result in the abandonment of a contract, with consequent trouble to everybody, extra cost to the Government and chaos in the Departmental or Parliamentary work. Of course work is, from time to time, rejected; but for the most part it is just good enough to secure acceptance, or is wanted in such haste that, bad or good, the article must be had and used.

But it would be unfair to the several contractors for printing and binding for the departments in the past if the blame for all the imperfect work turned out were made to rest on them, or those charged with the superintendence of their work, or even on the system itself. One of the causes of this has undoubtedly been the kind of paper employed for reports, pamphlets, etc. Mr. Blackburn, in his report accompanying this, speaks of the public "printing executed in Canada" as "of a very inferior kind." Arising, it is but fair to say, to a great extent from the inferiority of the paper used." Again, there are instances, not of unfrequent occurrence, when a department—sometimes several of them at once, give large orders to be executed in such a short time as to render careful or well finished work well-nigh impracticable—impossible without the use of expensive modern appliances. With reasonable foresight better work might be had. Without it the best establishment we can hope for here might fail either as to time or quality of work.

And turning to the question of delays, which are as undoubted and sometimes more vexatious than indifferent work,—all the blame here is not to be fairly imputed to the printers and binders. I have known cases of work being ordered upon a requisition—sometimes even marked "urgent" or "immediate." The type being set and proofs furnished—these latter have lain for weeks—nay, sometimes months—in the departments, while the contractors' type was standing useless and those needing to use the work wondering why the "printers" delayed. But there still remains a good deal of bungling and delay for which the system and contractors are fairly chargeable. In the constant struggle after profit, contractors will keep their plant and their hands down as low as will enable them to execute the work, sufficiently well not to forfeit their contract, not sufficiently well to give satisfaction: when called upon for a spurt, at times, either men or plant will be lacking. They will not, until fairly driven to it incur the extra cost for fuel, light and labor which night work involves. And again one job may be kept back for another which can be conveniently worked on the same press which will thus earn a double price per token. Yet a superintendent of a government printing office, zealous to work it economically, (if economy rather than good work and quick work were his hobby) might—nay would be tempted to—save in these very ways, and produce delays in like manner. This working of several forms together was ingeniously carried further at Washington than I had heard of or imagined before,—much to the credit of the managers. If, for the sake of economy the government were induced to erect too small a building for convenient working, to furnish it with insufficient plant, and with a staff of hands only fitted for ordinary requirements, precisely the same evils of delay would be likely to follow in this latter establishment as in the contractor's. A true economy in these matters is, of course, not inconsistent with excellent and quick work; a false economy,—a starving one decidedly would be.

Of the indirect methods of increasing the profit on contract work, very little has come under my cognizance in Canada, though it will be seen in the reference further on to the system in some of the States, that the temptations in some instances would be well nigh irresistible. Here, at Ottawa, perchance delays in execution of work have been caused by reluctance to do that which brought in no profit or involved a loss, in any larger proportion to the profitable, than was absolutely insisted on. The "dodge" of "spacing out"—an evil which would seem to be almost inseparable from all printing contracts—I need do no more than refer to here.

Perhaps I should note here, what I have referred to above,—that in Boston we found outside work in process of execution, while the contract at Albany was in the hands of a large general publishing house. Thus they were enabled to keep their plant and hands always occupied when government work was wanting, a thing of the greatest importance for economical management and leading to the use of better material and turning out of better work. In Ottawa this would seem to be well nigh impracticable, and there are evils connected with a mixed system in an office where confidential work has to be done for the great officers of government. In England a clause to the following effect has been inserted in the chief printing contracts :—

“The contractor is to be bound and hereby engages to exclude all strangers from the office where the above mentioned printing for the government is carried on, and to adopt every precaution that may be suggested by the controller to hinder any book, pamphlet or other work, or any part of the same, printed for the government falling into other hands than those entitled to receive the same.” In case of such a thing occurring the controller is authorized “to remove whatever portion of the printing he may consider to be of a confidential description from the contractor to any other party he may please to select.”

In the mixed offices employed at the several state capitals this restriction would seem to be very difficult, and would enhance the cost of production of the work ; here it tends to a reduction of staff and plant to the barest requirements of the service.

GOVERNMENT PRINTING OFFICES.

These have been established and maintained for years past at Paris, Vienna, Berlin and Washington ; and once established seem never to have been abandoned. A brief account of them will be found appended. It becomes necessary for me here to discuss whether the ends sought to be obtained here, *i. e.*, better work, more speedily executed, can, in such an office, be combined with economy of cost. That the better work can be obtained with less delay does not admit of a doubt. Whether at the same cost to the country as now is really the matter to be considered. From the examination I have made, it seems to me that these government workshops have been established rather for public convenience and efficiency of work, than with any idea of saving money. With respect to the oldest of these offices, that at Paris, its economy has again and again formed the subject of discussion between different departments of the government and in the legislative body. The result has been that, while the *legal* monopoly has been maintained, as belonging to the national establishment, *practically* several of the departments give out what work they please to private printers, and the Senate sets up an opposition printing office of its own, in its own building. In so far as concerns the departments, at least, this overriding of the law has been excused, upon the sole ground of economy. It should be remembered, that the National establishment is burthened with printing the laws and the reports of the *cour de cassation*, and a certain number of scientific works ordered by the government and institute, *gratis*, and is charged with providing type in all Oriental languages. These expenses are charged against departmental work, instead of having the account balanced by charging the establishment with the rental of the buildings used, and cost of wear and tear and increased plant, and crediting it with the amount of these now unremunerated branches of its work. Hence, it is very possible, that the rates charged the departments on some classes of work will be high enough to induce and enable departmental chiefs, jealously eager to make the most of their annual grants, to procure cheaper work in the open market. For some years the establishment was farmed out to a contractor, who is said to have made a very large income from printing at the government rates. But we are not told in what condition he returned the plant. It is certain the government found it expedient to abandon the experiment resume and possession by its own officers. A good story is told in one of the official reports on the subject of the legislative printing, how a contractor underbid and did work cheaper per page than the government printing office. On further examination, however, it was

found that he had ingeniously reduced the size of the page by a couple of thousand ems and, paid as measured, was receiving more instead of less than the government price.

As I have said above, the Parisian example is not a conclusive one. But any lover of good, artistic work might well feel it worth while to pay a little more for such printing as that great workshop turns out.

At Washington all parties seem to be satisfied that, if not for economy alone, yet for all purposes the present arrangement is satisfactory and should be maintained. The claim is made, indeed, that as much as forty per cent. has been saved in the cost of the printing, but I have not been able to procure the figures on which the comparison is based. I can understand that, as against four or five separate offices turning out larger or smaller portions of the work, an office well organized, with everything concentrated under one efficient management would certainly effect a large saving. Yet, so far as I have been able to make a comparison, the prices paid are higher than (under the contract system) at any of the State capitals or here. But besides this I learn that rent and taxes are not allowed as part of the cost at Washington, no interest on capital account is brought into the calculation, and the cost of renewal or improvement of plant or wear and tear not estimated.

It is easy enough to prove that, by means of either system, under the best possible,—an ideally perfect—management, good work can be turned out more cheaply than under any other system indifferently or badly managed. But is the government certain to secure perfect management by such a change? That, it seems to me, is open to question, for several reasons.

First, in respect of economy, we have to consider the conditions under which government printing establishments have succeeded. I have heard of none elsewhere than at the capitals of great nations where very large quantities of work have to be performed, giving opportunity for the profitable use of the best machinery and the employment of the best men obtainable in the country. In Washington the plant is worth over \$600,000, from 2,000 to 2,400 hands are employed, and over \$3,000,000 of money is each year expended in keeping up the plant and producing the required work. In Paris 1 200 hands are employed and the type alone, apart from machinery, is valued at 4,000,000 francs or \$800,000. In Berlin over 800 employees are under pay, their wages and salaries amount to nearly \$225,000, the receipts for work nearly \$1,000,000. Plant about \$500,000.

It is obvious that the \$200,000 dollars worth of work of the Canadian Government or similar sums expended in the greater states of the North American Union do not offer the opportunity for the use of an establishment so well equipped as these. Yet the superior staff must be, of necessity, nearly the same to secure the best results. There must be at its head a thorough business man, conversant with the work through at least ten years experience gained as manager or managing partner of a large publishing establishment. Actual training at the case and in the press room may not be absolutely necessary, though that would doubtless be of value; but business training and experience, and business aptitude are essentials. As his assistant he must have some person also versed in the business to look after the accounts, make up estimates and audit and check the returns of the foremen, and the expenditure of the sums drawn out of the public treasury. There would be required a foreman printer with at least five years experience as such in some large establishment, and an assistant in charge of the press room. There must be a foreman for the bindery with like skill, and a skilled examiner of paper. To secure thoroughly good work without wastefulness, these must all be first class men.

Then, for the plant itself, the small office, especially if it is expected to do things in great haste when occasion requires, must be somewhat larger in proportion to the work done, than a private establishment worked solely for profit; and in a city like Ottawa, without other printing offices on a similar scale, and where, therefore, emergencies could not be met as in London, Paris, etc., by calling in assistance from hands ordinarily employed in such offices, it would not be safe to reduce the employés to the low number that would give the greatest possible economy.

The danger from political patronage is again not altogether imaginary. It may either lead to the employment of indifferent workmen, or, as in Paris, to the giving work away from the government office to outside printers. This latter course has not been without its effect here in the past. Is there no cause to apprehend that the tendency towards it will be increased not diminished by the government becoming its own printer? Nothing could be more damaging to the experiment. To secure a speedy execution of the work (as I have pointed out above) both machinery and workmen must be kept up a little above rather than under the absolute daily routine requirements. To make the working pay, staff and machinery must not be idle; and every job of work taken away from the establishment tends to lessen the chance of economy. And hitherto here (contrary to the claim of the Parisian Departments) such work has been done at increased not lower prices, thus adding to the cost of the printing as a whole.

Again to secure a full measure of economy, the head of the printing bureau must be given the power to settle the style in which work is to be produced, and given an authority in this respect greater than has hitherto been conceded to those charged with the superintendence of the Parliamentary or Departmental Printing.

Added to these special causes of doubt or possibly comprising all of them, is, what may possibly be in great measure a prejudice as it is a tradition*, that government-works are always more expensive than those of private contractors. Either an over-zealous, energetic man, with the public purse in his grasp rushes into too great extravagance to secure showy rather than profitable results, or the curse of routine gradually robs the superintendence of some portion of its efficiency.

It has been urged that the large profits made by the contractors here go to show that, with such profits used as working capital, the government offer would cost no more. But the binding contracts have not yielded large profits. It remains to be proved that the present contracts for Parliamentary printing have done so. It is very certain that the printers have not been able to realize anywhere near such profits out of the current contract for Departmental work as out of that which preceded it. And whatever they may have been, they have been obtained by such a keen use of economical methods, as only the striving for private gain is wont to secure, and with results upon the work, which have induced this inquiry.

In view of all these grounds for doubt, I cannot see my way clear to recommend the establishment of a government printing office on the ground of economy, — as likely in fact to secure the production of the work for less money than is now paid.

But, on the other hand to procure such work as would be creditable to the government and the country, and greater facilities for its speedy execution are objects so much to be desired as to incline me to the opinion that it would be well that the additional expense should be incurred. If thoroughly efficient management be happily secured, a staff of hands gathered purely for their working capacity, the best labor-saving machinery procured, and all the work which the government has at its disposal concentrated in an establishment thus formed, any additional cost (after the original outlay) could be made small if it did not altogether disappear. But if any or all the evils I have indicated are permitted to creep in, then the cost would certainly be much enhanced.

Not anticipating either the very best or very worst results I have ventured on the opinion given above.

An estimate of the probable cost of the plant for a government printing office is subjoined, with a statement of the space necessary in a building to be used for the purpose. Its cost I leave to be dealt with by the professional advisers of the government.

* As I am revising this report I come upon the following in an article by Mr. Taine in the *Contemporary Review* :—

“ Even in a country of so much probity as France, it is calculated that every enterprise managed by the state costs one quarter more and brings in one quarter less than when entrusted to private hand. Consequently, if work were withheld from individuals, in order that the state might undertake it, the community would suffer a loss of one half when the accounts came to be balanced.”

Should it be determined not to establish a government printing office at present, but, for a time, to continue the contract system under a modified form, I would respectfully suggest that the service could be improved by the following changes:—

1. That there should be but one contract for both the Parliamentary and the Departmental work, *i. e.* one for the whole printing and one for the whole binding, and that these contracts should be renewable on a revision of prices, if during the previous term, the work turned out should be altogether satisfactory. Possibly it would be advisable to make such review or new contract more frequently than once in five years, as now. This would stimulate the printer and the binder to greater care and expedition in their work and give them some sort of guarantee that expenditures to perfect plant, etc, would not be thrown away ;

2. That the whole work should be under the superintendence of one capable man to be called the "superintendent of printing," responsible to a board selected from the commissions for the internal economy of the two Houses, who would represent alike the Executive and Parliamentary authority ;

3. That the Queen's Printer's and the Stationery offices should be united, and should deal with the publication, distribution and sale of the statutes, the *Canada Gazette*, the sale of the census reports, the reports of the Geological Survey and all surplus blue books transferred from the Parliamentary distribution office for that purpose, with the government advertising and the present duties of the stationery office ;—the two present heads to be for the present retained, but upon the death or retirement of one or both, a single officer to replace them ;

4. That no contract for paper should be for more than one years' supply, and that till a new one can be entered into, the chief clerk of the stationery office be authorized to buy supplies of printing as he does of other papers in the open market. Heavier and better finished papers should be procured.

The whole respectfully submitted,

B. CHAMBERLIN,

Queen's Printer.

OTTAWA, 1st December, 1885.

APPENDICES.

ESTIMATED COST OF ESTABLISHMENT HERE.

SPACE REQUIRED IN A BUILDING.

There is now occupied for the departmental, Gazette and statute work and storage of paper in this building and under the Library of Parliament (and more space is urgently required).....	2,660 sq. feet
At the Government Printing Office for Parliamentary and Departmental work.....	18,500 " "
At Mr. Woodburn's, for departmental binding.....	6,720 " "
At Mr. Mortimer's, for parliamentary binding.....	5,808 " "
Total	33,688 sq. feet

There would have to be added to this storage and office room for parliamentary work.

I do not think that less than 40,000 square feet would be sufficient, especially if an attic, with all its imperfection of storage capacity, is to be reckoned. Of course arrangements in a well-built office can be made for saving a good deal of the space now cut up, but as against this is to be placed the fact that both the parliamentary and departmental storage, packing and sorting rooms are fearfully over-crowded and that more rather than less plant is likely to be employed, and room must be provided for its use.

The form of building suggested by Mr. Blackburn, as in itself good and as lending itself, as it seems to me, more readily to extension, I heartily approve. In Washington the buildings have gradually been made to surround a quadrangle and the employees have found a compactness and convenience in this which has led to expedition in the work.

A substantial brick building with stone facings, with a basement for storage and engine room, with iron joists and cemented floors and proper fire-escapes, would be needed. I do not venture on an estimate of cost, leaving that to the professional men in the employment of the Government. Nor do I venture to advise as to the site, except to urge the necessity of plenty of light; that the printing house should not be so dominated by any other buildings as to crowd or darken it. For convenience it should be near the Government Buildings, and connected with each department by telephone. It will, of course, make a noteworthy addition to the cost, if the site has to be bought instead of using Government property.

COST OF PLANT.

This I should set down at—for the printing office, including stereo-typing, etc.....	\$48,000
Bindery	12,000
Steam engine, etc., with attachment for heating	10,000
Contingencies	5,000
Say.....	\$75,000

I leave out of my calculations altogether for the present, the lithographic depart-

ment either in the building or plant. In Washington that work is procured from outside establishments.

The value of the plant in the present printing office, including steam engine, is estimated at about \$55,000, and it has by no means proved redundant. But for the purchase by Government of type for the Consolidated Statutes it would have required an increase of about thirty per cent. That in the departmental bindery alone is estimated at about \$8,000, and is certainly insufficient for the work. Mr. Woodburn's estimate for the plant of an establishment which would do both departmental and parliamentary work satisfactorily is \$15,000.

I believe, therefore, the figures above are rather under the requisite amount, but they might do to start with.

GOVERNMENT PRINTING IN GREAT BRITAIN.

In Britain, until the end of the last century, the printing, binding and stationery for the public service were procured from tradesmen having royal patents for their supply. Among the reforms in the public service then proposed, I believe by Mr. Burke, and acted on by Mr. Pitt, was the establishment of a Government stationery office intended to secure at once a better system of control, and later, modifications of the lax methods of procuring supplies. Several Parliamentary committees subsequently reported against the system of granting royal patents for the exclusive furnishing of these and other things needed for the working of the Government departments, but without bringing them to a speedy end, for it was not till 1860 that the last of the royal patents for printing, that of Messrs Eyre & Spottiswoode expired. I believe they hold a patent from one or both of the older universities still. Neither the work of printing and binding nor the supply of stationery has ever yet been submitted to open competition; but as patents lapsed new arrangements in the nature of running contracts, subject to periodical revision of prices, have been entered into. Each House of Parliament has hitherto insisted on its right to appoint its own printers and settle its own prices with them, about which, however, they have consented to consult the stationery office through the Treasury Board under which it works. That office also has been called on to audit the accounts, so far as to ascertain whether the prices and carrying out and additions were correct, but not thoroughly.

The work for the outside service—if not more—is distributed between the three ancient capitals of London, Dublin and Edinburgh, besides divisions as to different portions of the work, the prices differing for each place and each contract.

The following contracts were in existence at the time of the last report of the controller which I have seen, and at the date of the Report of the Select Committee of the two Houses, 1881.

For Departmental Book-work :—

For England :—Messrs. Eyre & Spottiswoode, and Messrs. Harrison.

For Scotland :—Messrs. Neill & Co.

For Ireland :—Messrs. Thom & Co.

For Departmental Job-work—(such as forms, etc.)

This has recently been grouped and divided according to classification among several printing houses, at a common scale of rates agreed upon.

For Parliamentary Work :—

For Parliamentary papers and journals, the same as for Departmental book-work—(see above.)

For papers sent down by message from Her Majesty—known as command papers:

For the House of Lords—Messrs. Eyre & Spottiswoode.

For the Commons:—Messrs. Hansard & Sons.

For Votes and Proceedings, and order book:—Messrs. Nichols.

For bills for both Houses:—Messrs. Eyre & Spottiswoode.

For Minutes of Evidence taken before Committee:—Messrs. Hansard & Sons.

For the Statutes:—Messrs. Eyre & Spottiswoode.

or in all fourteen separate contracts, besides those for job work on forms, etc.

Besides all this division of the work, there are some small presses and other material at the Admiralty and the Art and Science Department, worked by employees in those departments when called upon. And rooms, fuel, light, etc., are also furnished by the Foreign, War and Indian Departments, to the contractors, for getting out specially confidential work there.

In Dublin there is a branch of the stationery office, with a resident inspector; but no such check exists in Edinburgh. "In consequence of this" says the Controller, in his report, "the greater part of the requisitions for printing and binding for the government offices in Scotland are not sanctioned before the work is executed; nor is the paper, printing or binding of Scotch contractors subjected to the same examination as in England or Ireland."

The existing departmental contracts expire in the present year; those for Parliamentary work in 1886—most of them having been entered into in 1877 and 1879 for seven years—being there (as our five years term is here) the legal life of a parliament. What will be done with contracts now lapsing I have not learned, but in 1886 a complete recasting of all is proposed. The Joint Committee of 1881, in reporting, commented on the "inexpediency of such a separation of contracts," yet proposed only a modified consolidation, holding, however, that "the first essential step in reform will be the abandonment of the present system under which each House employs a separate printer * * * working independently of and without reference to any other Government contract." It recommended "that new contracts be drawn up with due regard to the fact that the printing for the Houses of Parliament is part of the work of the state, executed at the cost of the public, and paid for with moneys included in the same vote as those required for the payment of Government printing." "That the stationery office, being the Department expressly established to deal with such matters, * * * be directed to make preliminary arrangements and at the proper time to lay the contracts open to *public competition*."

The Committee adds that "it will be necessary, in framing contracts, so to arrange them by a wise division of the work as to be neither so large as unduly to limit competition, nor so small as to be unattractive to the most competent firms. There will, no doubt, always be a certain quantity of printing of an exceptional character, such, for instance, as the Votes and Notices, for which it will be wise to make special provision. There could be little objection, should either House desire it, to the appointment of a special printer, but * * * it should be made perfectly clear that his employment would be limited to certain specified work."

For the binding also there are several contracts for the three kingdoms—those for vellum or blank book binding being separate from those for printed books; and the contracts for despatch books and portfolios are again separate.

The paper required for the printing and binding offices are furnished upon running contracts for a term of years. It has been found there as here that the plan has of late proved a bad one for the Government. There are special contracts also for envelopes; other paper and stationery are procured and furnished as in Canada.

The Statutes there have been the private property of the printers, Messrs. Eyre & Spottiswoode. That also is changed or about to be changed.

Votes for these services are taken, in most cases, directly in favor of the stationery office and accounts so made up, not charged as here, for the most part, against the contingencies of the several Departments. The question has been raised in the discussions in England whether such a system as ours is not better, as tending to stricter economy on the part of the Departments ordering.

The printing services brought under the supervision of the stationery office amount to about half a million of pounds sterling a year.

IN THE UNITED STATES.

Pursuant to instructions, I visited, in September last, the capitals of Massachusetts, and New York, and of the United States to ascertain the methods by which the government printing was there done. I was accompanied by Mr. J. Blackburn, of London, a publisher of many years' experience, whose report accompanies this. We also visited the large printing establishment of Harper Bros. in New York *en route* to Washington, and of Lippincott & Co., in Philadelphia, gathering numerous hints as to organization and working by the best methods.

We found, in the two states which we visited, that the work was done under contract for a term of years,—in Massachusetts for five years, in New York for two. Among the officials and the printers whom we consulted the opinion seemed to be very decided that no change to a government printing office was desirable, or at all likely to be sanctioned. And subsequent inquiries made by letter at the capitals of the great states of Ohio, Pennsylvania and Indiana brought me information that the contract system was in use in all of them and no change was likely.

In Massachusetts the contract is held by the Wright & Potter Printing Co., who have been the successful tenderers for 20 out of 25 years past. Their office is specially fitted up for Government work, but in any slack time they are enabled to secure work from Boston and other publishers. By this means they can afford to keep up, without loss, a better plant than would be absolutely necessary for the Government work. The paper is furnished through the state Secretary's Department upon requisitions from the printers—the Department having contracts with makers. The binding is procured at lowest market rates through the printing contractors. From their contracts, for some reason, the addresses of envelopes, headings for writing papers, and for books and forms, which do not occupy half a page of the paper used, are excepted, and procured at trade rates from the contractors or elsewhere. Most of this work does go in fact, I believe, to the contractors, at good paying rates. The waste allowed in the manipulation of the paper is most generous,—18 quires of writing paper and 19 of printing only being required to be returned out of the ream furnished. Undoubtedly this tends to secure a larger average of good work,—but seems wasteful to us who grant so much less. Ten per cent of envelopes and 5 p. c. of cards or other stock are also allowed for waste. The price for composition is 44 cts per 1000 ems. plain,—with the usual increases for tabular and rule and figure work. Press work $47\frac{1}{2}$ for 500 or $23\frac{3}{4}$ for our token of 250. For alterations 35 cts. per hour; for night work 30 cts per hour. In all disputes De Vinne's "price list" is wisely made the authority for settlement.

For New York the contract is held by the large publishing house of Weed, Parsons & Co., Albany, the government work by no means being the largest part of its production,—more especially since the canals have been made free and the great number of blank forms formerly required for the collection of tolls, &c., are needed no longer. They have taken the regular printing work for the legislature at a lump sum; but besides this regular or routine work, there is much that is not so counted,—for instance, any additional copies of any return or report specially ordered by vote of either house, &c., The amount paid for legislative printing, therefore, exceeds the lump sum very much, and by careful watching and manipulation it is obvious the "regular contract" work may be much kept down. Else it would be in the power of adverse committees to pile on enough work of this kind to embarrass if not to ruin any contractors unless financially strong. For Departmental work also the prices are very low, 25 cts. per 1000 ems, and for pamphlet work all other operations at 46 cts per hundred copies of each signa

ture of eight pages. Blank forms, per form, 50 to 90 cts per hundred. The Government expressly binds itself to give all its Departmental work to the contractors. The Statutes here, as in Great Britain, have been the property of the contractor for the time being, after 2,000 copies have been furnished to the Government for official distribution: but for 5 years after they are printed they must be kept on sale at book stores in Albany and New York at a fixed price.

In neither of these States did it seem to me that the methods of issuing requisitions and making up and auditing accounts were as carefully devised as with us; but time did not admit of such a thorough examination,—even if we had felt entitled to ask it,—as to make my opinion about the matter conclusive.

In Pennsylvania the schedule to the Act on the subject provides a scale of maximum prices, and tenders are received at a reduction of so much per cent. all round on these. Composition is fixed, for instance at 60 cents per 1,000 ems; press work, 50 cts. per token; folding and stitching 20 cts. per 100 sheets; inserting maps \$1 per hundred, covering, including paper, press work etc., at \$1 per hundred; ruling (for each passage through the machine) per 100 sheets, 10 cts. The last contract was taken at 61 per cent. off these prices reducing the composition to less than 24 cts. and the press work to 20½ cts. The contract is for 4 years.

In Indiana, the printing, binding, stationery, lithography, etc., are all given out by one contract for 2 years. Composition 40 cts. for plain, and 47 cts. for rule and figure work; press work, 30 cts. per token—16 pp. to a form; folding and stitching, and covering, signature of 16 pp., 19 cts. per 100 copies of first signature,—additional signatures 10 cts. per 100 copies. The supervision of the service is intrusted to a government board, introduced in 1875, and attended with a great lessening of cost as our own change of system in 1869—6 years previously—was found to be. On the first year of our present system, Mr. Young, of the stationery office, and myself found a saving in Departmental printing and stationery of sixty per cent.

PRINTING ESTABLISHMENT AT WASHINGTON.

I had the pleasure, in company with Mr. Blackburn, of visiting and inspecting the Government Printing House at Washington. No person who has taken an interest, as a man of business or one merely curious, in printing work as a great industry, can see it without a feeling of great gratification. A great nation, with intense pride in largeness, is fitly represented here: the most ingenious of all people, probably, in devising labor-saving and labor-quickenng machinery has here applied its peculiar talents in a manner worthy of its boastful claims. A single establishment which turns out work costing from \$2,500,000 to over \$3,000,000 per annum, with a plant which in 1883 was estimated at \$550,000, and to which according to estimate over \$50,000 has been added since,—which employs from 2,000 to 2,400 hands at high wages is not unworthy of the greatness of the nation, the work of whose Government it has been established to perform. The pay roll in 1882-83 amounted to about \$5,000 per day. The premises in 1881 covered an area of about 47,000 square feet, the buildings, being for the most part four stories high; and we found it fitted up with the electric light, connected with the outer world and the departments by telegraph, and with these latter and the various branches of the establishment with the chief offices, by telephone. Thus no time is wasted as so much has been wasted here. There are the latest machines for printing that Hoe's great establishment has turned out; the drying machine with its heated bright rollers, instead of the old drying room work; the hydraulic press for folded sheets, whence they go in compressed packages to the storeroom or the bindery; the latest folding and sewing machines going by steam

power ; the ruling machines with latest appliances for striking and stopping, etc. ; the newest machine for making the backs of books, etc.

The establishment in something like its present form was started in 1861, not having then, however, all the work which has since been concentrated there. But so often as the question has been raised, it seems to have been decided that, having a government establishment, it was best that all government work should be done in it. As in France, the argument has ever been, that by combining the unprofitable with the profitable an establishment doing both might be made to pay, that to give out fat work and leave the lean for the Government office to do was to make it unfairly a burthen on the public revenue. It seems also to have been received almost without dispute—though much disputed in France—that the doing by a Government of anything needed for itself as a Government and not for private parties or corporations is, in no wise, an unjustifiable interference with private enterprise. It is simply a question of good work or bad and of gain or loss.

The utility of the establishment has so approved itself, that a mere question of absolute saving by its discontinuance is hardly discussed. And it has attracted and combined interests till it has become possessed of some political power. I was told that on one occasion when the giving out a portion of the work was urged in favor of a local firm, the proposition was voted down, and the member of congress making it found the votes and political influence of the printing office sufficient to defeat him at the next election. Whether, if the capital of the United States were in New York or Philadelphia, the influence in favor of private firms might not make some change may fairly be doubted.

The work of the establishment is very excellent ; the arrangements for its working seem to be well nigh perfect. What is needed to insure the highest efficiency seems to be always forthcoming ; and I believe that in no place can one study to more advantage the best methods and best machinery used in printing, or perhaps in binding also. It seems to have been lucky in securing efficient heads—the present public printer, Mr. Rounds, not the least able and energetic, nor least happy in the staff serving under him. The routine seems to have been made as nearly perfect as possible. A job sent in by a department is first estimated for ; if a matter of ordinary routine, the work and estimate may go on simultaneously ; if any extraordinary expenditure is likely to be incurred the estimate is sent into the department for approval before the work is proceeded with. The copy and requisition is enclosed in a "jacket," on which each foreman and workman must enter the time it came into his hands, the time employed or wasted on it, the paper delivered and used, etc. This returned to the accountant enables him to charge up the job, the entries being carefully made under all the several headings and the total carried out. The register of requisitions received and sent out and receipt and delivery of work is almost precisely the same as that in use in my own office here.

On the subject of paper, the public printer says in his report for 1883 : "Without good paper it will be impossible to turn out satisfactory work. The receipt, inspection and approval of the paper is a very important duty, requiring the services of a paper expert. The importance of this branch of the service prompted me to appoint a superintendent, who is required to see that every bundle of paper is properly inspected and fully up to contract in quality, weight and finish."

The result as to celerity which may and have been attained by such a staff and such appliances is something well nigh marvellous. An old story about printing is that of the old woman who went to Franklin's office and asked him to print her a new bible (her old one having become too much worn for further service) while she knitted away the afternoon looking on. Nor are unreasonable demands and expectations as to the time in which printing and binding may be done unheard of even now. But at Washington the absurd becomes well nigh practicable. In his history of the office, Mr. Kerr, an old employee, with well-justified pride, tells us how the revised statutes were turned out :—

"The statutes numbered 1,038 pages. The copy was received by the public printer at 5 p.m. on Wednesday, and a bound copy was placed in the hands of Mr.

Poland, who had charge of the matter in the House, at 12 o'clock noon on the following Saturday. The printing required the greatest care, as it was being prepared for the signature of the President. The matter was read by the proof-readers three separate times. Another book of 500 pages, difficult matter, was turned out between Thursday morning and Saturday night. It contained 4,000,000 ems of composition; 440 pages brevier measure with nonpareil tabular was turned out in thirty-six hours. Such wonders can a force of 1,200 to 1,500 hands work, when you have work to employ them and concentrate their efforts on one job. It goes without saying that 100 to 150 could do nothing of the sort.

Again, to show what a great office may do: in his report for year ending 30th of June, 1883, in connection with the census printing, the public printer says, "at times this office has had as high as twenty tons of long primer, brevier and nonpareil type, rule and figure work, locked up, awaiting return of proofs.—probably the largest amount of "live matter" ever kept standing at one time in this or any other country."

Yet for the report, in English and French, of the Commissioners for the Consolidation of our own statutes we shall have locked up from 4,800 to 5,000 pages of small pica and minion during the coming session. It will cost \$15,000, and weigh about twenty-five tons. And it is not uncommon at the approach of a session to have a ton and a half of metal locked up in reports awaiting their revision and correction. Thus it will be seen that a very heavy strain may be put on the smaller office required to do our work.

We come next to the very important question of cost.

The wages paid at Washington differ very considerably just as does the value of the work performed; but according to our notions and the rates obtained for the state contracts they are high. The length of a day's work is fixed by law at eight hours. The youngest apprentice gets his 12½c. per hour, or \$1 per day. The cheapest female employees get \$30 per month. The pay per hour runs up as high as 58c., or \$4.64 per day. The foremen of printing and foremen of binding each get \$2,100 per annum; the superintendents of rooms under them and inspector of materials, \$5.75 per diem each. The law limits the price of composition to 50c. per 1,000 ems. But ordinary journeymen compositors get 40c. per hour, or \$3.20 per day, which would more than pay for setting and distributing 6,000 ems in the eight hours.

As a matter of curiosity and comparison I ascertained the cost of producing the Revised Statutes at Washington. It was given me as follows:

Composition, stereotyping, presswork and folding.....	\$9,770 87
Binding in full sheep.....	22,500 00
	\$32,270 87

I omit the cost of paper which they estimate for at 10c. per lb., and get for less than 8c. We pay from 10c. upward. Now, the price we should pay here would be as follows:

Composition.....	\$2,079 75
Presswork.....	1,104 00
Stereotyping.....	880 80
Binding (including folding).....	13,800 00
Total.....	\$17,864 55

Again, leaving out the binding, (unfortunately I have not the prices for the several States), I get the following result:

Cost at Washington.....	\$9,770 87
Cost in Massachusetts.....	8,197 36
Cost in Pennsylvania.....	6,014 45
Cost in Indiana.....	4,184 06
Cost in Canada.....	4,064 55

According to the New York rates, in which paper is included, the total would be \$15,654.55. The Washington price for the paper was \$12,500.00, leaving only \$3,149.55, for the other operations. But I cannot suppose that under such a contract, the same weight of paper would be given in Albany, and by lowering it the price might be brought up to or over the Canadian rate. With paper added in both cases it would stand at Washington \$22,270.87, at Albany. \$15,654.50.

But in this comparison there is this further to be taken into account. No capital account is kept at Washington, and no charge for interest on the investment in plant, say \$600,000, or the land and buildings, costing probably much more, (possibly twice as much,) is included in these estimates of cost of work, nor is any proportion of the annual estimate for rene and improved plant and repairs to buildings, varying from \$50,000 to \$150,000 per annum, taken into the account.

Of course, one example like this does not settle the whole case; but I believe that with such wages as 50c. per 1,000 ems, and 40c. per hour, and in all other respects proportionate rates, other kinds of work must give very similar results. In fact the annual report of the bureau for 1883 cost at Washington (without paper) \$546.71. Here the cost would be \$227.42. If capital and renewal charges were brought in, as is done here and in the states, the cost would, of course be perceptibly increased.

Per contra we should probably not get such good work, so compactly set, so saving of paper, &c.

GOVERNMENT PRINTING IN FRANCE.

There is a large Government establishment in Paris by which the law directs that all the printing work of Government shall be done.

L'Imprimerie Nationale is the growth of more than two centuries. Founded in 1640 by Louis XIII, it was established in the Palace of the Louvre, and till the revolution of 1792 seems to have been more a foster child of successive royal patrons of art than a place of commercial industry, though it doubtless served as a model in many respects for the private establishments which grew up around it. The typography of the Louvre was always of a recognised excellence. In 1793, the revolutionary rulers of France determined to extend the usefulness of this printing office by calling on it to do the ordinary Government work. The same duties were imposed upon it by the governments of the Consuls, the Emperor, the restored Bourbon and "Citizen" Kings, and was continued under the second empire as it has been under the renewed republic,—its duties and privileges, under the laws, being rather added to than diminished. Successive rulers under the several regimes have warded off the attacks upon it, made by ministers and members of the Legislature in the interest of the printers of Paris and the Provinces. In 1794, it was enacted that no payment for printing executed elsewhere than at the Government printing office should be paid for out of the public treasury, nor allowed in the accounts of public officers. Printers, receiving orders from and doing such work for them, must take their recourse for such payment against such officers personally. In 1796 this was strongly reiterated, payment of such accounts out of the national treasury being most expressly forbidden. In 1809 it was forbidden to do work for any body but the Government and its departments—exceptions being made, however, an the ordinance of July 1823, as to printing, which required the use of type not to be found in private printing establishments; also scientific or like works, ordered by public authority (because of their excellence and their lack of immediate commercial value) to be printed at the public expense. A type foundry is attached to the establishment in which are produced type for the printing of various oriental languages.

The work done for the various departments of the government is charged against

them, not at actual cost price but at a tariff rate calculated so as to meet the expenses of the establishment, and the printing of the laws and such scientific works as are ordered as above mentioned. The balance, if any, accruing according to this tariff, is returned to the public treasury as the profit of the printing office. These refunds have, of course, been kept as low as possible; but the very fact that so little is realized has been made matter of accusation against the management of, or of argument for doing away with the Government printing establishment, or restricting it again to the narrow limits of usefulness which confined it in pre-revolutionary times. The profit, it has been urged in debate, upon the capital of an ordinary printing office in private hands, should be over 6 per cent. And there being at the time 13,300,000 fr. (\$2,660,000) capital invested in this enterprise, it should have yielded 798,000 fr. It yielded actually as follows;

Paid in as refund.....	8,400 fr.
Printing laws.....	80,000 “
Scientific works, etc.....	40,000 “
	128,400 fr.

And yet so high is the tariff fixed which yields these results that heads and officers of the various departments are constantly having recourse to private printing offices to lessen their expenses and keep within their votes—each department, in this respect, “fighting for its own hand.” In a debate in the French legislature on the subject in 1873, this was urged strongly by those who sought to have the government work offered to the private printing houses, and in a letter on the subject from Mr. Fabre, representing Canada at Paris, dated 2nd September last, he says: “Theoretically, all printing of an official character ought to be done in the National Printing House, the property of the state, and carried on by it; but in practice each Ministerial department, having in view the economical use of its own moneys, has recourse wherever it can, to private enterprise, at lower prices.” But he adds, that this is done not solely on account of the objectionably high rate of the government office tariff, but “also in consequence of the need felt to satisfy, to some extent, the claims of private industry.”

And in a later letter (15th Sept.), he says: “The criticisms to which the National Printing House has been subjected have been many, but nevertheless not of sufficient force to lead to its abolition; yet the monopoly of all government printing work, which was accorded to it, is far from being absolute. The different Ministerial departments often have recourse to private enterprise.”

And in pursuing his investigation into other matters connected with the printing service, he says; he “soon found that there was no method of, no really effective surveillance exercised over it,—each department, and even each separate branch of the same department followed a different routine,” and adds, “it is not without surprise that in the French administration, so justly celebrated for its organization, rules and methods of order and regularity, and above all for its system of audit of public accounts, I found such a gap” (lacune.)

In one department each chief of a branch gave out his work as he chose from time to time. In another, a part was done in this way, and another part actually submitted to public competition. The Senate has given a printing company offices within its own walls in which to do its work.

As against these efforts to distribute the government work among private establishments, it has been urged repeatedly,—and with success so far as the votes of the legislative bodies have gone—that the services it has rendered to the government and the public and the printing art itself have been such that it ought to be maintained. The objects to be secured by its maintenance are very strongly set forth in a report to the Emperor Napoleon III, by a commission appointed to examine the matter in 1864. “The Imperial printing house,” it says, “as at present organized is calculated to promote the perfecting of typography, and to assist intellectual progress by the gratuitous

publication of works deserving such encouragement. It has also an industrial establishment where all the printing necessary for the principal branches of the public administration is to be done under the most favorable conditions. It produces typographic *chefs d'oeuvres*; it renders valuable services to letters and science, and it offers to the government for printing work guaranties of speed and secrecy, of correctness, and of superior excellence of execution, that would be sought in vain from private establishments"; and it adds "the separation from each other of the branches which constitute the Imperial Printing House is not to be thought of."

For it had been urged that the Government should revert to the pre-revolutionary idea of a government printing office for the laws and bringing out of works deserving public patronage but not of sufficient commercial value to procure a private publisher, and of curiosities of excellence in typographic art, leaving the different departments free to procure from other printers the work necessary for governmental administration. Then, for ordinary work advantage could be taken of the competition of an open market to secure excellence and cheapness, and the money necessary for the special work could be voted on its own merits, not mixed up with the cost of an establishment with objects so different.

"Admitting," says the Commission, "that there has been any economy in going into the market, which is not indisputably proved, it is to be feared that private establishments cannot continue to work at prices which, for the sake of securing a large and profitable customer, they were willing to take for some orders. And, even admitting the mere economy, it is certain that for printing which requires great despatch and special care, which requires to be done with the highest security for absolute secrecy and correctness, for which an immense establishment and a numerous body of employés is required there is no private establishment in a position to do what the Imperial Printing House does, not only at the same but even for a higher price. Thus the economy which is obtained, perhaps, on some classes of work would be overbalanced by a loss on others. Deprived of the benefit of the easy and profitable work, the Imperial Printing House would be compelled to demand higher rates for the more difficult and expensive." The Imperial Printing House is in a position, it is urged, to do this work more cheaply, as it has a capital invested in plant on which no interest is paid or calculated, and buildings on which no rent is payable. Against that saving, however, was to be set the cost of printing the laws and the reports of the *Cour de Cassation*, and the works of science, etc., ordered by the Government and the Institute. These, during the previous year, had amounted to 133,000 francs, or about \$26,600. The figures for a later year are given at 120,000 francs.

The question of monopoly having been raised by the printers, it was answered, on several occasions, that so long as the government only did its own work and did not compete in the market for work which other people or establishments had to offer, it could not be said to compete with private enterprise.

In a speech by Mr. A. Legrand in the debate on this subject in 1873, he called attention to the fact that from 1814 to 1820 the establishment was farmed out to a contractor who was reported to have made 350,000 fr. a year out of it instead of from 8,000 to 70,000 fr. a year, as under government management, though then the monopoly of government work for it was less strictly maintained. Respecting the result as to wear and tear and keeping up of plant and excellence of work, I find no information. Dissatisfaction on some ground seems to have been created. Mr. Rouher referring to it in a speech in the National Assembly (1851) said that the system "was utterly condemned by experience,"—perhaps, simply from the notion on the part of the government that it should realise as much for itself, if it could,—for the old system was returned to and has ever since been maintained in theory though not, as we have seen, in practice.

From a report of the budget committee in 1832 and of a sub-committee or commission on this special subject, I make two extracts as of value to the management of of such an establishment if it be created here. Speaking with regard to dividing the work, giving a part to printers outside of the government establishment, the commission

(of which a printer and a publisher were members), says "called on to do a certain quantity of printing, of an exceptional kind, it has found the need of a great establishment, large buildings and an expensive plant. These needful expenses once incurred, the less the work given to keep it employed, the dearer it will be to the country. The necessary cost of maintenance and operation distributed over much work, is diminished for each portion. Additional work costs merely the labor and material. Supplies furnished on a large scale are, as a matter of course, cheaper than when restricted. Thus the Royal Printing House, like any other industrial establishment, only proves the recognised rule that a great establishment can produce more cheaply than several smaller ones."

The budget committee enforcing this says:—

"It is evident that if the work given is lessened, a considerable pecuniary loss would result. In all industrial enterprises, there are expenses which must be much the same for a great as for a small establishment, so that while up to a certain quantity of output there may be loss, beyond that a profit may commence to be realized, this increasing with the increase of the production."

I do not think that 52 years of commercial and industrial experience has in any wise invalidated this argument.

The premises occupied cover a space of nearly 10,000 sq. metres or over 11,500 sq. yards; the type alone in stock, in 1873, was valued at over 4,000,000 francs or \$800,000; the plant altogether at about \$1,111,500. What additions have been made in the last 10 years I have not ascertained. The employes in 1878 numbered between 1,100 and 1,200. The paper used in 1877 was 272,464 reams, costing nearly \$620,000.

The excellence and beauty of the workmanship in this great establishment is worthy of all praise. It is, perhaps hardly to be matched in the world. At the Government printing office at Washington most excellent work is turned out, but for beauty as I regard it, neither matches the best of private establishments in the United States, as Harpers', the Riverside Press and others, nor this great Parisian house. For the sake of economy the use of comparatively small type and the cramming the greatest number of types into the smallest page of paper, with narrow, stingy margins and headings is undoubtedly useful, but it is as undoubtedly not high art. Both in England and France the much abused leading and "spacing out" gives grace to the page and ease and pleasure to the reader's eye, if not profit to the employer.

One of the great modern triumphs of the Paris office was boasted of in the debate of 1873. Mr. Taillefer, reporting as chairman of a Committee, said that at the time of the Alabama arbitration at Geneva between Great Britain and the United States, a great many documents being suddenly furnished for the support of the British case, which it was necessary to print in haste, recourse was had to the Imperial Printing House, as the only place where so much work could be turned out in time—in the French language, I suppose. It succeeded and earned the thanks of the British Government.

GOVERNMENT PRINTING HOUSE AT BERLIN.

This establishment, which in its present form dates only from 1879, seems to have been created rather as an addition to the workshop needed to do the engraving and lithographic work required for government securities, stamps, etc., than as an ordinary printing house, and is, of course, surrounded with all possible safeguards. It does other printing as well, however, but has no monopoly of it, and works for others besides the government departments. Almost all the information I have procured is contained in a letter from Mr. F. J. Dore, an *attaché* of the office of the High Commissioner of Canada in London, who was instructed to obtain such particulars on the spot as were to be

had. For this purpose he was furnished with letters from the Foreign Office to the British Ambassador at Berlin, and assisted as far as possible. But the work of the office is treated as in some sort a "mystery," as in old times the trades were called; the workmen are solemnly bound to disclose nothing, and Mr. Dore was not permitted to take an expert with him when visiting the establishment. Yet it is their boast that the endeavor of the authorities is to make its workmanship a model for handicraftsmen generally. Its good in that respect seems much lessened by the shutting up the place from their examination. In Washington, not only was entrance to the printing office and bindery readily obtained, but the great establishment where the engraving and printing of the national currency is carried on there and the mint at Philadelphia were made easy of access and daily visited by large numbers of people. Some documents sent out by Mr. Dore contain little of interest beyond what he has himself written, being for the most part made up of minute rules for conducting the work and for accounting. The profits derived from the establishment are, unlike those realized at Paris, very respectable; how much is derived from government work and how much from outside customers I have been unable to make out, and it seems to have decreased in the last year from the average of previous years.

Mr. Dore reports:—

"The *Reichsdruckerei*, which is a consolidation of three or four extinct printing and engraving departments, is a government institution of considerable size and importance. Its operations include the printing and engraving of all bank notes, treasury bills, government debentures and other documents connected with the monetary issues of the empire, of postage stamps of every denomination, postal cards and all other government stamps, of ordnance and other topographical maps required for the use of the military and civil services; the printing of all state papers, secret despatches, and reports, etc., and the lithographing of drawings, etc., for patents of invention."

It also prints the Prussian laws and reports of parliamentary debates.

"The working staff is composed of a superintendent or director and his deputy, 10 secretaries and under secretaries, 98 managers of branches, clerks and subordinates; 539 male workmen, 169 females, forming a staff of 818 persons, costing annually 938,000 marks (£46,900 sterling). Of this amount the superintendent and his deputy received £3,355, the other members of the superintending and clerical staff £5,405, and the workpeople the balance, £38,500.

"The yearly expenditure of the establishment averages 3,000,000 marks, and its receipts amount to a little over 4,000,000 marks (£200,000). The value of the buildings is computed at 1,400,000 marks (£70,000) and the plant, including stock in trade, at £130,000.

"The machinery in use consists of four steam engines, aggregating ninety-six horse power, thirty-seven printing machines, thirty-eight hand presses, twenty machines for lithography and engraved work, and two hundred other machines and mechanical contrivances, embodying the latest modern inventions and discoveries of all countries.

"The yearly work executed, as last reported, was: one hundred millions leaves of print; one thousand millions postage stamps and postal cards; seventy millions other government revenue stamps; ten to twelve millions bank and treasury notes, one million government debentures, &c.

"The ordinary printing, binding, lithography, engraving, &c., of the government is not necessarily given to this establishment. Liberty is given to the heads of departments to have their work done by trades people in whatever way they think best, but as a rule contracts are made by the year. The printing tariff of the *Reichsdruckerei* adapts itself generally to the ordinary trade prices.

"The system (establishment) owes its origin to Dr. Stephan, the Postmaster-General, who is evidently a man of large administrative capacity. It has been in existence over four years, and appears to answer admirably the requirements for which it was created. No change in its organization is at present contemplated.

“The large working rooms, which are lighted by electricity, are splendidly ventilated, and I was much impressed by the good order, method and regularity observed in every branch of the establishment. The comparative quietude with which the work is conducted is also a most noteworthy feature, and affords striking evidence of skilled discipline.

“The working hours are from 7 a.m. to 5 p.m., with an intermission of an hour and a half for meals. The daily wages of the men average from three to six marks, (from 75c to \$1.50); the women get two marks per day, (50c.)”

A photographic *atelier* is to be added to the establishment, with a view, doubtless, to photo-lithographic work and photo-engraving.

I see that a refectory has been attached to the establishment, where meals are served to the work people, so that they need not leave the building till their day's work is over

GOVERNMENT PRINTING HOUSE AT VIENNA.

This is an older institution than that at Berlin, and its management apparently even more a “mystery.” Through the good offices of the Imperial Foreign Office, Mr. Dore was enabled to furnish me with some documents from which I glean the following statistics.

In 1883 it gave employment to between 1050 and 1100 persons, including a Director a Vice Director and a clerical and accounting staff of 28 persons. The staff in the compositors' rooms of the ordinary printing branch was 218: in the press room, 71. There were in stock 1380 fonts of German type and 368 of Foreign, weighing about 130 tons and 12 to 13 tons of stereotype plates. About 6000 sheets in plates and type were standing for the press. 35 steam presses and 10 hand presses, besides other machines were in use and a 30 horse power steam engine, with one of 16 horse power in reserve and a gas meter of the same (16 horse) gave the motive power for the work.

In the public securities (money-value) branch there were 204 hands connected with copperplate engraving and printing—the latter using 38 presses; also 173 hands upon type printing, using 15 steam power and 12 hand presses, besides other machines.

In the stamps and envelopes branch 21 hands were employed: in the lithographic 62 with 3 power and 18 hand presses and other machines.

In the type foundry and stereotype rooms 45 hands were employed. Every year 12 to 13 tons of type and 3 to 4 tons of stereo-plates are produced for the establishment.

In the bindery there were 121 hands.

About 105,000 reams of paper of various sizes were used in 1883.

The estimates for 1884 provide for an expenditure of.....	1,251,200 fl.
Against an income of.....	1,341,200 “
Giving a balance at credit of.....	<u>90,000 “</u>
Administration to cost.....	23,300 fl.
Other salaries and wages.....	644,195 “
Paper.....	275,000 “
Material and fuel.....	125,000 “
Publication and sale expenses.....	50,000 “
Rent, repairs and other expenses making up the balance.....	

It will be observed that here as at Berlin outside work is done in the government workshop.

I learn, through Mr. Dore, that a similar establishment exists at Petersburg, but no particulars respecting it has been obtained.

REPORT

RESPECTING THE ESTABLISHMENT OF A PARLIAMENTARY AND DEPARTMENTAL PRINTING OFFICE.

To the Hon. J. A. CHAPLEAU, Q.C.,
Secretary of State, Ottawa.

INSTRUCTIONS.

SIR,—In pursuance of instructions, I proceeded to Boston, 5th September, in company with Col. Chamberlin, Queen's Printer, for the purpose of making some investigations into the working of various plans that are current in relation to public printing. At that city we were kindly received by the Under Secretary of State, who put us in possession of the facts incident to the contract system that is in vogue in the State of Massachusetts. It was found that it was not so simple or so absolute as that existing in Canada, and that it was open to abuses of various kinds, arising for the most part from the desire of the contractors to elude certain conditions that had been imposed, with the view of securing the execution of the public printing at a price below that at which it could fairly be performed.

THE CONTRACTORS.

Having been referred to the contractors, those gentlemen took us over their printing office, which did not present any remarkable feature except this one, that it was at the top of a building four stories high. The machinery was for the most part out of date, but there were some of the most recent kinds in place and we were informed that others were to be procured. The ability of the contractor to make a large profit out of a contract that was, upon the face of it, one that would land them in considerable loss, was apparent from the fact that the same firm had had the execution of the public printing in their hands for nearly twenty years.

MATTERS AT ALBANY.

Passing on to Albany, the state of things was not altogether dissimilar. The contract for the legislative printing was found to be taken at a "lump sum," the constant endeavour of the contractors being to execute as little of it as possible. To this end efforts are made to keep back the printing that comes under the contract, and to stimulate the passing of special resolutions in the Legislature ordering extra printing to be performed. As this portion of the printing required or sought for does not come under the terms of the contract, the contractors were found to be able to charge such a price for it as to leave them a large profit, though the work done under the terms of the contract itself is turned out at a considerable loss. From such a condition of things, it would seem that the attempt to procure the execution of printing for less than the cost price of the composition has proved as great a failure there as it has in Canada.

THE ALBANY PRINTING OFFICE.

The establishment of the contractors was found to be a very extensive one. It is four stories high, and is provided with the best machinery. It comprises not only the appliances necessary to ordinary printing, but lithography also. The

expedients of stereotyping and electrotyping are also in use, while the binding is carried on in an extensive way. The entire office is lighted by electricity, and we were told that in its action both the proprietors and those employed found advantage.

NEW YORK VISITED.

Having devoted considerable time to the examination of this large establishment we proceeded to New York, where we met Mr. S. Hoe, by appointment, and were placed by him in possession of much useful information. We visited the great factory for the manufacture of all kinds of printing machinery, known as that of Hoe and Co., and found that the utmost attention is paid not only to the style of manufacture, but to the quality of material used. The number of printing machines in the course of construction could not have been less than two hundred, comprising, among others one for the public printing office at Washington, which is to cost \$25,000.00. There were some smaller ones being set up, to cost \$14,000.00 each, these being for some printing offices at Utica. But it would not be desirable that such expensive machinery should be purchased for use in Canada, seeing that for the most part numbers of the sheets to be printed are not large.

HARPER'S GREAT ESTABLISHMENT.

We went also to the large printing office of the Harpers, Mr. Lockwood, of the firm of Hoe and Co., kindly going with us to point out, with as little delay as possible, the special objects of interest.

The machinery used is, for the most part, of very modern construction, though some old style presses—the Adams press—are still in use for certain special work.

PUBLIC PRINTING OFFICE, WASHINGTON.

Having examined all those points that were of any special moment, we next went on to Washington, and presenting our letters, were received with the greatest possible kindness and attention by the heads of the departments at the great public printing office there. The number of persons that are employed was stated to vary from 2,200 to 2,400. Of these some 700 are women. The work is divided into departments, each of which is cared for by some practical and experienced man, the whole being under the official superintendence of the Public Printer. This functionary is responsible to Congress for the due execution of the work and the proper conduct of affairs generally. His salary is \$4,500.00, but it is to be raised to \$6,000.00 at the coming session of Congress, at least such a step has been already advised. The establishment of this public printing office dates back to the year 1861, and was forced upon Congress by the unsatisfactory manner in which the contract system had been carried on. Several attempts have been made to reverse the present policy in regard to the public printing, but so satisfied has the large majority of Congress been with the results of the existing system as regards efficiency and economy, that the attempts spoken of have invariably failed. From time to time, the establishment has been enlarged and additional space has been found necessary in which to place the fast accumulating records. The manner of carrying out the details of the business appears to be as nearly perfect as it can be made. Care is taken to weigh every ream of paper as it enters the building, and to count the number of sheets so that the editions may correspond with the quantity of paper used. Should it be found, upon inspection, that the paper is not up to the proper standard, it is at once returned. By this means the contractors are kept strictly to their work, and the public interest is subserved.

It may be mentioned that the price paid to those who furnish the paper is far less than in Canada, while it is of a much better quality. This condition ensures economy and a superiority of printing which is much to be admired.

It is notorious that the Parliamentary and Departmental printing executed in Canada is of a very inferior kind, arising (it is but fair to say), to a great extent, from the inferiority of the paper used, which is poor in surface, and uncertain in colour.

The bindery is a very extensive portion of the whole, so much so, that it was mentioned that the sweepings from the gilders' tables realised as much as \$5,000.00 a year.

The newest machinery has been introduced into the bindery, so that expedition has taken the place of the delay that was formerly complained of. These machines comprise a new style of hydraulic press, which saves a large amount of time, and permits a great economy of space, a matter of much moment in such establishments. The latest kind of ruling machines for ledger work are also to be seen in effective operation, by which time is saved, and wages reduced to the most economical basis. Newly constructed machines for sewing books before binding are also the cause of much economy of money and space.

The press room contains more than one hundred machines. Some of these found to be out of date are being replaced by others of modern manufacture, the most useful being those made by the firm of Hoe and Co., both as respects present use and future economy. Where the matter of present outlay of capital is not of supreme importance, to obtain the best machinery is undoubtedly the most economical in the long run. The administration of the press room is such, that by the use of women's labour for the purpose of feeding the presses, the weekly cost of running them has been reduced to \$3 50 per week each. Under ordinary circumstances, the price, including the necessary quantity of ink, would be far greater.

The net result obtained from the establishment of the Public Printing Office was stated to be 40 per cent. better than had been secured under the former contract plan. But this great saving may arise, to a great extent, from the faults that so strongly marked the contract plan before. The undersigned is not prepared to say that so large a saving would be found to take place in Canada under the system in vogue at Washington. But it is an undoubted fact, that by the use of similar presses and other appliances, and by more attention being paid to the quality of paper used, the general effectiveness of the printing could be much enhanced and expedition secured.

PAPER CONTRACTS.

The contracts for the manufacture of paper are let each year. In Canada it has been the practice to give contracts for a term of years, the last one being for a term of five years. By this means the public have been deprived of a falling market, and paper that could have easily been bought, during the last three years, for $6\frac{1}{2}$ to 8 cents per lb., has been paid for at the rate of $9\frac{3}{4}$ cents. It is evident that a more economical method than that should be introduced.

THE ELECTRIC LIGHT.

The presence of the electric light in all the departments is a source of much comfort, and no one would now think of going back to the use of gas, which is defective as regards light, and unhealthy by reason of the deleterious matters thrown off in the course of combustion. So conclusive are the opinions on the superiority of the incandescent light, for the purposes of a printing office, that it was stated that, sooner than go back to the use of gas, the men would pay for the use of the light themselves. The cost of erecting the electric light in all the departments, and furnishing the necessary appliances, was stated to be \$17,000.00. But a sum of less than one-half of that would be ample to place the electric light in such an office as the Government of Canada might require. The system in use is that of Mr. Edison.

THE LABOUR QUESTION.

At one time the office was in the hands of the Printers' Union, so far as the regulations of its labour were concerned. It is now so no longer, as many apprentices being admitted in the various rooms as are found necessary and useful, while aforesaid they were limited in an arbitrary manner. Now, no attention

is paid to that feature. The foremen of the respective departments employ as many younger hands as may be found to be necessary, paying the men wages that are satisfactory to them. The wages paid to time hands are at the rate of 40 cents per hour, and the piece work is done at the rate of 50 cents per thousand ems.

ESTIMATE OF WORK DONE.

It is the practice to keep an estimate book, by means of which each job of work is kept within reasonable bounds, as regards cost, for if it be found, upon the return of the work, that it has cost too much, enquiry is at once made, and the cause of the defect discovered.

THE ORDER OBSERVED.

The most complete order and regularity is observed in all the departments. The rooms are constantly kept free from waste and dangerous substances, such as paper clippings. The protection from fire seemed to be well cared for, though those effective hand grenades, which are found to be in use at Albany, were not present. But we were told that it was intended to introduce them. Mr. Parsons, of Albany, was loud in praise of them, and said if he had had them before his large establishment took fire, it would never have been burned.

PROBABLE COST.

Should it be deemed expedient to adopt a similar mode of procedure in Canada, it may be of interest to know the proximate cost of such an establishment suited to our condition here. It may be said that the outlays would be much as follows:—

Printing machinery.....	\$25,000.00
Type, &c. (about)	12,500.00
Bindery.....	8,000.00
Steam engine and heating	10,000.00
Lithographic Department	12,000.00
Stereotyping outfit.....	2,500.00
Electric light.....	7,000.00
Contingences (say).....	5,000.00

In all about \$87,000.00. To this should be added the outlay necessary to the building. The cost would depend, to a very great extent, upon circumstances, but special conditions apart, it would not be likely to cost more than \$50,000.00, if care were taken to put up a plain though strong and roomy building, it being borne in mind that provision should be made for inevitable development. The size of a building that could be recommended would be that of three sides of a long square of about 130 feet by 105 feet. The wings might have a breadth of 40 feet each. It would be advisable that the floors should be constructed by the use of iron girders, filled in with brick, and that the wood used should be hardwood. The staircases should be of iron, and other precautions used against the ravages of fire.

PROSPECTIVE RESULTS.

If properly built and equipped and furnished, there is little doubt that a printing office conducted as a Department of Government might be made of great service. But very much would naturally rest upon the administration of it. If it were to be feebly or inefficiently administered, it might not result in all that could be hoped for, though it is difficult to conceive how it would be possible to produce printing of so inferior a quality as that now had. Under the prevailing system it is only natural that the contractors—whether for paper or for printing—should seek to make as much profit as possible out of their transactions, while, if a departmental officer were to be employed, his endeavour, undoubtedly, would be to turn out the work as creditably and as cheaply as possible. No doubt each method of procedure has its

drawbacks, but it may be said of the plan of a public printing office that it would be the want of due supervision which would alone make it inefficient or needlessly expensive.

CONCLUSION.

If the general public wish to see the public printing incident to Canada present an appearance equally good to that shown in the work issuing from the Government printing offices of Washington, and of Victoria, Australia, it will be only by a resort to the same methods. For so long as contractors have their own interests at stake instead of those of the country, so long may we look for a resort to those expedients, the effect of which is stamped in so unmistakeable a manner on the Parliamentary and Departmental printing that is now in use in this country.

I have the honour to be, Sir,
Yours faithfully,

JOSIAH BLACKBURN.

APPENDIX D.

I DEPARTMENT OF THE SECRETARY OF STATE,
STATIONERY OFFICE BRANCH,
OTTAWA, 31st December, 1884.

SIR,—I have the honour to report the following respecting the business of this office for the year ended 30th June, 1884, and to submit details of the expenditure for and issue of goods in the accompanying tabular statements.

Value of goods in stock 1st July, 1883.....	\$	24,190.53
do Received during the year.....		105,667.03
Profit on the year's business.....		2,549.82
		<u>\$132,407.38</u>

Goods issued to Departments.....	\$28,007.28
do Outside service.....	32,864.75
do Order of Queen's Printer.....	47,455.28
do In stock at 30th June, 1884, (verified).....	24,080.07
	<u>\$132,407.38</u>

As compared with last year this shows an increased—

Discharge to the Departments inside.....	\$4,349.87
And a decrease to outside.....	\$ 182.11
And to Queen's Printer.....	3,317.13
	<u>3,499.24</u>

Leaving net increase of..... \$850.63

The increased demand reported for 1882-83 was \$20,447.34 over the preceding year, and for several years past the increase has been very great, so that in comparison, that of the past year is very trifling.

The difference, however, is, to a great extent, owing to a reduction in prices, chiefly of papers. The quantities sent out showing a large increase.

It is impossible, without a very elaborate calculation, to show precisely the amount of this reduction, which affected the accounts only seven months of the year; but the following will show it approximately:

The payments in sterling are less than last year by £1,311.95	\$6,382.49
equal to.....	2,120.21
And the currency payments more by.....	<u>\$4,262.28</u>

A net decrease of.....	\$4,262.28
Stock in hand is less in value by.....	110.46
	<u>\$4,151.82</u>

Approximate net reduction.....	\$4,151.82
This added to the increase shown in the account.....	850.63
	<u>\$5,002.45</u>

Gives as the increased demand.....	\$5,002.45
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As the saving is almost wholly in the prices of papers, a calculation of the stock in hand, as verified at the respective periods, will prove nearly the same rate:—

The stock of papers of all grades 1st July 1883, was..... 3,018.19--0 reams
 The same at 30th June, 1884, was..... 3,558.10-11 “

An increase in quantity of..... 539.11-11 “

The stock in 1883 was net value..... \$11,804.64 Average..... \$3.91
 “ same in 1884 do 12,204.48 “ 3.43
 $\therefore 539 \times 3.43 = \$1,849.77$

Less difference in total 399.84, a difference in value of \$1,448.93 ÷ \$12,204.48 equal to 11 $\frac{87}{100}$ per cent, or say 11 $\frac{1}{2}$ per cent.

Regarding the work of the office, there have been 8,641 demands received and executed, an excess of 272 over the last year, and on the whole the service has been fully as well supplied, very few complaints of any consequence having been made.

There have been 4,216 packages sent by mail, and 124 cases, etc., despatched by freight to the outside service.

The waste paper collected was 58,499 lbs., of which 32,138 lbs were sold at \$1.00 per cwt., and 26,361 lbs. at 80c. per cwt., realizing \$532.27, which has been deposited to the credit of the Receiver General.

I beg respectfully to submit the whole,

And have the honour to be, Sir,
 Your obedient servant,

JAMES YOUNG,

The Honourable J. A. CHAPLEAU,
 Secretary of State for Canada.

GOVERNMENT STATIONERY OFFICE.

STATEMENT of Expenditure for, and Issue of, Goods in each Month of the Year ended 30th June, 1884.

	Goods Entered.		Goods Issued.
	Sterling.	Currency.	Currency.
	£ s. d.	\$ cts.	\$ cts.
1883.			
July.....	925 12 0	3,850 71	9,621 88
August.....	594 15 7	7,688 27	12,364 57
September.....	480 8 1	4,577 57	7,360 74
October.....	1,073 12 8	2,758 80	7,752 75
November.....	455 0 7	3,958 39	6,931 56
December.....	241 17 3	5,926 33	8,208 43
1884.			
January.....	742 17 4	5,229 61	9,499 81
February.....	716 9 11	5,814 80	10,455 87
March.....	672 9 3	5,427 27	8,062 72
April.....	723 17 2	6,158 75	9,258 54
May.....	1,684 4 10	6,325 28	10,104 71
June.....	497 19 1	5,009 42	8,705 73
Transferred to Queen's Printer.....		70 49	
Paid in currency.....		62,795 69	
Paid in sterling.....	8,809 3 9	42,871 34	
Net total expenditure.....		105,667 03	
Add value of stock brought forward, 1st July, 1883.....		24 190 53	
Balance—profit on year's business.....		2,549 82	
Total issue of goods.....			108,327 31
Value of stock carried forward, 30th June, 1884.....			24,080 07
		132,407 38	132,407 38
1884.			
July.....	1,278 1 8	4,782 69	11,111 51
August.....	641 12 4	6,917 92	6,568 95
September.....	744 4 11	4,115 87	7,360 92
October.....	701 8 0	5,877 88	11,208 19
November.....	1,096 1 10	5,864 75	9,835 91
December.....	616 12 9	4,967 73	7,207 67
Paid in currency.....		32,326 84	
Paid in sterling.....	5,078 1 6	24,713 29	
Net expenditure.....		57,040 13	
Value of stock brought forward, 1st July, 1884.....		24,080 07	
Total issue of goods.....			53,293 15
Balance carried forward.....			27,827 05
		81,120 20	81,120 20

GOVERNMENT STATIONERY OFFICE—Continued.

GENERAL STATEMENT of Accounts, exhibiting Details of Expenditure, for Goods Received and Value of Goods issued to the Civil Service, during the Year, from the 1st July, 1883, to 30th June, 1884.

Class of Goods.	Sterling. £ s. d.	\$ cts.	Departments.	Inside Service.	Outside Service.
To Book papers.....	1,109 12 0	1,224 90	By Agriculture.....	\$ cts. 1,863 32	\$ cts. 118 26
Foolscap do.....	1,788 0 9	2,625 09	do Census Branch.....	.....	18 30
Double cap papers.....	397 12 9	667 91	do Immigration Branch.....	.....	4,471 91
Posts folio do.....	368 13 5	717 95	Customs.....	1,094 57	.....
Special do.....	168 4 7	4 62	Finance and Treasury Board.....	1,235 97	.....
Printing do.....	289 1 6	11,409 31	do Insurance Branch.....	.....	85 98
Loan do.....	519 7 5	.....	Governor-General's Secretary's Office.....	430 11	.....
Blotting do.....	19 0 0	1,042 05	do do Government Hous.....	597 95	.....
Copying do.....	125 9 3	117 98	Inland Revenue.....	1,329 21	3,568 21
Manilla do.....	.....	4,537 58	Justice.....	798 96	.....
Cartridge do.....	54 4 7	.....	do Inspector of Penitentiaries.....	82 43	.....
Drawing do.....	244 18 1	283 57	do Kingston do.....	.....	331 49
Tracing papers and cloth.....	121 15 0	107 40	do St. Vincent de Paul do.....	.....	251 84
Cut 4to and 8vo papers.....	928 7 8	83 48	do Dorchester.....	.....	88 66
B. B. paper and envelopes.....	71 17 5	161 69	do Manitoba.....	.....	141 70
Envelopes.....	31 13 8	15,037 51	do Dominion Police.....	.....	60 91
Parohment and buckram.....	120 12 5	149 50	do North-West Territories.....	.....	270 53
Drawing instruments and materials.....	347 12 8	403 23	do Supreme Court.....	.....	400 20
Colours, India ink, &c.....	109 8 6	398 98	do Consolidation of Statutes.....	.....	46 52
Pens, steel or quill.....	414 17 0	631 33	Marine and Fisheries.....	1,645 29	442 57
Pencils.....	262 12 4	837 94	Militia and Defence.....	2,083 08	1,072 89
Penholders.....	20 11 0	33 93	do Adj't. General's Office.....	130 66	.....
Sundries, A and B.....	57 8 6	821 94	Privy Council.....	723 37	.....
Cards, cardboards, &c.....	8 18 0	440 18	Public Works.....	2,431 77	3,625 73
Sundries, C.....	45 12 0	54 80	Post Office.....	1,509 93	9,497 83
Cheque books.....	.....	61 60	do Savings Bank Branch.....	.....	.....
Copying material and presses.....	2 15 0	1,201 02	do Money Order Office.....	2,014 82	1,405 28
Sundries, D.....	8 15 3	11 46	Railways and Canals.....	361 75	892 59
Diaries.....	1 2 0	576 57	Canadian Pacific Railway.....	1,492 19	525 58
Despatch boxes.....	119 0 6	28 40	Interior.....	.....	.....
Elastic bands.....	90 18 6	3,550 43	do Dominion Lands Branch.....	4,859 50	1,841 12
Sandries, E.....	8 13 7	37 92	do Ordnance Branch.....	69 56	.....

GOVERNMENT STATIONERY OFFICE.
COMPARATIVE STATEMENT of Issues of Goods to the Departments in the Years 1882-3 and 1883-4.

Departments.	Issue in 1882-3.		Issue in 1883-4.		Increase in 1883-4.		Decrease in 1883-4.	
	Department.	\$ cts.	Outside Service.	\$ cts.	Department.	\$ cts.	Outside Service.	\$ cts.
Agriculture		1,569 64		1,863 32		273 68		
do Census Branch		403 12		118 26				281 86
do Immigration Branch		86 93		18 30				68 63
Customs		988 49		1,094 57		106 08		
Finance and Treasury Branch		1,963 74		1,235 97				727 77
do Insurance Branch		140 20		85 98				54 22
Governor-General's Secretary		331 17		430 11		98 94		
do Government House		276 39		697 95		321 56		
Inland Revenue		1,102 89		1,329 21		226 32		
Justice		751 26		798 96		47 70		
do Inspector of Penitentiaries		96 84		82 43				14 41
do Kingston Penitentiary		322 86		331 49				8 63
do St. Vincent de Paul Penitentiary		293 10		251 84				41 26
do Dorchester		28 03		88 66				60 63
do Manitoba		135 92		141 70				5 78
do British Columbia		7 27						
do Dominion Police		80 82		60 91				19 91
do North-West Territories		1 20		270 53				269 33
do Supreme Court		513 05		460 20				
do Consolidation of Statutes		48 81		46 52				
Marine and Fisheries		1,422 32		1,645 29		222 97		
Militia and Defence		1,431 81		2,083 08		651 27		
do Adjutant-General's Office		100 91		130 66		29 75		
Privy Council		646 37		723 37		77 00		
Public Works		1,767 57		2 014 82		247 30		
Post Office		2,721 85		2,431 77				290 08
do Savings Bank Branch		321 37		1,509 93		1,188 56		
do Money Order Office Branch		257 28		361 76		104 47		476 42
Railways and Canals		1,338 14		1,492 19		154 05		
do Canadian Pacific Railway				605 94				214 74
Interior		3,808 41		4,859 50		1,051 09		80 36
do Dominion Lands Branch				2,813 50		1,814 12		969 38

	51 97	69 56	17 59	1,136 03
do Ordnance	1,730 88	594 85	17 59	1,136 03
do North-West Mounted Police.	72 25	163 23		
do do Government.	455 72	663 04		
do Geological Survey.	865 91	1,125 46		
Indian Affairs	921 73	797 78		123 95
Secretary of State	643 72	942 97		
do Registrar's Branch.	90 33	233 83		
do Queen's Printer's Branch.	69 13	151 53		
do do do Work account	50,772 41	47,455 28		3,317 13
do do do Stationary Office Branch.	47 18	42 96		4 22
do do do High Commissioner	11 00	2 50		8 50
do do do Civil Service Examiners	226 14	149 53		76 61
Auditor-General.	635 04	831 30		
Finance—Charges of Management.	3,677 48	479 93		
Clerk of the Crown in Chancery.	49 18	49 82		
Library of Parliament.	278 61	217 77		
Departments generally.	278 19	252 47		25 72
Civil Service Board.	3 72			3 72
Refunds.	150 83	257 52		106 69
Total Issue to Departments.	23,687 41	28,007 28		
do do Outside Service	83,819 27	80,320 03		
Increase for Departments.			5,539 74	
do do Outside Service.				1,189 87
Decrease for Departments				
do do Outside Service.				9,652 43
Gross Increase.				1,189 87
do Decrease				10,842 30
Net Increase				880 63

APPENDIX E.

THE RECORDS OF CANADA.

To the Hon. J. A. CHAPLEAU,
Secretary of State.

REPORT.

The progress made in the classification of the Records during the year 1884 is very marked. The papers of each period are arranged in chronological order,—each period in a separate room; and searches have become not only possible but comparatively easy. To attain this result it was necessary to deviate from the programme indicated in last year's report. The frequent demands for documents belonging to the first period, that is to say, to the period embraced between 1760 and 1841, have compelled me to interrupt the completion of the general index from 1867 to 1883, which I had begun. In fact, for a search often fruitless, it was necessary for me to lay aside every other work for several days, sometimes for weeks, and much time was afterwards lost in repairing the disorder caused by these researches. This state of things could not last without becoming a permanent obstacle to all progress in the work undertaken by me. It was therefore necessary for me to put aside the index in order to arrange all the manuscripts of that period. The same work, far easier it is true, was done for the two other periods.

Two things have especially struck me in this work: first, the importance of a great number of these documents, in an historical point of view; afterwards, the numerous gaps that exist and which it would be necessary to fill up, as much as possible, if we do not wish many interesting facts to remain irrevocably buried in the oblivion of the past.

I spoke last year of the importance of the manuscripts confided to my care, and I cited to you, as an example, the colony of French royalists established in 1799, in the Windham and Niagara districts. The heads of these refugee families dispersed. The Count de Puisaye returned to England in 1805, the Quéton de St. George family divided into two branches, at present of different nationality, and the tomb of the Count de Challus, probably the last of the name, may be seen in the Montreal cemetery. Other facts not less interesting than the establishment of this colony are frequently brought to light by chance during the making of searches and the work of arrangement. I will only cite, as a proof, the two following incidents, which show with what rigour the law relative to foreigners, the Alien Bill, was carried into effect at the end of the last century and at the beginning of the present.

In 1793 the Marquis du Barrail and his companions had emigrated from Guadeloupe to Dominica, where they had enlisted under the English flag. After having served with distinction and having been provided with the most flattering certificates from the Dominican Government and the English General commanding in those parts, they sought refuge in Canada, where Lord Dorchester permitted them to reside until further orders (1795). The following year His Excellency General Prescott gave them notice to leave the country. Their critical situation touched the Abbé Des Jardins, an influential priest of that period, who made it the object of a memoir intitled "Notes on the Immigrants from Guadeloupe."

The case of Charles Louis Cazeau is still more curious. He was born in Canada and had resided there till he had completed his studies at college in 1790. Afterwards he traded five years with the Indians on the Missouri and the Mississippi, in the service of a merchant of Illinois. In 1796 he went to France to visit his father,

then a wine merchant at Paris; he returned in 1799 on an American vessel and landed at New York, where he engaged as a clerk. In 1805 he returned, as he says, "to the bosom of his family and friends" at the River du Chêne; but the provisions of the Alien Bill did not allow him to remain in his native country and he had recourse, to obtain this favor, to the influence of M. Chartier de Lotbinière, M.L.C. This file, composed of letters, certificates and petitions, is very curious to consult.

These are, however, only interesting incidents to state; the following nominal list, having reference to the first period, 1763-1841, for which there exists no repertory, will show the importance of these records. The papers and files are gathered in bundles.

PUBLIC DOCUMENTS AND RECORDS.

1763-1841.

I.—The Governor, Executive Council, Officers thereof, Provincial Secretary, Civil Secretary, Law Officers.

Subject.	Date.	Number of Bundles.
Executive Council—Reports and proceedings.....	1800—1841	2
do Members of	1793—1841	2
do Clerk of	1793—1841	2
Provincial Secretary—Papers.....	1793—1841	1
do Draft of letters.....	1793—1841	20
Civil Secretary—Papers	• 1793—1841	1
Law Officers—Opinions, reports, &c.....	1797—1841	32

II.—Parliamentary: Legislative Council, Members, Proceedings, Officers thereof; House of Assembly, Members, Officers, Election; Printing and Distribution of Laws.

Legislative Council—Addresses and proceedings.....	1810—1841	3
do Messages, speeches, answers.....	1812—1841	2
do Members, commissions of.....	1798—1841	3
do Officers, correspondence, &c.....	1793—1841	3
House of Assembly—Addresses and proceedings.....	1805—1841	5
do Clerk, correspondence, elections.....	1804—1841	2
do Returning Officers	1860—1841	4

III. General Revenue, Receiver-General, Inspector-General, Auditor-General, Officers of Customs, Arbitrators to Upper and Lower Canada.

Accounts	1800—1841	30
Stat-ments.....		
Re-ports.....		
Re-turns.....		
Let-ters.....		

IV.—Lands.

Subject.	Date.	Number of Bundles.
Grants.....	1783—1841	64
Jesuits' estates.....		
Queen's domains.....		
Seigniorial affairs.....		

V.—Ecclesiastical.

Church of England.....	1787—1841	8
do Rome.....		
Other religious bodies.....		

VI.—Educational and Charitable Institutions.

Royal Institution.....	1787—1841	20
Colleges.....		
Academies.....		
Other schools.....		
Literary and scientific institutions.....		
Charities.....		

VII.—Roads, Bridges, Canals, Public Buildings.

Public buildings.....	1791—1841	12
Roads and internal communications.....	1806—1841	30
Bridges.....	1803—1841	4
Canals.....	1807—1841	6

VIII.—Harbours, Quarantine, Immigration.

Trinity Board.....	1810—1841	20
Lighthouses.....		
Harbours.....	1810—1841	8
Health Officers, Quarantine.....		
Immigrants.....		

IX.—Agriculture, Trade, Patents.

Agricultural societies.....	1803—1841	10
Trade, manufactures, banking, &c.....	1803—1841	6

X.—Judicial.

Subject.	Date.	Number of Bundles.
Proceedings in particular suits.....	1804—1826	6
Prosecutions, criminal.....		
Grand Jury, presentments.....	1801—1825	2
Gaol calendars.....	1805—1825	6
Judges—Reports of trials, opinions.....	1793—1841	12
Attorney, Solicitor and Advocate-General—Reports, opinions, correspondence.....	1801—1841	12
Clerks of the Crown, proceedings.....	1803—1841	2
Prothonotaries, proceedings.....	1802—1841	6
Baptismal, marriage, burial returns.....	.....	1
Sheriffs, Bailiffs, Gaolers—Statements, correspondence.....	1803—1841	12
Court houses, gaols.....	1808—1841	4
Coroner, proceedings.....	1800—1841	4
Barristers, Notaries, Attorneys, admission of.....	1808—1841	15
Small causes, commissions.....	1800—1841	2
Vice-Admiralty Court, officers, &c.....	1801—1841	6
Magistracy—Stipendiary, Honorary.....	1799—1841	10
Quarter Sessions, proceedings.....	1808—1841	3
Clerks of Peace, Constables, proceedings.....	1804—1841	2
House of Correction.....		

XI.—Municipal Commissions.

Correspondence and papers.....	1831—1841	2
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XII.—Militia, Military, Indians.

Papers.....	1763—1841	30
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XIII.—Post Office.

Papers.....	1804—1829	4
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XIV.—Home, Foreign, Provincial Governments.

Foreign.....	1800—1841	4
Consular.....	1801—1841	2
Upper Canada.....	1803—1841	4
Halifax.....		
New Brunswick.....		
Prince Edward Island.....	1799—1841	2
Home.....		

XV.—Miscellaneous.

Subject.	Date.	Number of Bundles.
North-West Company		4
Distressed parishes		1
Province boundaries.....		1
Secret Service.....		3
Indemnity Commissioners	1808—1841	30
Addresses to the King, House of Lords and Commons, Governors and Provincial Parliament—		
On rolls		Rolls 156
On paper.....	1773—1841	Bndls. 8
Petitions from public bodies and associated parties.....	1791—1838	
do individuals for employ.....	1806—1841	2
do for special objects.....	1808—1841	6
do pensions	1800—1841	2
do practice of law and physic.....	1803—1841	2
do leaves of absence	1815—1841	2
do relief.....	1805—1841	2
do free passage and passes	1803—1841	
do tavern licenses.....		
Marriage bonds.....	1811—1839	6
Population returns.....		

An approximate idea may be formed of the richness of these records, if I add that this inventory contains only the ninth part of the papers of that period. I at first began by grouping them year by year, then by classifying them by subjects. This last operation is, as yet, only begun, and it will be necessary to examine four thousand more bundles before being able to establish a complete and definite inventory; but the method which I follow bearing on each year of the period, I thought it useful to submit the above list, in order to give you a better idea of the nature and value of the records. Unhappily, as I have already stated, many papers are wanting, which create considerable gaps in the three periods. These gaps have been the result of different causes; they are of two sorts, temporary and definitive; the former may be remedied, the latter cannot.

The provisions of the law of 1868 do not appear to have been sufficiently observed in practice. That law decrees that "it is the duty of the Secretary of State to preserve all the Records and papers of State, which are not specially transferred to the other Departments." And it has happened that a great number of files have been sent to other Departments, which have not returned them. This has been repeated so often that it has become almost impossible, in the present condition of things, to make a general repertory, each entry of which should be verified, papers in hand.

The issue and return of documents should be the object of special regulations, which should be strictly observed.

But all the missing papers have not found their way into other Departments. Some of these papers have disappeared, and it is impossible to trace them. I will only give one instance. I found, when setting in order the Records of the first period, the envelope of a bundle bearing this inscription, "Original correspondence with Genls. Amherst and Gage, and other officers in the years 1762 and 1763." And this envelope was empty. No trace remains of the correspondence which it contained. Other documents more recent, but not less interesting, have also disappeared.

The collection which was spoken of in the last report has been begun with success, and there is reason to believe that it will be completed in the course of this year.

All of which is respectfully submitted.

The Keeper of Records.
A. AUDET.

APPENDIX F.

SCHEDULE of Addresses of the Senate during the Session of 1884.

Subject.	Number Voted.	Number of Returns made.	Number of Pages of Foolscap contained in Return.	Remarks.
Miscellaneous.....	3	2	84	
Railways.....	1	1	48	
Vessels.....	2	2	16	
Postal Affairs.....	1			
Fisheries.....	2	2	263	
Total.....	9	7	409	

SCHEDULE of Addresses and Orders of the House of Commons during the Session ending the 19th day of May, 1884.

Subject.	Number Voted.	Number of Returns made.	Number of Pages of Foolscap contained in Return.	Remarks.
Agriculture.....	4	3	83	
Breakwaters and Piers.....	4	4	99	
Civil Service.....	1	1	3	
Canals.....	5	3	19	Tabulated Statement, additional.
Coal.....	4	4	53	
Customs.....	14	12	287	do do
Extradition.....	1	1	43	
Finance.....	17	12	147	do do
Fisheries.....	7	5	13	
Harbours.....	4	4	120	
Imports and Exports.....	1	1	8	
Immigration.....	8	4	112	do do
Interior, or Indian Affairs.....	29	18	1,897	
Judges.....	2	2	136	
Intoxicating Liquors.....	4	4	839	do do
Lands.....	8	6	114	do do
Lighthouses.....	3	3	161	
Miscellaneous.....	26	23	880	do do
Militia.....	6	5	97	do do
Postal Affairs.....	13			
Public Works.....	18	14	263	do do
Provincial Accounts.....	1			
Wharves.....	2	2	10	
Receipt and Expenditure.....	2	2		do do
Railways.....	50	42	973	do do
Rivers.....	6	5	86	
Vessels.....	10	6	279	
Wheat.....	3	2	2	do do
Total.....	253	188	6,724	

APPENDIX G.

Synopsis of Returns to Addresses, &c., presented to the House of Commons, Session of 1884.

Ref. No.	Subject.	Date of Address and Receipt.	Mover.	Department referred to and date.		Return.		
				Department.	Date.	Received.	Dated.	Presented.
1	For copy of Petition of Eugène Gosselin, presented to Dominion Arbitrators, &c.	1884.				1884.		
2	For copy of Petition of Louis Chabot, presented to Dominion Arbitrators, &c.	Jan. 21-22	Mr. Amyot	Railways and Canals	Jan.	22 Feb.	12 Feb.	12 Feb.
3	For copy of Petition of Charles Chabot, presented to Dominion Arbitrators, &c.	do	do	do	do	do	do	do
4	Return of Receipts and Expenditure in detail, chargeable to Consolidated Fund, from 1st July, 1882, to 20th January, 1883, and from 1st July, 1883, to 1st January, 1884.	do	do	do	do	do	do	do
5	Return, in the form used in the statements usually published in "Gazette," of Exports and Imports, from 1st July, 1882, to 1st January, 1883, and from 1st July, 1883, to 1st January, 1884.	do	Sir R. Cartwright	Finance	do	22 Jan.	24 Jan.	24 Jan.
6	Return showing the amount of Money on deposit on 1st January, 1884, whether in Canada or elsewhere, &c.	do	do	Customs	do	22 Feb.	1 Feb.	2 Feb.
7	Return of Immigrants supposed to have settled in Ontario in 1879, 1880, 1881, 1882, and 1883.	do	do	Finance	do	22 Jan.	24 Jan.	24 Jan.
8	Correspondence on the subject of the inspection of Newfoundland Pickled Herring.	do	do	Agriculture	do	22 Mar.	10 Mar.	10 Mar.
9	Petitions to Minister of Agriculture that prizes be granted for Essays, &c. upon Agricultural Industries and Mechanical Arts, &c.	Jan. 23-24	Mr. Fortin	Inland Revenue	Jan.	22 Feb.	6 Feb.	5 Feb.
10	Departmental Orders, &c., as to proposed Canadian loan of four millions, &c.	do	Mr. Gigault	Agriculture	Jan.	do	15 Feb.	15 do
11	Statement of Account of Government with the Exchange Bank of Canada.	do	Sir R. Cartwright	Finance	do	24 Jan.	30 Jan.	30 do
		do	do	do	do	24 Jan.	26 do	26 do

12	<i>Copy of Contract, &c., entered into by Government with Jonathan O'Brien in re building of Steamer "Princess Louise,"</i>	Mr. Weldon	Marine and Fisheries	do	24 Feb.	19 Feb.	19 do	20
13	Report of Capt. Scott, &c., upon loss of Steamer "Princess Louise"	do	do	do	21 Jan.	30 Jan.	do	4
14	Return of Wheat and Flour imported into and exported from Provinces during 5 months ended 30th November last...	Mr. Patterson, Brant	Customs	do	24 Feb.	15 Feb.	do	20
15	Return of Wheat and Flour imported into and exported from Provinces during 5 months ended month of December, 1883.	do	do	do	24			
16	Return of Claims presented for drawback on goods manufactured for Export and not included in last Return made to House.	do	do	do	24			
17	Return of each City, &c., in which Public Buildings, consisting of Post Office or Custom House, or both, have been erected since 1st January, 1879.	do	do	do	24	15 do	15 do	20
18	Copies of Judgments of Supreme Court as to questions of Legislative power with reference to regulation of intoxicating Liquors, &c., case of Hodge against the Queen, &c.	Jan. 24-25 Mr. Lister	Public Works	Jan.	25 March	5 March	5 March	5
19	Statement in re Superannuation Fund.	Mr. Blake	Justice	do	25 April	12 April	12 April	15
20	Correspondence between Government and Canadian Pacific Railway Company and any other Railway Company in re the opening of the Union Jacques Cartier Railway.	do	Finance	do	25 Feb.	7 Feb.	7 Feb.	14
21	Correspondence with Railway Companies or individuals respecting the construction or subsidizing of proposed railway link between Gravenhurst and Callander, &c.	Mr. Houde	Railways	do	25 do	6 do	6 do	7
22	Orders in Council, &c., in re sale of Supply Farm No. 20, on Fish Creek, near Calgary, &c.	Mr. Cockburn	do	do	25 March	25 March	26 March	26
23	For Copies of Reports of High Commissioner in re Immigration to Canada, &c.	Mr. Cameron (Huron)	Interior	Jan.	26 Feb.	13 Feb.	14 Feb.	25
24	Persons entering Manitoba by rail during each month in last calendar year, &c., also in re Emigrants, &c.	Mr. Blake	Agriculture	do	26 do	26 do	do	28
25	For Copies of Orders in Council in re Licenses to cut timber on Indian Lands near Fort William, &c.	do	do	do	26 April	2 April	2 April	3
		do	Supt.-Gen. Indian Affairs	do	26 March	13 March	13 do	8

Synopsis of Returns to Addresses, &c., presented to the House of Commons, Session of 1884—Continued.

Ref. No.	Subject.	Date of Address and Receipt.	Mover.	Department referred to and date.		Return.				
				Department.	Date.	Received.	Dated.	Presented.		
26	For maps showing location of Canadian Pacific Railway, as approved or constructed, &c.	do	do	Railways	do	26 do	3 do	3 March	3	
27	Correspondence, &c., relating to allowances proposed to be paid to Canadian Manufacturers for goods required by Canadian Pacific Railway, &c.	do	do	Customs	do	26 do	24 do	do	do	26
28	Copies of Orders in Council, in re appointment of the present High Commissioner of Canada, &c.	do	do	Clerk Privy Council	do	26 Feb.	19 Feb.	19 Feb.	19 Feb.	20
29	For Correspondence as to any payments, &c., in respect of the Office of High Commissioner, and statement of payments made of such accounts in respect of the Office during its tenure by Sir A. T. Galt, and by present incumbent, &c.	do	do	Finance	do	26 (in part) Feb. 16 (in part) Feb. 26 (Supplementary Mar 'h 21)	do	do	do	26
30	Copies of Correspondence in re Judicial Salaries, &c.	do	do	Justice	do	29 March	26 March	26 do	do	26
31	Copies of Despatches from Imperial Government in re Vice-Admiralty Courts, &c.	Jan. 28-29	Mr. Vail	do	do	do	do	do	do	29
32	Correspondence between Government of Nova Scotia and Department of Railways, in re Railway matters, since 6th March, 1883.	do	Mr. Weldon	do	do	do	do	do	do	29
33	Statement of Amount expended in re Public Buildings, Antigonish, &c.	Jan. 28-29	Mr. McDonald	Railways	do	29 Feb.	4 Feb.	5 Feb.	6	6
34	Return of Wheat, and duty collected thereon, imported from United States, and entered for consumption, for 6 months ending 31st December, 1883	do	Mr. Meisac	Public Works	do	29 Feb.	4 March	5 March	5	5
35	Return of Home Farms and Indian Instruction Farms, closed &c., since 1st January, 1883.	do	Mr. Dundas	Customs	do	do	16 Feb.	15 Feb.	20	20
36	Copies of complaint against D. J. Hughes, County Judge, County Egin	do	Mr. Cameron, Huron	Supt.-Gen. Indian Affairs	do	do	do	do	do	4
		do	Mr. Wilson	Justice	do	do	29 April	9 April	9 April	9

37	<i>Copies of Reports by Steamboat Inspectors, upon "St. Lawrence," "Princess of Wales," &c</i>	do	Mr. Davies	do	29	March 13	March 13	March 14
38	Statement of sums of \$5,000 and \$2,688.74, under Warrants issued by Governor General, for payment to "Le Courier de St. Hyacinthe, and also re Royal Society, &c."	do	Mr. Somerville	do	29	Feb. 1	Feb. 2	Feb. 4
39	Return of expenses incurred by Members of Government sent to England or elsewhere, from 2nd April, 1883, to present date	do	do	do	29	March 15	March 15	March 17
40	Return of Coal carried by Intercolonial Railway, during year ending 31st December, 1883, and also tons carried by boat from Nova Scotia.	do	Mr. McMullen	do	29	April 15	April 15	April 15
41	Amount paid into Superannuation Fund, during the time of service by each of those superannuated, during the year ending 31st December, 1883	do	do	do	29	Feb. 14	Feb. 14	Feb. 20
42	For information asked for by Address of 5th March, 1883, respecting amount of subscribed stock of Canadian Pacific Railway, prior to authorization for an increase of its Capital Stock, &c.	do	Mr. Blake	do	29	(See action on 41.)		
43	Copies of any Official Memorandum of the Canadian Pacific Railway Company, or Public Letters, or Memorandum of its Officer, relative to its position and prospects, and transactions, including recent guarantee	do	do	do	29	Feb. 6	Feb. 6	{ No. 42 herewith, Feb. 7
44	That steps may be taken with a view to secure compliance on the part of the Canadian Pacific Railway Company, with the provisions of the Act of 1881, to amend the Consolidated Act of 1879, by supplying the information required by submitting copies of all contracts made by the Company for the construction of the Railway	do	do	do	29	do	do	{ No. 45 herewith, Feb. 7
45	For copy of Instrument of Incorporation, and of a Company called "The North American Contracting Company," or by some similar name with which a contract has been made for construction of part of the Canadian Pacific Railway	do	do	do	29	(Filed with No. 44)		

SYNDICATS of Returns to Addresses, &c., presented to the House of Commons, Session of 1884—Continued.

Ref. No.	Subject.	Date of Address and Receipt.	Mover.	Department referred to, and date.		Return.		
				Department.	Date.	Received.	Dated.	Presented.
46	Statement of Revenue of Intercolonial Railway for 6 months, for year ending 31st Dec., 1883, under the several Divisions, similar to Annual Statement B.	Jan. 23-29...	Mr. Weirton	Railways	Jan. 29	29 Feb.	13 Feb.	14
47	Return of Rolling Stock purchased for the Intercolonial Railway, for year ending 31st Dec., 1883; also, Government Workshops built, &c.	do ...	do	do	do	29 April	1 April	3
48	For Copies of Orders in Council under Commission issued in connection with claims arising out of the construction of the Intercolonial Railway.	do ...	do	do	do	29 March	28 March	1
49	For Statement of Coal entered Warehouse free for Exportation, during years ending 30th June, 1882 and 1883.	do ...	do	Customs	do	29 do	7 do	March 11
50	Return of Memorials, &c., asking for a drawback on Sugar refined in Canada when exported, &c.	do ...	do	do and Finance..	{ do Feb.	29 } 28 } Feb.	29 do	4
51	Return of Claims presented for drawback on material used for Shipbuilding, &c.	do ...	do	do	do	29 do	15 do	20
52	Statement of Name, &c., of Vessels that receive Bounty under Act appropriating \$150,000 for "Sea Fisheries."	do ...	Mr. Robertson (Shelburne)	Marine and Fisheries.....	do	29 do	7 do	13
53	Return of Spirits and Intoxicating Liquors imported, &c., for Consumption, during year 1883, &c.	do ...	Mr. McCraney	Customs and Inland Revenue.....	{ Feb. do	19 } 11 } do	19 do	20
54	Sales and Leases of Coal Lands in North-West, &c.	Jan. 29-30...	Mr. Blake	Interior	Jan.	30 April	4 April	4
55	Correspondence <i>in re</i> importing Nova Scotia Coal into United States Ports for Ocean Steamship purposes, duty free.	do ...	do	Customs.....	do	30 Feb.	11 Feb.	12
56	Copies of Order in Council <i>in re</i> Bounty on Manufacture of Iron.....	do ...	do	do and Finance... { Feb.	{ do do	30 } 18 } Feb.	18 do	20

SYNOPSIS of Returns to Addresses, &c., presented to the House of Commons, Session 1884 - Continued.

Ref. No.	Subject.	Date of Address and Receipt.	Mover.	Department referred to and date.		Return.		
				Department.	Date.	Received.	Dated.	Presented.
75	Copies of Agreement between Government and Contractors <i>re</i> contract Canadian Pacific Railway Company, Sec B.....	do	Mr. Casey.....	Railways.....	do 31 March	3 March	3 March	3
76	Estimate of further sums required to be paid to Contractors for Sec. B, Canadian Pacific Railway, &c.....	do	do	do	do 31 Feb.	13 Feb.	13 Feb.	14
77	Casualties to Train on Intercolonial Railway, from 1st March, 1883, to 1st January, 1884.....	do	Mr. Weldon.....	do	do 31 do	16 do	16 do	18
78	Statement of sums expended in each year since the change of system by each Department, out of the lump Vote for Sessional Returns, &c.....	{ Jan. 31 } { Feb. 1 }	Mr. Blake.....	Auditor.....	do Feb. 1 do	2 do	2 do	4
79	Name of persons offering to sell lands at Amherstburg for Custom House and Post Office, &c.....	do	Mr. Lister.....	Public Works.....	do 1 March	5 March	5 March	5
80	Persons in Public Works Department whose Salaries have been charged to particular work since 1881, &c.....	do	do	do	do 1 April	17 April	17 April	17
81	Correspondence on subject of proposed Factory Bill.....	{ Jan. 31 } { Feb. 1 }	Mr. Blake.....	Finance.....	do Feb. 1 do	23 Feb.	25 Feb.	26
82	Correspondence <i>re</i> Duty on Freight Charges, &c.....	do	do	Customs.....	do 1 do	12 do	14 do	14
83	<i>re</i> cost connected with the heating of Public Buildings.....	do	do	Public Works.....	do 1 March	5 March	5 March	5
84	Correspondence respecting recent troubles with Indians at Metlakatla and Fort Simpson, &c.....	do	Mr. Shakspeare.....	Supt.-General of Indian Affairs.....	do 1 do	7 do	7 do	11
85	Correspondence between Government and Canadian Pacific Railway Co. <i>re</i> migration to Manitoba and North-West, &c.....	do	Mr. Patterson (Brant).....	Agriculture and Railways.....	{ Feb. 1 } { Mar. 6 }	do	8 do	12
86	Correspondence <i>re</i> Porpoise Fishery at River Ouelle.....	Feb. 1-2	Mr. Blondeau.....	Marine and Fisheries.....	do Feb. 2 do	12 Feb.	12 Feb.	13

87	Correspondence in re arrest of Henry Watson, &c.	Mr. Guillet	Governor General's Secretary	do	16 do	18 do	21 do
88	Correspondence in re grant or payment of Subsidies to Railways, &c.	Mr. Blake	Railways	do	4 do	16 do	18 do
89	Correspondence in re Subsidies for Manitoba, &c.	do	Interior	do	2 do	13 do	13 do
90	Correspondence in re Mission of Minister of Finance to England in 1883 in matter of new loan.	Sir Richard Cartwright	Finance	do	2 Feb.	19 Feb.	19 Feb.
91	Return showing name, &c., of Islands on Lake Ontario and other inland waters held by Government as Indian lands, &c.	Mr. Platt	Supt.-General of Indian Affairs	do	2 do	13 do	13 do
92	Return of Public Health Officers in various Cities of Canada, &c.	do	Agriculture	do	2 do	14 March	14 March
93	Copies of claims of Eustache Dorton Pilot, and Moise Leclerc, Bailiff, presented to Dominion Arbitrators.	Mr. Belleau	Marine and Railways	{ Feb. 2 } do 9 }	Feb.	26 Feb.	26 Feb.
94	Engineer's Report in re Ingonish Break-water	Mr. Campbell (Victoria)	Public Works	Feb.	5 March	5 March	5 March
95	Timbered lands, &c., sold by Government since 1st March last, near Bow River, North-West.	Mr. Jackson	Interior	do	5 do	20 do	21 do
96	Tenders as to construction of Post Office and Custom House at St. Thomas	Mr. Wilson	Public Works	do	5 do	5 do	5 do
97	Receipt and Expenditure out Consolidated Fund to 10th February, 1883 and 1884.	Sir Richard Cartwright	Finance	do	7 Feb.	13 Feb.	13 Feb.
98	Correspondence in re vacancy caused at Morris town by death of Archibald McGillivray, late Preventive Officer, &c.	Mr. McIssac	Custom	do	7 do	11 do	11 do
99	Statement of money expended in each of the Provinces since Confederation, &c., on Works of a strictly general character, &c.	Mr. Landry	Public Works	do	8 April	17 April	17 April
100	Copies of Order in Council in re appointment of Samuel J. St. Onge Chapleau, as Sheriff North-West Territories.	7-8 Mr. Cameron	Interior, Railways, Justice and Public Works	Feb.	7 March	8 March	8 March
101	Correspondence in re School of Navigation, Quebec, &c.	11-12 Mr. Amyot	Marine	do	12 Feb.	29 Feb.	29 do
102	Correspondence in re improvement of Fairford River, outlet of Lake Manitoba, &c.	Mr. Orton	Public Works	do	13 March	17 March	17 do
103	For return of amounts expended from 1st January, 1880, in repairs on the Pelée Island, Long Point, &c., and Rondeau Lighthouses.	Mr. Lister	Marine	do	12 do	17 do	17 do
104	For copy of petitions in re Kingsville Harbour Works, &c.	do	Public Works	do	12 do	17 do	17 do

Synopsis of Returns to Addresses, &c, presented to the House of Commons, Session of 1884—Continued.

Ref. No.	Subject.	Date of Address and Receipt.	Mover.	Department referred to and date.		Return.		
				Department.	Date.	Received.	Dated.	Presented.
105	Arrangements between Dominion Government and Quebec Central Railway Company, for right of way of St. Charles Branch, Intercolonial, &c.....	do	Mr. Landry	Railways.....	do	12 April	2 April	2
106	Correspondence <i>in re</i> placing Gas Floating Lights on River St. Lawrence, &c.....	do	Mr. Valin	Marine.....	do	12 Feb.	28 March	12
107	Petition asking for placing Lights on River St. Lawrence, North of Island of Orleans.....	do	do	do	do	12 March	7 March	do 12
108	Correspondence <i>in re</i> appointment of Jas H. Jacques and Chas. Kearney in Civil Service.....	do	Mr. Irvice	Deputy Heads of Departments.....	do	23 do	6 do	7
109	Statement of cost of the first 40 miles west of Callander, built by Canadian Pacific Railway Company, &c.....	do	Mr. Blake	Railways.....	do	12 do	15 Feb.	15
110	Statement of mileage built by, and the payments in detail to the Construction Company in respect of the Canadian Pacific Railway line from the point 40 miles east of the Saskatchewan, &c.....	do	do	do	do	12 do	do	2
111	Statement of the mileage cost of the Canadian Pacific Railway line for the 615 miles west of Winnipeg to the Saskatchewan.....	do	do	do	do	12 do	do	2
112	Statement of the sums payable and the amount of stock deliverable to the construction Company under its contract with the Canadian Pacific Railway &c.....	do	do	do	do	12 do	do	2
113	Statement of the consideration paid by the Canadian Pacific Railway Company for the St. Lin Branch Railway, &c.....	do	do	do	do	12 do	15 Feb.	15
							20 do	21
							15 do	15
							18 do	18

114	Statement of the net price received by the Canadian Pacific Railway Company for each lot of 10 millions of stock, comprising the 30 millions issued to a Syndicate.....	do ...	do	do	12	(in part) Feb. 15 (in part) Feb. 18	16 Feb. 15 do 18
115	For sums paid by Government of Canada on account of subsidies voted to several railway lines.....	do	do	do	14	Feb. 21	do 22
116	Copies of Statements in re Collection and Expenditure of Revenue of Port Stanley Harbor.....	13-14 Mr. Dupont	do	do	15	March 5	5 March 5
117	Copies of Orders in Council, &c., in re the changing of the Indian Agent's Office, at Toronto, to Ottawa, &c.....	Mr. Wilson	do	Public Works	15	Feb. 20	21 Feb. 22
118	Statement of the names of the principal Officers, in service of Government on Intercolonial Railway.....	Mr. Cook	do	Supt.-General of Indian Affairs	15	March 7	7 March 11
119	Copies of Reports of surveys in re dredging at Jernseg, Queen's County, N.B.....	Mr. Landry	do	Railways	15	do 6	do 6
120	Number of days, &c., upon which the Intercolonial Board of Commissioners held sittings, from 1st January, 1883, to 31st January, 1884.....	Mr. King	do	Public Works	15	do 28	28 April 1
121	Copies of Reports of Architects in re selection of a site for the Amherstburg Custom House and Post Office.....	Mr. McMullen	do	Railways	15	do 5	5 March 5
122	Correspondence in re seizure of Coal Oil Barrels at Sandwich, &c.....	Mr. Patterson (Essex)	do	Public Works	15	Feb. 20	20 Feb. 20
122	Statement of Employees on Intercolonial and Prince Edward Island Railways, in certain Departments, &c.....	do	do	Inland Revenue	15	April 3	3 April 4
123	Return of Immigration Agents employed during 1883.....	Mr. Davies	do	Railways	15	March 14	14 March 17
124	For Report of Engineers in re construction of a Harbor on north shore of Lake Erie, either at Leamington, Kingsville or elsewhere, &c.....	Mr. McMullen	do	Agriculture	15	April 15	15 April 15
125	Statement of Shareholders in Canadian Pacific Railway Company, and Stock held by each Shareholder on certain dates.....	Mr. Patterson (Essex)	do	Public Works	26	March 28	28 April 1
126	Copy of Orders in Council, &c., for payment of \$130,000 to Government of British Columbia on account of Esquimaux Graving Dock.....	Mr. Muloch	do	Railways	26	do 6	6 March 6
		Mr. Baker (Victoria)	do	Public Works	26	do 6	6 March 6

* Return completed by letter of 19th February, 1884.

SYNOPSIS of Returns to Addresses, &c., presented to the House of Commons, Session of 1884—Continued.

Ret. No.	Subject.	Date of Address and Receipt.	Mover.	Department referred to and date.		Return.		
				Department.	Date.	Received.	Dated.	Presented.
127	Statement <i>in re</i> Officers, Clerks, &c., employed in various Departments of Dominion, in Province of British Columbia &c.	do	do	Deputy Heads	March 1	(In part) } April 14 (In part) } April 15	April 15	
128	Correspondence <i>in re</i> construction of Breakwater at Point Escuminac, Bay of Miramichi, N.B.	do	Mr. Mitchell	Public Works	Feb. 26	March 6	March 6	March 6
129	Correspondence between Dominion and Imperial Governments <i>in re</i> maintenance of a Naval Station at Esquimaux.	do	Mr. Baker (Victoria)	Governor General's Secretary	do 26	do 5	do 5	do 5
130	Correspondence <i>in re</i> Daniel McCourt, dismissed from his office of Lock Tender, Coruwall Canal, &c.	do	Mr. Blake	Railways	do 26	do 5	do 5	do 7
131	Copy of Memorial signed by Frank Moberly and W. A. McCallum, on behalf of inhabitants of Neebing for relief <i>in re</i> their bonuses to Prince Arthur's Landing and Kaminitiquia Railway Company.	do	do	do	do 26	do 3	do 3	do 3
132	Statement of Expenditure of Canadian Pacific Railway Company in connection with St. Lawrence & Ottawa Railway, &c.	do	Mr. Casgrain	do	do 26	do 29	do 29	April 1
133	For copies of Tenders called for and made last year, for extension of Wharf at St. Jean, Port Joli	Feb. 25-26	Mr. Casgrain	Public Works	Feb. 26	March 28	March 28	March 28
134	For copies of Order in Council <i>in re</i> appointment of an Administrator of the North-West Territories, in absence of Lieut.-Governor Dewdney	do	Mr. Cameron (Huron)	Interior	do 26	do 11	do 11	do 13
135	For Reports of Government Engineers <i>in re</i> construction of a Harbour of Refuge at Port Stanley or Port Burwell, North Shore Lake Erie.	do	Mr. Wilson	Public Works	do 26	do 31	April 1	April 2

136	Copies of Despatches, &c., in re excessive Customs duties collected on Hay grown and exported from Canada to United States	do	Mr. Irvine	Clerk Privy Council	do	26 April	7 do	7 do	8
137	Correspondence in re Charges against the Captain of the Life-Saving Crew at Port Rowan, in not saving the lives of crew of Barque "Fitzgerald"	do	Mr. Jackson	Marine	do	26 March	17 March	17 March	28
138	Accounts, &c., rendered to Militia Department by Canadian Express Co., for transport during certain months of 1883, &c.	do	Mr. Somerville (Brant)	Militia	do	26 April	1 April	1 April	3
139	For copies of Commission appointing His Excellency the Governor General of Canada, &c.	do	Mr. Casgrain	Governor General's Secretary and Clerk Privy Council	do	26 March	4 March	4 March	4
140	Copies of Commissions appointing the several Lieut.-Governors of Quebec, &c.	do	do	Secretary of State	do	March	4 do	4 do	5
141	Survey in re Navigation of Swan Creek and Swan Creek Lake, N.B.	March 3-4	Mr. Burpee (Sunbury)	Public Works	do	4 do	11 do	11 do	12
142	Return of Vessels navigating Lakes Superior and Huron, inspected past season under authority, &c.	do	Mr. Dawson	Marine	do	4 April	8 April	8 April	14
143	Correspondence in re disposal of W ^g of Section 6, Township 2, Range 14, West Principal Meridian, Manitoba, and re claims of John Robertson and one Wallace to said lot, &c.	do	Mr. Blake	Interior	do	4 March	26 March	26 March	26
144	Statement of amount paid to Joatham O'Brien, for building "Princess Louise" steamer.	do	Mr. Weldon	Marine	do	4 April	2 April	2 April	7
145	Length of miles of the Intercolonial Railway, between Rivière du Loup and Moncton, and original cost, &c.	do	Mr. Burpee (Sunbury)	Railways	do	4 March	10 March	10 March	11
146	Correspondence between the Government and any Local Governments in re Liquor License Act of 1883	do	Mr. Cameron (Huron)	Clerk Privy Council	do	4 April	2 April	2 April	18
147	Copies of Orders in Council in re reservation for a Town Site at Fort McLeod, &c.	do	do	Interior	do	4 March	26 March	26 March	26
148	For Orders in Council in re Sale of Government Herd of Cattle in North-West to any person or Company, &c.	do	do	Interior and Superintendent-General of Indian Affairs	do	4 April	4 April	9 April	18
149	Correspondence in re purchase of Moccasins for Militia, 1883, &c.	do	do	Militia	do	4 March	26 March	29 do	1
150	Correspondence in re purchase of Tents for Militia, 1883, &c.	do	do	do	do	4 do	12 do	12 do	13

Synopsis of Returns to Addresses, &c., presented to the House of Commons, Session of 1884—Continued.

Ref. No.	Subject.	Date of Address and Receipt.	Mover.	Department referred to, and date.		Return.	
				Department.	Date.	Received.	Dated.	Presented.
151	Return of amount paid for Drawback on cotton duck used for sails for ships &c. under Customs Act, &c.	March 3-4...	Mr. Kirk.....	Customs	Mar. h 4... March 13	March 13	March 17
152	Amounts derived from sale of buildings on Intercolonial Railroad between Hadlow and Rivière du Loup.....	do	Mr. Blondau.....	Railways.....	do 4... do	do 28	April 1
153	Reports, &c., in re action brought by one Skeffington against Thos. Michaud and Florian Dumais, of St. Paschal 1881.....	do	do	do	do 4... April 1	April 1	do 3
154	Copies of Despatches, &c., in re arrest of Roger Amero, belonging to Digby, N.S.	do	Mr. Woodworth.....	Justice and Governor-General's Secretary....	do 4... March 17	March 17	March 17
155	Correspondence in re claim of N.B. to balance due it on the portion of the Intercolonial Railroad known as Eastern Extension since May, 1876, &c.	do 10-11...	Mr. Burpee (Sunbury).....	Railways.....	do 11... April 2	April 2	April 2
156	Copies of complaint in re conduct of Major General Luuard, sent by Lt.-Col. A. T. Williams, M.P., &c.	do	Mr. Mulock.....	Militia	do 11... (April 7) { Supplementary (April 10)	April 7	do 8
157	Correspondence between Government and Sir John Rose, &c., in 1875, in re conduct of Mr. Potter, President Grant Trunk Railway Company, in denying the credit of Canada and Quebec in re loan in London, &c.	do	Mr. Mitchell.....	Finance and Railways....	do 11... March 24	March 24	March 24
158	Statement of all moneys paid to T. Chas. Watson by Government since 1881, &c.	do 12-13	Mr. Wilson.....	Railways and Dep Heads	do 13-21 April 14	April 14	April 15
159	Correspondence in re accommodation for foot passengers at Wellington Bridge, Lachine Canal, &c.	do	Mr. Curran.....	Railways.....	do 13... March 21	March 21	March 24
160	For report of Mr. C. Michaud, C.E., as to explorations of River St. Francis, &c.	do	Mr. Bergeron.....	Public Works.....	do 13... April 2	April 2	April 4
161	For report of Mr. Guerin, C.E., in re explorations of the Yamaaka River...	do	do	do	do 13... March 27	March 27	March 27

Synopsis of Returns to Addresses, &c., presented to the House of Commons, Session of 1884—Concluded.

Ref. No.	Subject	Date of Address and Receipt	Mover.	Department referred to, and date.		Return.	
				Department.	Date.	Received.	Dated.	Presented.
176	For copies of Complaints, &c., against Clovis Caron, Fishery Overseer, County of Bellechasse	do	Mr. Blondeau.....	Marine and Fisheries.....	do 29	do 4	do 7
177	Return of Salary made to Mr. Geo. Hutchinson, as person in charge of Meteorological Service, at St. John, N.E.....	do	Mr. Weldon.....	Marine.....	do 29	do 10	do 15
178	Copy of Contract entered into by Government and John Sinoet, for building of Breakwater, at Mouth of St Peter's Harbour, P. E. I., &c.....	do	Mr. McIntyre.....	Public Works	do 29	do 16	do 17
179	For copies of Tenders for the enlargement of Sections 4 and 10, of St. Lawrence Canals.....	do	Mr. Cockburn.....	Railways and Canals.....	do 29	do 18	do 18
180	Copies of Correspondence with United States Government in re alleged Violations of Neutrality of Canadian Territory by United States Troops.....	do	Mr. Charlton	Governor General's Secretary.....	do 29	do 1	do 2
181	For copies of Order in Council appointing Alphonse Audet to present position in Civil Service	do	Mr. Casey	Secretary of State	do 29	do 1	do 2
182	Statement of Receipts and Expenditure, chargeable to Consolidated Fund, &c., to 20th March, 1883-84, in each year, respectively, and Return of Exports and Imports, to 1st March, 1883-84, respectively.....	do	Sir R. Ca. twright.....	Finance and Customs.....	do 29	In part, April 3 Suppl. April 8	do 7 do 8 do 8
183	Return of Expenditure in each year since Confederation on account of Rideau Hall and Grounds, &c	do	Mr. McCuaney.....	Public Works, Finance and Marine.....	do 29	In part, April 17	do 17 do 17

184	For copy of Award made by Arbitrators to settle Claims of Contractors for Section B, Canadian Pacific Railway.....	do	Mr. Casey.....	Railways.....	do	29	do	Presented by Sir O. Tupper in person, 15th April 18
184	(a) For a Return of Papers in re the Pajot Farm, Town of Sandwich, &c., Claim of Wyandottes, of Anderton, &c.....	do	Mr. Patterson (Essex)	Superintendent (General) of Indian Affairs.....	do	29 April	17 April	17 April 18
185	For copies of Contract awarded for the rebuilding of the Drill Shed at Montreal, &c.....	do	Mr. Bernier	Public Works.....	do	29 do	16 do	16 do 17
186	For number of Steam Tugs bought or built by Government in 1883, for use of Dominion, &c.....	do	Mr. Jackson.....	do	do	29 do	15 do	15 do 15
187	For Statements of Passes given on the Intercolonial Railway, from 1st January, 1874 to 1st January, 1884, &c.....	do	Mr. Montplaisir.....	Railways.....	do	29 do	15 do	15 do 15
188	For a Return of Certificates given by Medical Men under Temperance Act, 1878, in Prince County, P. E. I.....	do	Mr. Davies.....	Inland Revenue.....	do	29 do	3 do	3 do 4

APPENDIX H.

KEY to Synopsis of Returns presented to the House of Commons during the Session of 1884.

Subject.	Mover.	Reference Number.
Administration of Affairs, N.W. Territories	Mr. Cameron (Huron).....	72.
Appointments in Civil Service	Messrs. Irvine	108.
	Casey.....	181.
Amherstburgh Custom House and Post Office	Mr. Patterson (Essex).....	121.
Appointment, Administrator N.W. Territories	Mr. Cameron (Huron)	134.
Arbitrators— <i>See</i> Dominion Arbitrators.		
Antigonish, Public Buildings	Mr. McIsaac	33.
Amero, Roger	Mr. Woodworth	154.
Audet, Alphonse	Mr. Casey	181.
Banks (Exchange).....	Sir R. J. Cartwright.....	11.
Bounty to Vessels, <i>in re</i> Fisheries (Sea)...	Mr. Robertson (Shelburne).....	52.
Bounty—Manufacture of Iron.....	Mr. Blake	56.
Bonus to Inhabitants of Neebing.....	Mr. Blake.....	131.
Breakwaters and Piers	Messrs. Campbell (Victoria).....	94.
	Mitchell	123.
	Davies.....	169.
	McIntyre	178.
Bridges	Messrs. Curran	159.
	Vail	170.
Chabot, Louis	Mr. Amyot	2.
Chabot, Charles	Mr. Amyot.....	3.
Chapleau, Samuel J. St. Onge	Mr. Cameron	100.
Caron, Clovis	Mr. Blondeau	176.
Coal, Coal Oil and Lands	Messrs. McMullen	40.
	Weldon	49.
	Blake.....	54, 55.
	Patterson	122.
Civil Service	Messrs. Irvine	108.
	Casey.....	181.
Canals.....	Messrs. Blake.....	130.
	Curran	159.
	Cockburn	179.

KEY to Synopsis of Returns presented to the House of Commons during the Session
of 1884—Continued.

Subject.	Mover.	Reference Number.
Canada Express Co.	Mr. Somerville (Brant)	138.
Commission appointing Governor General of Canada.....	Mr. Casgrain	139.
Commission appointing Lieut.-Governor of Quebec	Mr. Casgrain	140.
Dominion Arbitrators	Mr. Amyot	1, 2, 3.
Drawbacks on Goods, &c.	Mr. Paterson (Brant)	16.
Drawbacks on Sugar.....	Mr. Weldon.....	50.
Drawbacks on Material for Shipbuilding ..	Mr. Weldon.....	51.
Drawbacks on Cotton Duck for Sails	Mr. Kirk	151.
Duty on Wheat, imported	Mr. Dundas	34.
Duty on Freight Charges.....	Mr. Blake.....	82.
Duty on Hay	Mr. Irvine	136.
Drill Shed, Montreal	Mr. Bernier	185.
Dorion, Eustache	Mr. Belleau	93.
Dewdney, Lieut.-Governor	Mr. Cameron (Huron)	134.
Dumais, Florian	Mr. Blondeau	153.
Exports and Imports.....	Sir R. J. Cartwright.....	5, 182.
Exports and Imports (Wheat and Flour)	Mr. Paterson (Brant)	14, 15.
Exports and Imports.....	Mr. Dundas	34.
Erection of Public Buildings	Messrs. Lister.....	17.
	Mclsaac	33.
Extradition, Roger Amero.....	Mr. Woodworth	154.
Fisheries	Messrs. Fortin.....	8.
	Robertson (Shelburne).....	52.
	Mulock	58.
	Blondeau	86, 176.
	Davies.....	175.
Factory Bill	Mr. Blake.....	81.
Factory, St. Croix Cotton	Mr. Innes	164.
"Fitzgerald," Barque	Mr. Jackson	137.
Governor General's Warrants.....	Mr. Somerville	38.
Governor General, Commission as.....	Mr. Casgrain	139.
Governor, Lieut., of Quebec, Commission as	Mr. Casgrain	140.
Gas Floating Lights.....	Mr. Valin	106.

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APPENDIX I.

ADDRESSES and Orders of previous Session, to which Returns were presented in the Session of 1884.

Subject.	Number Pre-sented.	Number of Pages of Foolscap contained in Return.	Remarks.
Miscellaneous	13	448	Tabulated Statement, additional.
Customs	8	304	
Lands	17	462	do do
Postal Matters	3	3	
Breakwaters	1	20	
Militia	1	1	
Timber Licences	1	4,000	
Railways	3	19	
Superannuation	1	3	
Intoxicating Liquors	1	22	
Lighthouses	2	141	
Total	51	5,423	

APPENDIX J.

TABLE of Charters of Incorporation issued under the "Canada Joint Stock Companies' Act, 1877," during the Year 1884.

Name.	Capital Stock.	Number of Shares.	Amount of each share.
	\$		\$
The Hamilton Vinegar Works Company (Limited)	50,000	500	100
The Snow Drift Baking Powder and Grocers Company (Limited)	15,000	150	100
The British American Rancho Company (Limited).....	200,000	2,000	100
The George T. Smith Middlings Purifier Company of Canada...	150,000	6,000	25
The Canada Rope Serving Machine Company (Limited).....	18,000	3,600	5
The Alberta Lumber Company (Limited)	500,000	5,000	100
The Dominion Coal, Coke and Transportation Company (Limited).....	500,000	25,000	20
The Woodward Underground Telegraph and Telephone Company of Canada	200,000	4,000	50
The National Electro and Stereotype Company	10,000	100	100
The Moosomin Farming and Trading Company (Limited).....	100,000	1,000	100
The North American Agricultural Implement and General Manufacturing Company of London, Canada (Limited)....	1,000,000	10,000	100
The Pigeon River Log Driving Association and Improvement Company.....	40,000	400	100
The Mount Royal Rancho Company (Limited).....	50,000	1,000	50
Dominion Button Hole Company (Limited).....	50,000	500	100
The George Bishop Engraving and Printing Company (Limited)	100,000	1,000	5
The North-West Gold Mining Company (Limited).....	50,000	10,000	100
The Lievre River Land and Phosphate Company (Limited)	75,000	750	100
The Thousand Islands and Montreal Steamboat Company	100,000	1,000	100
The Owen Sound Dredging, Towing and Wrecking Company (Limited).....	40,000	400	100
The Dominion Telephone Company (Limited).....	200,000	2,000	100
The Canadian Parcels and Valuables Transmission Company (Limited).....	50,000	1,000	50
The Sussex Land and Stock Company (Limited).....	20,000	200	100
The Vickers Express Company (Limited).....	100,000	1,000	50
The Railway Safety Appliance Company of Canada (Limited)	25,000	500	100
The Toronto Lead and Color Company.....	50,000	500	100
The Holmes Electric Protection Company for Canada (Limited)	100,000	1,000	100
The English and Canadian Wire Fastening Company of Montreal, Canada (Limited)	300,000	600	500

APPENDIX K.

SUPPLEMENTARY LETTERS PATENT.

- A. Harris, Son and Company (Limited)—Increasing the Capital Stock to \$750,000, being an addition of \$500,000 to present Capital, divided into 5,000 shares of \$100 each.
- Globe Cattle Company (Limited)—Increasing the Capital Stock to \$500,000, being an addition of \$300,000 to present Capital, divided into 5,000 shares of \$100 each.
- The Farm and Dairy Utensil Manufacturing Company (Limited)—Increasing the Capital Stock to \$100,000, being an addition of \$50,000 to present Capital, divided into 500 shares of \$100 each.
- The Rainy Lake Lumber Company—Increasing the Capital Stock to \$650,000, being an addition of \$300,000 to present Capital, divided into 3,000 shares of \$100 each.
- The Provident and Commercial Land Company (Limited)—Decreasing the Capital Stock from \$600,000 to \$77,825, a deduction of \$522,175 from present Capital, said decreased Capital being divided into 3,113 shares of \$25 each.
- The North-West Cattle Company (Limited)—Increasing the Capital Stock to \$300,000, being an addition of \$150,000 to present Capital, divided into 1,500 shares of \$100 each.
- The Alberta Lumber Company (Limited)—Increasing the Capital Stock to \$1,500,000, being an addition of \$1,000,000 to present Capital, divided into 10,000 shares of \$100 each.
- The Temperance Colonization Society—Sub dividing the Capital Stock of \$2,000,000 into 50,000 shares of \$40 each, in lieu of 20,000 shares of \$100 each.
- The Black Diamond Steamship Company of Montreal (Limited)—Increasing the Capital Stock to \$500,000, being an addition of \$200,000 to present Capital, divided into 2,000 shares of \$100 each.
- Nova Scotia Steel Company (Limited)—Sub dividing the 160 Shares of \$1,000 each, into 1,600 shares of \$100 each; also increasing the Capital Stock to \$250,000, being an addition of \$90,000 to present Capital, divided into 900 shares of \$100 each.

APPENDIX L.

LIST of Counties and Cities in which the "Scott Act" has been submitted, adopted or rejected, showing the number of Votes polled for and against, and the aggregate number of Voters on the Roll at the date each contest took place.

Name of County or City.	Votes for the Petition.	Votes Against.	Aggregate Number of Voters on Roll.
Megantic, P. Q.	372	841	3,401
Stanstead "	760	941	3,267
" 2nd election	1,620	1,132	2,116
Brome "			3,431
York, N.B.	403	203	798
Fredericton, N.B.	252	293	788
Carleton "	1,215	69	3,913
Charlotte "	867	149	4,220
Albert "	718	114	2,300
Kings "	798	245	4,499
Queens "	315	181	2,579
Westmoreland, N.B.	1,082	299	5,754
Northumberland, N.B.	875	673	3,321
St. John, N.B.	1,074	1,076	3,062
Sunbury "	176	41	1,369
Digby, N.S.	944	42	2,802
Queens "	763	85	1,574
Shelburne "	807	154	2,268
Colchester "	1,418	184	4,147
Annapolis "	1,111	114	3,205
Kings "	1,478	108	3,431
Hants "	1,082	92	3,642
Pictou "	1,555	453	5,780
Cape Breton "	739	216	3,666
Inverness "	960	106	3,546
Cumberland "	1,560	262	4,653
Yarmouth "	1,287	96	3,361
Prince, P.E.I.	1,762	271	5,434
" for repeal	1,075	2,939	5,000
Charlottetown, P.E.I.	837	253	1,829
Kings "	1,076	69	5,673
Queens "	1,317	99	6,351
Lisgar, Man.	247	127	2,163
Marquette "	612	195	4,600
York, Ont.	3,783	1,934	12,967
Lanark "			
Lambton "	2,667	2,352	7,695
" 2nd petition	2,857	2,962	9,993
Hamilton "	1,661	2,811	7,593
Halton "	1,483	1,402	4,664
Wentworth "	1,611	2,209	6,896
Welland "	1,610	2,378	7,064
Oxford "	4,073	3,298	11,327
Simcoe "	5,712	4,629	13,915
Stormont "			
Glengarry "	4,590	2,884	13,057
Dundas "			
Peel "	1,805	1,999	6,059

LIST of Counties and Cities in which the "Scott Act" has been submitted, adopted or rejected, &c.—*Concluded.*

Name of County or City.	Votes for the Petition.	Votes Against.	Aggregate Number of Voters on Roll.
Bruce, Ont.	4,501	3,189	12,160
Dufferin "	1,904	1,109	4,098
Huron "	5,957	4,304	13,810
Prince Edward, Ont.	1,528	1,653	5,144
Norfolk "	2,781	1,694	7,005
Renfrew "	1,748	1,018	5,676
Brantford "	646	812	2,434
Leeds and Grenville, Ont.	5,058	4,384	.....
Brant, Ont.	1,690	1,088	8,063
Lennox and Addington, Ont.			5,989
Carleton			7,513
Guelph, Ont.			1,550
Middlesex, Ont.			17,012
Northumberland and Durham, Ont.			16,934
Wellington, Ont.			11,920
Arthabaska, P.Q.	1,479	235	.....
Compton "		Maj. agst. 488	4,265
Kent, Ont.	4,368	1,975	.....
Missisquoi.			4,063
Lambton			10,500

} Under consideration or being
voted on. }

APPENDIX M.

LIST of the Officers, Clerks and Servants of the Department of the Secretary of State on the 31st December, 1884, with date of Appointment, Rank and Salary in each case.

Name.	Date of Appointment.	Rank.	Salary.
			\$
Powell, Grant.....	May 1, 1839...	Under Secretary of State.....	3,200
Emond, Gustave.....	Mar. 1, 1881...	2nd Class, Shorthand Writer.....	750
Taché, Louis Henri.....	Aug., 1882...	Private Secretary and Temporary Clerk, at per diem allowance.....	600
Morgan, Henry James.....	Nov. 19, 1853...	Chief Clerk Correspondence.....	2,250
Steele, Henry Edward.....	Aug. 11, 1841...	1st Class.....	1,800
Pulford, Ernest George.....	Dec. 1, 1878...	2nd do.....	1,100
Larochelle, Norbert.....	June 1, 1882...	3rd do.....	500
Harrison, Edward.....	July, 1882...	Temporary, at per diem allowance.	
<i>Registry Branch.</i>			
Catellier, Ludger Aimé.....	Aug., 1859...	Deputy Registrar-General and Chief Clerk...	2,250
Audet, Alphonse.....	June, 1883...	Keeper of Records and Chief Clerk.....	2,050
Brousseau, Elzéar.....	Feb. 1, 1864...	1st Class.....	1,600
Bélanger, Jean Amable.....	Oct., 1853...	1st do.....	1,600
Burns, John.....	Feb., 1873...	3rd do.....	950
Learoyd, Arthur Gilpin.....	Sept., 1873...	3rd do.....	950
Storr, Ira William.....	Oct., 1873...	3rd do.....	850
Collins, George.....	1874...	3rd do.....	850
Kirwan, Philip Tracey.....	Nov. 1, 1879...	3rd do.....	700
McDonald, Donald D.....	Oct., 1878...	3rd do.....	700
Sansom, Charles Baskerville.....	Aug., 1879...	3rd do.....	750
Medlow, Charles.....	Feb., 1879...	3rd do.....	750
DeVillemure, Louis C. L.....	Nov., 1884...	Temporary, at per diem allowance.	
<i>Queen's Printer's Branch.</i>			
Chamberlin, Brown.....	June, 1870...	Queen's Printer and Chief Clerk.....	2,400
Gliddon, William.....	Nov., 1871...	2nd Class.....	1,350
Mousseau, Albert Olivier.....	April, 1882...	2nd do.....	1,100
Potvin, Auguste.....	Dec., 1869...	3rd do.....	950
Grison, Louis Armand.....	July, 1876...	3rd do.....	800
Andrews, George.....	1884...	3rd do.....	400
<i>Stationery Branch.</i>			
Young, James.....	Oct., 1857...	Chief Clerk.....	1,900
Roxborough, Thomas.....	Dec., 1869...	3rd Class.....	950
Robertson, Thomas.....	July, 1871...	3rd do.....	950
Walsh, William.....	Jan., 1876...	3rd do.....	800
Gouldthrite, Frank Slocum.....	Dec., 1878...	3rd do.....	550
Beaulieu, Arthur.....	Sept., 1881...	Temporary Clerk, at per diem allowance.	

List of the Officers, Clerks and Servants of the Department of the Secretary of State
on the 31st December, 1884—*Concluded.*

Name.	Date of Appointment.	Rank.	Salary.
<i>Messengers.</i>			\$
O'Keefe, Thomas.....	1866...	Messenger.....	500
Hughes, John.....	1870...	do	500
Larkin, James.....	1873...	do	500
Allen, Henry.....	1874...	do	495
Foran, John.....	1883...	do	330
Elie, A.	1884...	do	300

ANNUAL REPORT

OF THE

DEPARTMENT OF THE INTERIOR

FOR THE YEAR

1884.

Printed by Order of Parliament.



*To His Excellency the Most Honourable the Marquis of Lansdowne,
Governor General of Canada, &c., &c.*

MAY IT PLEASE YOUR EXCELLENCY :

The undersigned has the honour to lay before Your Excellency the
Annual Report of the transactions of the Department of the Interior.

Respectfully submitted,

D. L. MACPHERSON,

Minister of the Interior.

OTTAWA, 29th January, 1885.

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ANNUAL REPORT
OF THE
DEPARTMENT OF THE INTERIOR
FOR THE YEAR 1884.

DEPARTMENT OF THE INTERIOR,
OTTAWA, 20th January, 1885.

To the Honourable Sir David L. Macpherson, K.C.M.G., Minister of the Interior :

SIR,—I have the honour to submit the Annual Report of the Department of the Interior for the departmental year which terminated on the 31st October, 1884.

Several changes in the staff of the Department have taken place during the past year. Mr. Lindsay Russell, the Surveyor-General, I regret to say, retired from the service on account of failing health, at the close of the financial year. It is sincerely to be hoped that the country has not been finally deprived of the advantage of his great abilities and professional skill, and that he may yet be thoroughly restored.

The increased accessibility, by means of the Canadian Pacific Railway, now in operation beyond the summit of the Rocky Mountains, and the growing importance of the available mineral resources of the North-West necessitated the appointment of a Superintendent, and Mr. William Pearce, the Inspector of Dominion Lands Agencies, was selected for that post. He was succeeded in the Inspectorship by Mr. H. H. Smith, of whose services since his appointment I have taken occasion to speak in the report of my visit to Manitoba and the Territories. Mr. Pearce retained his position as a member of the Dominion Lands Board, and thus a quorum of the Board will be more constantly available for the disposal of cases which cannot be settled by the Commissioner alone.

LAND AGENCIES.

The progress of survey and settlement called for the establishment of additional Land Agencies, and early in the summer the following new land districts were created:—Touchwood, Coteau, Swift Current, Calgary and Edmonton. At the latter place a settlement of considerable proportions has been in existence for several years.

There has been a decrease in the number of homestead and pre-emption entries made as compared with 1883, but there has been no diminution of the general work

of the Department, the number of letters received, exclusive of the correspondence of the Geological Survey Branch, having been 27,525, compared with 27,180, and the number sent 33,386, as compared with 33,500, for the preceding year.

The following is a summary statement of the homestead and pre-emption entries and sales made by the Department, through its several agencies in Manitoba and the North-West Territories, during the past two years :—

	1883.	1884.
Homesteads.....	970,719 acres.	533,280 acres.
Pre-emptions	659,120 “	364,060 “
Sales	202,143 “	213,172 “

There is very little reason to doubt that this decrease is largely owing to the unfortunate utterances of agitators, whose motives are now so well understood that danger to the progress of the country need no longer be apprehended from that source. These persons took advantage of the partial failure of the crop of 1883 to thrust themselves to the front, and gave expressions to views which were not entertained by those for whom they professed to speak, but which, nevertheless, worked much harm to the country.

THE LAND BOARD.

The work in the Commissioner's office at Winnipeg has largely increased, as will be seen by his report, the number of letters received being 9,413, and the number sent 6,224 in excess of the previous year. The Board disposed of 3,668 applications for the cancellation of homestead and pre-emption entries, 1,659 applications for patents, 437 applications for leave of absence, and reported on 711 squatters' claims.

In connection with the work of the Land Board, I here repeat the table of transactions of the Department, published in the Report for 1883, with the figures for 1884 added.

Year.	Homesteads.	Pre-emptions.	Sales.	Total.
	Area.	Area.	Area.	Area.
	Acres.	Acres.	Acres.	Acres.
Up to 1872.....	40,000	1,600	15,200	56,800
1873.....	136,640	2,400	16,620	155,660
1874.....	215,520	101,461	17,713	334,694
1875.....	84,480	67,314	4,908	156,702
1876.....	52,960	40,406	39,562	132,928
1877.....	145,220	107,715	170,989	423,924
1878.....	308,640	275,240	125,380	709,260
1879.....	555,246	270,178	271,343	1,096,817
Oct. 31, 1880.....	280,640	140,790	260,797	682,227
do 1881.....	438,707	263,647	355,166	1,057,520
do 1882.....	1,181,652	904,211	613,282	2,699,145
do 1883.....	970,719	659,120	202,143	1,831,982
do 1884.....	533,280	364,060	213,172	1,110,512

Fiscal Period.	Homestead and Pre-emption Fees.	Ordinary Sales.		Sales to Colonization Companies.	Total.
		Cash.	Scrp.	Cash.	
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
July 1, 1872, to June 30, 1873.....	6,970 00	21,616 00	.....	.....	28,586 00
do 1, 1873, do 30, 1874.....	8,290 00	17,697 00	.....	.....	25,987 00
do 1, 1874, do 30, 1875.....	11,570 00	13,591 90	.....	.....	25,161 90
do 1, 1875, do 30, 1876.....	4,700 00	3,704 31	.....	320 00	8,724 31
do 1, 1876, do 30, 1877.....	5,620 00	1,069 90	136,955 16	.....	143,645 06
do 1, 1877, do 30, 1878.....	15,370 00	2,682 24	120,159 54	.....	138,211 78
do 1, 1878, do 30, 1879.....	36,026 00	8,188 44	210,904 84	.....	255,119 28
do 1, 1879, do 30, 1880.....	32,358 09	41,768 47	81,685 86	.....	155,812 33
do 1, 1880, do 30, 1881.....	30,682 75	62,940 84	70,828 30	.....	164,451 89
do 1, 1881, do 30, 1882.....	94,228 90	1,228,424 37	50,590 84	354,036 17	1,727,290 28
do 1, 1882, do 30, 1883.....	127,740 00	516,092 21	33,638 40	248,492 01	925,962 62
do 1, 1883, do 30, 1884.....	70,390 00	423,113 36	40,919 67	253,713 40	788,136 43

HOMESTEAD INSPECTION.

The Homestead Inspection Service continues to fulfil satisfactorily the purpose for which it was instituted, and is a great convenience to settlers living at a distance from a Land Office, as the inspectors are empowered to take affidavits that formerly had to be made before an agent of Dominion Lands. The Revenue also has benefitted by this service to an amount exceeding \$19,000 during the departmental year, arising from the increased price obtained for cancelled pre-emptions and from inspection fees.

THE MILE BELT.

Mention was made in the Report for 1883 of the intention to open the tier of sections on each side of the main line of the Canadian Pacific Railway, known as the "Mile Belt." These sections were made available for homestead and pre-emption entry at the beginning of the current calendar year, on liberal terms of settlement, and they were taken up rapidly. At the same time, the even-numbered sections between the southern limit of the Canadian Pacific Railway Belt and the International Boundary, which were withdrawn from homestead and pre-emption by the Order in Council of 5th July, 1882, were again opened to entry on the ordinary conditions.

CLAIMS OF OLD SETTLERS.

At the time the offices of Deputy Head and Surveyor-General were separated, and Mr. Lindsay Russell was charged with the duties appertaining to the latter position, it was provided that he should also investigate and settle the claims to land by virtue of long occupations advanced by the old settlers along the North Saskatchewan. When it was found that Mr. Russell's health did not admit of his visiting the settlements, an Order in Council was passed remitting this portion of his work to the Land Board. Accordingly, early in the year, Mr. Pearce went to Prince Albert, and from thence to Battleford, Edmonton and St. Albert, and made a careful

personal enquiry into all the claims of this class at those places, with the result that all, with one or two exceptions at Battleford and Edmonton, have been finally and satisfactorily disposed of. The only claims of old settlers remaining unsettled are at Lac la Biche, Victoria, and Battle River. The necessary investigation at the two latter places will be made early next spring, but the claims at Lac la Biche cannot be properly adjusted until the surveyors reach that point.

COLONIZATION RAILWAYS.

Grants of land have been made to the Manitoba and North Western and Manitoba and South Western Railway Companies, to enable them to proceed more rapidly with the work of constructing their respective roads—to the former 2,752,000 acres, being at the rate of 6,400 acres per mile for a distance of 430 miles, and to the latter 972,800 acres, or 6,400 per mile for the distance from Winnipeg to Whitewater, about 152 miles. Both these lines will traverse rich agricultural districts, and afford the means of transport much needed for their development. Lands to the extent of 3340 per mile, for 110 miles, have also been granted to the North-Western Coal and Navigation Company, to aid the building of a line from the coal banks of the Belly River to some point on the main line of the Canadian Pacific Railway near Medicine Hat, the completion of which will not only render the coal deposits of that region immediately available, but will place the people of the Fort Macleod country in much closer communication with the markets of the East.

CATTLE RANCHES.

The success of the cattle industry in the Fort Macleod district, and generally along the base of the Rocky Mountains to Calgary, may now be considered settled. There are forty-one companies and individuals engaged in that business, holding, under lease from the Department, an area of 2,782,690 acres, on which they have placed large numbers of cattle, horses and sheep. The natural increase of these flocks and herds must, in the near future, be a source of great wealth to the Territories. There are, also 875,000 acres of grazing lands on which no cattle have been placed yet, and it will, no doubt, be in the public interest to terminate the tenure of all of these at the close of the period of three years from the date of each grant, unless the necessary conditions be complied with in the meantime.

Strong representations were made by the North-West Cattle Association that sheep should not be allowed on the cattle ranges, and in view of these, and of the experience of the ranchmen of the United States, in regard to this matter, an Order in Council was passed, defining the territory within which sheep shall not be permitted to graze, as set forth in the sub-report of Mr. Ryley hereto, at page 32.

COLONIZATION COMPANIES.

The business of these companies has suffered, in common with that of the Government Land Agencies, from the causes already alluded to, but some of them have, never-

theless made very substantial progress, and but few complaints have reached the Department from settlers within their respective tracts. Very full extracts from the reports of Mr. Rufus Stephenson, the Government Inspector, are published in this volume, at page 18 of Part I., and may be consulted with advantage for information as to the advancement of settlement on the lands allotted to the several companies.

ORDNANCE AND ADMIRALTY LANDS.

The revenue from these lands shows a falling off of about \$5,000 in the fiscal year, but the steps taken to compel payment of arrears, recommended in my last Annual Report, have already produced more satisfactory results, so far as regards the current fiscal year.

PATENTS.

The improved system of issuing patents for Dominion Lands, inaugurated in 1883, continues to work well. The number prepared and issued during the departmental year ending the 31st October last, was 3,896. The number of entries now in existence affecting lands in the North-West Territories, exclusive of Manitoba, will, on maturity, demand the issue of over 12,000 patents. Great delay has occurred, I regret to state, in issuing patents to persons entitled to lands in Manitoba, by virtue of actual peaceable possession at the time of the transfer of the country from the Hudson's Bay Company, but that branch of the business of the Department is now happily almost closed.

REGISTRY OFFICES.

The growth of the Calgary district called for the establishment of a registry office at that point, which one was opened early in July, by Mr. T. A. MacLean, the Registrar.

TIMBER AND MINES.

The net amount received on account of sales, leases and dues from timber, mineral and grazing lands for the year ending 31st October, last, was \$104,616.55, as compared with \$171,941.82 for the previous year. Both the above amounts are exclusive of the sums of \$69,073.56 and \$3,419.63, debited at the head office to the account of the Canadian Pacific Railway Company, in 1883 and 1884 respectively.

There was, therefore, a decrease in the receipts from these sources of \$67,325.27, which may be accounted for by the fact that some of the most valuable timber berths in the district of Calgary were leased in 1883, and large bonuses derived therefrom were paid into the treasury in that year, in addition to the usual dues and rents. It should be remembered, however, that the decline in the revenue derived from royalties is caused by a corresponding decline in the price of lumber, the benefit of which has been realized by the settlers. The price at Edmonton averaged from

\$25 to \$30 per M. during the year, which is not excessive for an isolated district. At Calgary it averaged \$30 per M. feet, and at Fort Macleod and Cypress Hills only \$20 per M. At Battleford and Prince Albert somewhat higher prices were obtained. Twenty-seven yearly licenses to cut timber, covering an area of 2,238 square miles, were issued during the year. Of the above, 1,299 square miles are within the Province of Manitoba, principally in the Duck and Riding Mountain districts, and along the shores of Lakes Winnipeg and Winnipegosis. In Alberta, the majority of the berths under license are situated in the Red Deer River country, and along the Clearwater, North Saskatchewan and Old Man's Rivers.

The best timber in the Assiniboia District is to be found in the neighbourhood of the Cypress Hills. In the Saskatchewan country most of the berths under license are situated on the streams north of Prince Albert, tributaries of the North Saskatchewan River, and on the western slope of the Porcupine Hills.

Up to the close of the departmental year 361 applications for mineral lands other than coal lands have been received. The locations applied for are situated chiefly on the tributaries of the Bow River; but the mining industry of the North-West Territories is yet in its infancy. Several applications for authority to bore for petroleum, near Tail Creek, Red Deer River, have been filed.

Washing for gold has been prosecuted on the North Saskatchewan River, from a short distance above Edmonton, for a number of years, but, hitherto, only in a desultory manner and with varying success. It is expected that more systematic modes of working than those now in use will be tried at an early date, which will test the value of these deposits. The yield of gold in some localities, although not sufficient to remunerate individual labour, may prove profitable when conducted by companies with proper appliances for hydraulic placer mining.

COAL.

Three hundred and seventy applications for coal mining locations were received during the year. The Saskatchewan Coal Company, operating near Medicine Hat, and the North-West Coal and Navigation Company, on the Belly River, are the only companies that have engaged extensively in this business. The former company mined and sold 6,000 tons of coal during the four months ending 15th December last, and have been delivering in Winnipeg at \$7.50 per ton. The latter produced, during the season, about 9,000 tons, 3,000 of which were purchased by the Canadian Pacific Railway, and the remainder distributed between the company's steamers, the Government offices at Calgary and Fort Macleod, and the settlers along the railway. The price of cordwood in Winnipeg has, meantime, been reduced about 50 per cent.

SURVEYS.

Part No. 2 of this volume contains the report of the Chief Inspector of Surveys upon the work performed by that branch during the departmental year.

Three hundred townships, containing an area of 6,400,000 acres, were subdivided and set out for settlement.

The very large area of 27,000,000 acres, surveyed during the season of 1883, being fully equal to the immediate requirements of settlement, it was considered advisable to curtail operations in the field for the present, as experience has shown that surveyors' posts and mounds in unsettled districts are in danger of being obliterated from various causes; and in some instances of the kind, townships have had to be re-surveyed.

The surveys of last season were conducted chiefly in the districts between Carleton and Fort Pitt, between Edmonton and Calgary, and a few were made near Fort Walsh. The country traversed contains good water in abundance, and is interspersed with mixed woods and prairie. With a few exceptions, the soil is first-class farming land.

Forty-eight surveyors were employed in sub-division work, and thirteen on out-line surveys. The reduction in the number of surveyors employed, enabled the Department to select those possessing the highest qualifications; and the manner in which they performed their work was most satisfactory.

Town plots surveys were made at Calgary, Point Douglas and Silver City.

In 1883 the township lines had reached the Peace River district, but owing to the distance from the main line of communication, the running of these proved so expensive that it was discontinued, and exploratory surveys were under taken for the purpose of obtaining general information regarding that country, in a less expensive manner than by the extension of the regular surveys. With that end in view, an exploration was made of the Athabasca and Peace Rivers, and accurate measurements taken of 1,050 miles. Another party scaled the Saskatchewan and Nelson Rivers from Prince Albert to York Factory, and measured 850 miles. Reports of both these explorations are appended to the Chief Inspector's report, and contain interesting information.

Some of the old trails in the Prince Albert District were surveyed and permanently located at the request of the North-West Council, and it is proposed to continue the survey, from time to time, of the important trails in the Territories.

A new system of classification of township surveys has been adopted, which will be found more convenient for the purpose of reference. Those descriptions have been found too bulky to insert in this report, and they will, therefore, be printed in pamphlet form at an early date.

The following table affords a comparison of the area surveyed for settlement, since the organization of the Dominion Lands Office :—

	Acres.	No. of Farms of 160 acres each.
Previous to June, 1873.....	4,792,292	29,952
In 1874.....	4,237,864	26,487
1875.....	665,000	4,156
1876.....	420,507	2,628
1877.....	231,691	1,448
1878.....	306,936	1,918
1879.....	1,130,482	7,066
1880.....	4,472,000	27,950
1881.....	9,147,000	50,919
1882.....	9,460,000	55,125
1883.....	27,000,000	168,750
1884.....	6,400,000	40,000
Total number of farms.....		420,399

The agricultural population these lands would sustain, on the basis of three souls to a homestead, would be 1,261,197.

Expert statisticians have called my attention to the fact that the standard basis of such calculations is five souls to the family, and some of them maintain that although there may be a larger proportion of single men in a new country like our North-West than in the countries to which such calculations are usually applied, which was my reason for adopting the basis of three, the difference is almost, if not altogether, compensated for by the greater number of children in the families of those of our new settlers who are married. It may, therefore, be worth while to say that on the basis of five souls to a homestead, our surveyed lands in Manitoba and the North-West would sustain an agricultural population of 2,101,995.

FORESTRY COMMISSION.

In February last Mr. J. H. Morgan was appointed by His Excellency the Governor General in Council to examine into and make a preliminary report upon the subject of the protection of the forests of the Dominion, by the planting of trees on an extensive scale; and a summary of that report will be found in Part V. of this Volume.

Mr. Morgan has gone very exhaustively into the question, pointing out the disasters which the destruction of the forests has caused in ancient, mediæval and modern times; the probable evils that will befall our country under like circumstances; the measures which have been and are being taken by all progressive civilized nations to remedy the evils caused by former waste, and to provide for

future supplies; the improved system of forestal education in the leading schools of Europe; the results achieved by those states and countries whose climatic, physical and geographical conditions most closely resemble ours; and the evident duty of the Government to take immediate steps to arrest the further destruction of our remaining forests; to adopt measures for replanting and for the introduction of a system of forest plantations on the prairies; and he recommends that the Government of the Dominion should, without loss of time, appoint a Commission to co-operate with a similar Commission from every Province in the Dominion, to deal with the question of the protection of the old and the reproduction of new forests.

BRITISH COLUMBIA.

At page 25 of Part I of this volume will be found a short report from Mr. Trutch, the agent of the Government in British Columbia, upon the steps taken by him to place on record a history of the titles to the lands in the Railway Belt alienated under the laws of British Columbia, and to make lists of those remaining unappropriated within the limits granted by that Province to the Dominion. By this report it appears that there have been numerous enquiries concerning and applications for Dominion lands in British Columbia.

About 10,000,000 feet B. M. of lumber have been cut from Dominion Lands, and the dues thereon will be collected.

A general survey of the Dominion Lands within the Railway Belt was undertaken during the year

GOVERNMENT OF THE NORTH-WEST TERRITORIES.

The Lieutenant-Governor of the North-West Territories submits a Report (Part No. IV) of his administration to the end of the calendar year, 1884.

The increase in the population of the districts of Calgary and Moose Mountain was considered sufficient to entitle them to representation in the Council, and they were accordingly added to the number of electoral districts already established. The Council was convened for the 3rd July, and at the meeting then held thirty-six Ordinances were passed, the most important being those respecting municipalities and schools. The former supersedes the Ordinance of 1883, which experience had proved defective in some respects, and the latter provides, amongst other things, for an easy mode of establishing school districts.

Twenty-eight schools—seventeen Protestant and eleven Roman Catholic,—are in receipt of aid from the grant of \$7,000 made by the Parliament of the Dominion, and the Lieutenant-Governor has other applications for assistance.

In repairing the travelled highways and building bridges over gullies and small streams, valuable assistance has been received from the settlers, both in money and labour.

The local revenue of the Territories from marriage licenses, fines and fees, has increased, and has enabled the Council to expend a larger amount than last year on public improvements—\$9,000 having been voted for that purpose.

Three towns were incorporated under the provisions of the municipal Ordinance, namely:—Regina, Moosejaw and Calgary; also four municipalities—Qu'Appelle, South Qu'Appelle, Wolseley and Indian Head.

The three judicial Districts of Assiniboia, Alberta and Saskatchewan have each been sub-divided, as shown in the Lieutenant-Governor's report, for the better administration of justice; and it is proposed the stipendiary magistrates shall hold court in each division twice a year.

Reference is made to the large share of western immigration received by the Territories, the improvements noticeable in farm buildings and the great increase in the area under cultivation.

The increase of population has been somewhat greater in the south than in the north, but the improvements in the northern regions give the districts surrounding Prince Albert, St. Laurent, Battleford and Edmonton, the appearance of old-settled countries.

During his visit to Edmonton, the Lieutenant-Governor was shown excellent grain of all kinds, raised in that and the St. Albert districts; and he was assured that all the crops that had been put in early turned out very well, although the spring had been unusually dry.

A much larger percentage of good wheat was grown along the line of the Canadian Pacific Railway than heretofore, and it is estimated that the new land broken during the past summer will increase the acreage under cultivation next year threefold.

Agricultural societies have been formed in almost all the settled districts, and the grain of all kinds, especially red Fife hard wheat, shown at all points along the line of the railway where exhibitions were held, was very superior. The root crops also were exceptionally good, and thoroughbred stock of all kinds was exhibited, breeders having imported into the Territories as fine blooded animals as can be found anywhere in the Dominion.

GEOLOGICAL AND NATURAL HISTORY SURVEY.

The summary report by the Director of this branch of the Department shows that a large amount of valuable and interesting work has been accomplished.

The explorations of the past season have been prosecuted by eighteen separate parties, distributed from British Columbia to Nova Scotia, the nature of the investigations varying in the several districts, according to circumstances, from detailed examinations to reconnaissances surveys of a preliminary character.

The meeting of the British Association for the Advancement of Science in Montreal, and the subsequent excursions of a number of the members of that body to Ottawa and to the Rocky Mountains, together with the preparation of a general map and sketch of the geology of Canada, with the special object of affording the necessary information to these gentlemen, absorbed a considerable portion of the time of the Director during the summer. It is, from a scientific point of view, a matter for congratulation that the British Association meeting in Canada has proved so highly successful.

In the autumn, the Director personally conducted an examination of some of the more interesting and critical points in the geological structure of the country near Rat Portage, and from that point eastward to Nipigon.

In British Columbia, Mr. A. Bowman has been engaged continuing and extending the work begun in the southern part of the Province by Dr. Dawson, it being important to gain all the knowledge possible of this district, in view of its proximity to the line of the Canadian Pacific Railway.

In the Rocky Mountains, Dr. G. M. Dawson has continued the reconnaissance work partially accomplished in previous years, with the purpose of making a preliminary geological map of the district, and particularly of outlining and examining the cretaceous coal-bearing areas, one of which yields the anthracite coal mentioned last year.

In the plains east of the Rocky Mountains, Messrs. McConnell and Tyrrell have been working on separate areas, of which it is proposed, so soon as the work is completed, to publish maps on a scale of eight miles to an inch, with explanatory reports.

The detailed examination of the Lake of the Woods region has been continued by Mr. Lawson, while Mr. Ingall has made a special examination of a number of mining localities on Lake Superior. Mr. E. Coste was engaged in a similar examination of the gold and iron mines of Marmora and Madoc, and in the autumn in special examinations of the mines of other districts. A portion of Mr. Coste's time in the autumn was also spent in the Province of Quebec, where he examined some of the mines at present being worked in the eastern townships.

From the work done in the Province of Quebec information was obtained for completing the maps of the Gaspé Peninsula. The exploration of Lake Mistassini and adjacent regions and the Rupert River is in progress, arrangements having been made for the parties wintering at the lake, and carrying on a survey of it on the ice. Delays, which are to be regretted, occurred in the early part of the summer, in connection with this expedition; but it is to be hoped that the ultimate results, both geographically and geologically, will be important and interesting.

In the vicinity of Lake St. John the Rev. Prof. Laffamme continued the work mentioned in the report of last year. Mr. Adams also spent some time in this district.

Dr. R. Bell was, during the summer, attached to the expedition under Lieut. Gordon, R.E., to Hudson's Straits and Bay, for the purpose of obtaining as much information as possible on the geology and general natural history of this interesting and important region.

The surveys in New Brunswick were continued by Messrs. Ells, Baily, Chalmers and assistants; and the geological mapping of this Province, on a uniform scale of four miles to an inch, is now approaching completion.

Work was also carried on in Cumberland and Colchester Counties, in Nova Scotia, by Mr. Ells, and in the eastern portion of the same Province by Mr. Fletcher and assistants.

A large amount of valuable work has been done in the laboratory of the Survey, of which that relating to the analysis of the fuels of the North-West may specially be mentioned. In the biological section, also, a great quantity of material brought in from the field has been examined and several publications issued.

In the botanical department, Prof. Macoun has been assiduously engaged in classifying and arranging the collection of plants, which is now becoming very complete, and in preparing and seeing through the press the second part of his catalogue of Canadian plants. He also spent some time in field work and collecting during the summer.

The Museum, in all its departments, has received much attention, and the yearly augmenting number of visitors indicates that it is gaining in popularity and usefulness.

Several reports and publications of a special character have been issued by the Geological Survey Branch during the year.

VISIT TO MANITOBA AND THE NORTHWEST.

Part VI of this volume consists of my report upon the visit which I paid to the Province of Manitoba and the North-West Territories last summer, in accordance with instructions from you. I took advantage of every opportunity presenting itself, to obtain information regarding the practical working of the land law, and found the settlers, a large number of whom I met in every district to which I went, thoroughly satisfied that the Act is as liberal in all its provisions as is consistent with the agricultural development of the country. I discussed with the miners the several provisions of the mining regulations, and have recommended to your favourable consideration one or two amendments for which they made request. I was unable to go down to Fort Macleod, and through the cattle ranching country of which that town is the

centre, but several of the range managers called upon me at Calgary, and from them I obtained much interesting information in regard to the valuable industry in which they are engaged, which has attained to so large proportions and so much commercial importance in the past three years. The administrative machinery of the Department of the Interior, under the supervision and control of Commissioner Walsh, is in efficient order, and appears to give satisfaction to the public.

I gave special personal attention to the farms established by the Canadian Pacific Railway Company along their line, within the region so long represented as an arid waste—a mere extension of what is known as the “Great American Desert.” The subject has assumed great public importance, and has been very generally discussed, but I have no where observed so faithful a statement of the facts as was contained in the report of an interview between the representative of a Toronto newspaper and the Hon. Alexander Mackenzie, M.P., after that gentleman had been over the ground. About the quality of the soil there is really no room for dispute. The surveys made by this Department during the past two seasons prove that it is of the average, which is characteristic of the North-West generally. The question which was in doubt, and which the railway company’s farms were intended to determine, was whether the moisture was sufficient to permit of successful agricultural operations. I had every facility afforded me by the company’s Land Commissioner, Mr. John H. McTavish, and his chief assistant, Mr. L. A. Hamilton, one of whom accompanied me out, and the other on the return trip, to judge for myself. The people of Canada, as a whole, have a much deeper interest in this matter than the Canadian Pacific Railway Company, who are entitled, according to the terms of their contract, to obtain 25,000,000 of acres of land, fairly fit for settlement, and would, therefore, be justified in rejecting, and would reject, the odd-numbered sections in this part of the railway belt if they were not of the stipulated class. I am satisfied, after careful consideration of the reports of our own surveyors upon the character of the soil, the evidence of people resident for years in the vicinity as to the prevailing climate, and the satisfactory results obtained by Mr. McTavish from all the farms—and there was more than one instance in which the soil was very indifferently prepared for seeding—that so much of this tract as is within reasonable distance of the railway will be rapidly taken up by farmers and stock raisers. The soil is of good average quality; but owing to the comparatively light rainfall, especially during the month of July, the crop, to be certain of success, must be put in very early, so as to get the full benefit of the spring moisture; and it is probable, owing to the absence of small streams, that the natural pastures would be poor on the higher lands in exceptionally dry summers.

I have the honour to be, Sir,

Your obedient servant,

A. M. BURGESS,

Deputy of the Minister of the Interior.

xxi

PART I.

No. 1.

REPORT OF THE LAND BOARD.

OFFICE OF THE DOMINION LANDS COMMISSION,
WINNIPEG, 20th November, 1884.

SIR, —I have the honour to submit, for your information, the following report of the business transacted by the Land Board for the year ending 31st October, 1884, with accompanying explanations and comments.

The Report of Mr. Pearce, who occupied the position and performed the duties of Inspector of Agencies down to the 1st day of June (at which time he assumed the duties of Superintendent of Mines), and of Mr. Inspector Smith, subsequent to that date, herewith enclosed, will show the extent of outside service performed by these gentlemen as Inspectors, in addition to the duties devolving upon them as members of the Land Board.

Correspondence.

Number of letters received..... 17,936
 " " sent..... 14,673

Comparison of number of Letters received and sent during Departmental Year ending 31st October, 1884; with the previous Year:—

	Received.		Sent.	
	1882-83.	1883-84.	1882-83.	1883-84.
November.....	541	1,116	660	1,012
December.....	473	1,159	534	795
January.....	615	1,398	865	1,076
February.....	745	1,196	867	1,129
March.....	674	1,209	715	994
April.....	756	1,597	607	1,437
May.....	699	1,611	651	1,641
June.....	706	2,162	697	1,575
July.....	644	1,739	639	1,224
August.....	780	1,451	537	1,371
September.....	800	1,529	635	1,146
October.....	1,090	1,769	1,042	1,273
	8,523	17,936	8,449	14,673

Increase of letters received..... 9,413
 " " sent..... 6,224

Cases of Cancellation.

Cases disposed of..... 3,668
 " pending..... 81

3,749

Squatters claims reported on..... 711
 Number of applications for patents..... 1,659
 " " leave of absence..... 437

You will observe that the number of letters received during the year just closed is more than double, and those written are 75 per cent. in excess of the previous year.

Inspection with a view to Cancellation.

These inspections result either from applications for that purpose, or from information obtained and reported by the Inspectors in the performance of their duties. The total number, as you will observe, was 3,749, of which 3,668 were disposed of before the close of the year.

The policy of the Land Board, during the past year, has been, in every case in which the homesteader showed a desire and had made a reasonable effort to comply with the law, to give him a further opportunity, coupled, in most cases, with a notice that a second application would prove fatal.

Squatters' Claims.

The number of claims of this nature reported on during the year is 711. These include the claims of old settlers at Prince Albert, Battleford and Edmonton, in reference to which evidence was taken on the spot by Mr. Pearce.

The investigation at Prince Albert occupied the greater part of the months of January and February last, and the decisions arrived at and confirmed by you have proved very generally satisfactory.

The claims at Battleford and Edmonton were investigated by Mr. Pearce during the past summer, and the evidence submitted by him to the Land Board, whose recommendations have been forwarded for your consideration and decision.

There are still a number of old claims upon the Red and Assinboine Rivers and their tributaries, requiring investigation.

Those upon Rat River are now under consideration, and it is hoped that another year will dispose of arrears of this nature.

Applications for Patent.

Of these, 1,659 have been passed upon during the year.

The agents have exercised more care in accepting and recommending applications than was observed during the first few months after the Act of 1883 came in force, and the number returned as unsatisfactory has, consequently, been much reduced.

The authority given by the amendments to the Act, passed in the Session of 1884, to enable others than the local agents to accept the proof required in connection with applications for patent—which authority has been conferred upon the Homestead Inspectors—has proved a great boon to settlers in the saving of the expense of a journey by the applicant and his corroborating witnesses to the office of the local agent; and has also proved a protection against improper applications, as the Inspector, being upon the spot, has better facilities for ascertaining whether the required duties as to residence and cultivation have been fully performed.

Applications for Leave of Absence.

The fact that there were only 437 applications of the nature referred to during the past year, as compared with 1,079 in the year ending 31st October, 1883, is gratifying evidence that the efforts that have been steadily put forth to secure the occupation of their lands by homesteaders are proving successful.

The attention of applicants for leave of absence has been directed to the provisions of the law requiring residence upon and cultivation of the homestead during at least six months of each year, for three years; and to the fact that a homesteader only residing upon his land for the winter season is not fulfilling the conditions, as he cannot proceed with cultivation at that season of the year.

Homestead Inspection.

The organization of this branch of the service has proved very beneficial and efficient.

It enables the Land Board to obtain from an officer of the Department reports upon cases submitted to them for adjudication, and also by the late arrangements it gives to homesteaders the facility of making applications for patents at their own homes.

The service is rather expensive, as travelling over this vast extent of country necessarily involves a considerable outlay. Every effort is being made to have the service performed with a due regard to efficiency and economy.

Land Guides.

The necessity of continuing this service, at least up to the strength of the past year, is becoming less apparent.

The country is now so well settled that, in many cases, the newly arrived immigrant is on his way to a friend already located, and therefore does not require the assistance of a guide.

The service of the past season consisted of two Intelligence Officers, one at Moosomin and the other at Troy (Qu'Appelle Station); and eight guides, one at Minnedosa, three at Moosomin, two at Troy and two at Regina.

New Land Districts.

During the year just closed, the following named land districts were formed:—

Touchwood	Post Office,	Touchwood Hills.
Coteau.....	do	Carlyle.
Swift Current	do	Swift Current.
Calgary ...	do	Calgary.
Edmonton	do	Edmonton.
Battleford.....	do	Battleford.

These offices were opened, with the exception of those at Swift Current and Battleford.

At the former there was no building in which the office could be held. One has been erected, and the office will be opened in the early spring.

At Battleford the time did not appear to have arrived when the establishment of an office was a necessity, but it will probably be advisable to appoint the necessary staff in time for the business of next year.

Crown Timber Agencies.

I enclose herewith the report of Mr. E. F. Stephenson, agent for the Winnipeg district, showing a very satisfactory exhibit for the past year.

The other agents do not report through this office, and I am therefore unable to state the results in the outlying districts.

There has been dissatisfaction expressed in some quarters with the regulations requiring settlers to obtain permits, and representations have been made that the quantity covered by free permits is not sufficient for the wants of homesteaders.

You will observe, by the report of Mr. Stephenson, that but few of those who have returned their permits at the end of the year have cut the full quantity allowed, showing clearly that the quantity is quite sufficient.

Efforts have been made to convince settlers that the care and supervision exercised in the cutting of wood in the sparsely timbered sections of the country is to preserve this indispensable requisite to supply the actual wants of homesteaders.

I beg to submit, for your consideration, the advisability of changing the mode of collecting dues upon timber cut for lumbering purposes.

In my opinion it would be better that these dues should be ascertained upon the timber cut and delivered at the banking grounds, as under the present system of collecting upon the quantity manufactured and sold, the Department assumes all the risk attending the loss of logs or the destruction of timber by fire.

Coal.

Large deposits of coal have been discovered at various points; and pits are being operated in the vicinity of Medicine Hat, on the South Saskatchewan River, near the Canadian Pacific Railway, and on the Belly River.

In reference to the latter, a narrow gauge railway is about being constructed for a distance of 110 miles from the mines to the Canadian Pacific Railway.

Coal is also known to exist in the Rocky Mountains, and at various points both in the northern and southern parts of the country; so that the existence of an ample supply of coal for this vast prairie country has been demonstrated beyond the possibility of a doubt.

Mines.

I am informed that active explorations are being prosecuted in the Rocky Mountains for the precious metals, but have not heard of any very rich discovery as yet.

A number of claims have been entered for, and there is every reason for hoping that the labors of these pioneer explorers will be amply rewarded at no distant date.

Ranching.

Very satisfactory progress has been made during the past season in stocking several of the ranches held under lease.

Cattle, horses and sheep have been brought in in large quantities; and I have no doubt but that this will soon prove a very large and profitable industry.

I had the opportunity of driving over the country from Calgary to Macleod, and from Macleod to Medicine Hat, during the past summer, and speak from personal observation as to its adaptability for stock purposes. I have reason to believe that other and larger areas of the country are equally good.

State of the Country.

The harvest of the past season was satisfactory. Difficulty was experienced in securing the grain, in consequence of the exceptionally wet harvest time; but the cool weather fortunately prevented any serious loss from this cause.

The immigration for the past season was not so great as expected or hoped for, resulting, I fear, to a considerable extent, from the unhealthy agitation which prevailed in the country in the fall of 1883 and the following winter.

From information which has reached me, I have reason to believe that the settlers who came to the country this year are well satisfied with their prospects and locations.

There is a great need for railway facilities in those parts of the country lying distant from the main line of the Canadian Pacific Railway; but it is hoped that the very liberal land grants lately made, both to the Manitoba and South-Western and the Manitoba and North-Western Railway Companies will, to a large extent, supply this want during the next season.

The facility with which cultivation may be proceeded with in a prairie country makes the early construction of branch railways a much more pressing necessity than in a country from which the forests have first to be cleared away.

From intercourse with persons from all parts of the country, as well as from the reports of the local agents and Homestead Inspectors, I am glad to be able to report that a very general feeling of satisfaction prevails, both with the law and regulations as affecting the rights, privileges and duties of homesteaders.

I have the honour to be, Sir,

Your obedient servant,

A. WALSH,

Commissioner.

The Honourable Sir DAVID L. MACPHERSON, K.C.M.G.,
Minister of the Interior, Ottawa.

No. 2.

OFFICE OF THE DOMINION LANDS COMMISSION,
WINNIPEG, 31st October, 1884.

SIR,—I have the honour to hand you, for the information of the Honourable the Minister of the Interior, the following report on the general work of my office, from the date of my appointment, in May, to the close of the Departmental year ending this day.

I entered upon my duties on the 31st May, last, and, during your absence in June, with the Deputy Minister, took charge of the office here.

In July I went to Brandon to hold an investigation and take evidence in the disputed case of Lowes vs. Greer, for the east half-section 32, Township 9, Range 19 West. From thence I proceeded to Deloraine and inspected the office of the Turtle Mountain District; after which I went over the lands allotted to the Morton Dairy Company, and enquired into the affairs of that company, and the work that had been done. So far as actual work is concerned, I found that very little had been accomplished. At date of my inspection the operations of the company were at a standstill, and everything in the way of cultivation and improvements previously made was rapidly becoming valueless through neglect.

Early in August I visited Regina; there met the squatters upon that reserve; heard their statements, and made a report, recommending certain terms to be offered in settlement of their claims, which report was subsequently adopted; and all the squatters, with one or two possible exceptions, have obtained entries for the land claimed by them, respectively, and, I think it can be safely said, are now well satisfied with the treatment accorded them.

On the 6th August I inspected the agent's office for the Qu'Appelle District, and on the following day that of the Farmers' North-West Land and Colonization Company and of the Qu'Appelle Land Company, the agents being Messrs. A. G. Campbell and W. H. Gibbs respectively.

I then went to Indian Head, in company with Mr. J. McD. Gordon, for the purpose of assisting him in the disposition of the claims of certain squatters upon the Bell Farm.

On the 11th August I drove from Brandon to Odanah, and on the day following inspected the office for the Little Saskatchewan District. From Odanah I went on to Birtle, and on the 14th of the same month inspected the office for that district. Thence I proceeded to Bin Scarth, Asessippi, Kinbrae and Yorkton, inspecting the offices of the Scottish, Ontario and Manitoba Colonization Company, the Shell River Colonization Company, the Montreal and Western Land Company, and the York Farmers Colonization Company, respectively. Leaving Yorkton I visited the office of the Cook and Armstrong Colonization Company; thence to Crescent Lake, where I made an inspection of the office of the Saskatchewan Homestead Company;

and then proceeded to the headquarters of the Fertile Belt Colonization Company, but, owing to the absence of the agent, was unable to make an examination of his books. The operations of this company are, as yet, limited in extent; but I understand a number of persons have settled upon their lands, and preparations are being made for extensive operations during the coming year.

From Crescent Lake I went to Pheasant Forks, and inspected the books, etc., of the Primitive Methodist Colonization Company; thence to Fort Qu'Appelle, where the following agencies were inspected:—The Touchwood and Qu'Appelle Land and Colonization Company, and the Dominion Lands Colonization Company. I then proceeded to Touchwood Hills, and inspected the Dominion Lands Office for that District; and intended making a similar inspection of the agency for the Wishart Colonization Company, but was prevented from doing so by the absence of Mr. Wishart, the manager of the company.

Driving to Indian Head, I took the Canadian Pacific Railway for Calgary, and on the 6th September inspected the office for that district. This office had been opened but a short time, and I found only a limited number of entries had been made. Col. Barwis, whom I met here, was, however, about to make entry for some 300 persons, now residing in the Eastern Townships, Province of Quebec; and I understand he has since made a considerable number of entries for such persons, who, it is expected, will perfect the same, by going into actual residence early next spring. These parties, I am informed, intend going in to mixed farming; but their chief aim will be in the direction of butter and cheese making, the section of country in which they purpose settling being admirably adapted for such purposes.

On the 26th September I returned to Odanah and made a further inspection of the Little Saskatchewan District office, the result of which was communicated to you at the time.

On the 8th October I went to Nelson and inspected the Agency for the Dufferin District.

The offices at Prince Albert, Edmonton and Brandon having been quite recently inspected by Mr. Superintendent Pearce, it was considered unnecessary that a further examination should be made by me, and I accordingly refrained from doing so.

Reports in connection with all the foregoing inspections which I made have been forwarded, through you, for the information and consideration of the Minister.

During the present month I again visited Regina upon official business; and from thence proceeded to Moose Jaw, where I met a majority of the squatters upon that Reserve; took declarations from them respecting their claims, and a full report in reference thereto has been prepared and forwarded.

The work hereinbefore outlined, and the duties performed by me as a member of the Land Board, have fully occupied my time since the date of my appointment.

A schedule is hereto annexed, giving full information relative to the work performed at the several local agencies in Manitoba and the North-West Territories. The schedule relates only to the business transacted at the local agencies, and therefore does not include receipts at head office, or entries made for lands in the tracts allotted to colonization companies. It will be observed that there has been a considerable increase in the number of cancellations, which is principally due to the work performed by the Homestead Inspectors, and partly owing to the fact that between the 22nd March, 1883, and the 1st January, 1884, re-entry for cancelled homesteads was not permitted; the result being that many claims of this character, which would otherwise have been disposed of last year, were delayed, and now appear in the record of the present year's transactions.

I am informed, and believe the fact to be, that many of the entries which have thus been cancelled were made during the boom, by persons who had no real intention of becoming *bona fide* homesteaders; but who settled upon lands and made entries therefor with the view to the sale of the same so soon as a title might be acquired.

The complete success of the Canadian Pacific Railway experimental farms, in the more western part of the country, is a matter of much importance; and gives

promise that a large tract of land, heretofore considered of doubtful value, will soon be taken up and profitably worked.

By the extension of the Manitoba and North-Western Railway, and the proposed extension of the Canadian Pacific South-Western Railway next year, much good will be accomplished; and the largely increased settlement and cultivation of those portions of the country through which they are projected will be assured.

Although the immigration during the present year has not been so large as was at one time anticipated, those settlers who have taken up land are of a very desirable class of men, who intend to become permanent residents and to cultivate their land to a large extent.

I regret to report that many farms are unoccupied and consequently deteriorating in value, owing to the fact that the owners thereof have abandoned the same, either permanently or temporarily, while earning their second homestead. It has been stated, and there is reason to believe with a good deal of foundation, that numbers of persons who have acquired their first homesteads have borrowed money thereon, then abandoned them and made second entries. This practice, unless checked, will produce very serious results, giving the country an unsettled appearance, and causing dissatisfaction among *bona fide* settlers, by whom the absence of neighbours is much felt.

I presume the immediate withdrawal of the right to make second homestead entry would be unpopular, and considered by some as a retrograde step. At the same time I would respectfully call the attention of the Minister to the drawbacks in connection with the present system; and would suggest, with a view to the amelioration of the same, that the right to make a second entry shall be subject to the condition that a certain stipulated area upon the first homestead shall be cultivated in each year; or that a time be fixed after which the right will absolutely cease.

I am advised that many persons, upon their arrival in the North-West, in their anxiety to secure land, at once make entries, irrespective of their ability, owing to want of means, to perform the duties required of them; the result being that little or no improvements or cultivation are made for a considerable period after such entries are effected. In this connection, I would beg to suggest that the Act might be amended so as to permit intending homesteaders to acquire land and obtain patents at the end of five instead of three years, as at present; that such homesteaders be required to break a stipulated area on their homesteads during the first year; crop the same, break an additional area, and erect a habitable house the next year; that residence during these two years be not called for, but that it be required during the last three years. It is only by the adoption of some such amendment that persons of limited means can secure land; and, by working elsewhere than on their homesteads, earn money wherewith to secure the necessary stock and implements to enable them to conduct their farming operations successfully, and perform their homestead duties in accordance with the requirements of the Act, and put an end to attempts, which are not unfrequently made by parties, to obtain lands without complying with the conditions of the law.

I have the honour to be, Sir,

Your obedient servant,

H. H. SMITH,

Inspector.

A. WALSH, Esq.,
Commissioner of Dominion Lands,
Winnipeg, Man.

No.	AGENCY.	Letters.		Circulars.		Homestead Entries.		Pre-emption Entries.	
		Sent.	Received.	Sent.	Received.	No.	Acres.	No.	Acres.
1	Winnipeg	2,738	1,965	700	30	273	39,000	108	13,320
2	Dufferin	2,332	2,206	.....	187	240	30,120	170	19,320
3	Hurtle Mountain	2,056	1,517	.....	30	366	44,720	345	40,520
4	Souris.....	5,018	6,274	79	28	647	84,160	463	54,740
5	Little Saskatchewan	1,340	1,065	.....	27	116	15,760	70	8,640
6	Birtle	2,034	1,705	.....	43	520	74,960	323	43,760
7	Coteau	199	140	288	10	53	8,320	41	6,400
8	Touchwood.....	158	87	24	12	7	1,120	6	960
9	Prince Albert	798	654	.....	36	85	12,720	34	4,560
10	Calgary	161	278	7	8	25	4,000	19	3,040
11	Edmonton	116	91	.....	10	4	640	.....	.....
12	Qu'Appelle.....	4,650	3,872	.....	47	1,058	160,520	882	132,480
	Totals.....	21,598	19,854	1,098	468	3,394	476,040	2,461	327,740

Homesteads.				Sales.				Lands Cancelled.				H. O. Returns.		Hay Permits.	
Recommend- ed for Free Patent.		Sales after 12 months Residence.		Pre- emptions.		Other.		Homesteads.		Pre- emptions.		No.	Amount.		No.
No.	Acreage.	No.	Acreage.	No.	Acreage.	No.	Acreage.	No.	Acreage.	No.	Acreage.	No.	Amount.		No.
203	32,440	3	807 ⁵⁴	37	5,916 ⁷⁶	55	7,762 ¹⁸	176	28,160	80	12,800	102	31,764 11	13	
197	31,422	11	3,380	144	23,227 ¹⁸	111	2,623	73	11,655 ⁷⁰	47	7,455 ⁵¹	43	41,905 96	4	
63	10,129	11	3,363	29	4,888	24	7,504	136	21,760	122	19,520	50	32,441 38	89	
399	63,840	27	7,796	174	27,657 ⁵⁰	106	43,884	366	58,560	272	43,520	42	192,639 49	28	
250	40,000	2	420	118	18,597	16	2,469	62	9,120	30	4,000	45	38,939 68	.....
215	32,800	6	2,053 ²⁰	111	17,746 ⁵⁰	9	7,255	126	20,160	111	17,760	90	56,927 76	.....
.....	.....	.....	.....	.....	.....	1	320	8	1,280	8	1,280	10	4,458 00	.....
50	7,890	.....	.....	19	1,654	15	2,328	14	2,246	5	802	13	4,343 27	.....
.....	.....	.....	.....	.....	.....	172	{ Port McLeod Lots. }	.....	.....	.....	.....	7	5,574 00	.....
3	480	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8	45 00	.....
21	3,360	10	1,600	7	1,120	36	8,800	371	59,360	295	47,200	53	{ 39,748 53 * 2,153 80 † 220 00 }	48	
1,401	222,361	70	19,420	639	100,807	545	82,945	1,334	212,622	972	154,658	498	\$451,290 98	182	

\$ cts.

* Amount paid by purchasers to H. O. 1,566 40
do do at Winnipeg..... 100 00
{ Land Warrants 487 40

† Amount sent H. O. by Prim. Methodist Col. Co..... 2,153 80
220 00

Agency No.	Entries for Cancelled Lands.				Wood Lots.	RECEIPTS.					
	Homestead and Pre-emption, 160 acres each.		Homestead and Pre-emption, 80 acres each.			Pre-emption Entries.	Inspections.	Improvement to Govern-ment.	Bond Fees and other Sources.	Sales.	
	No.	Acreage.	No.	Acreage.						Pre-emption.	Other.
1	27	4,320	106	8,480	1	\$ 2,580 00	\$ 110 00	\$ 40 00	\$ 517 40	\$ 7,507 69	\$ 19,758 87
2	23	7,048	105	16,880-75		*2,400 00	90 00	343 25	19 15	28,048 86	11,303 50
3	84	26,880	177	28,320		7 without fee	510 00	540 00		6,257 68	13,490 44
4	52	16,640	225	36,000		3,660 00	220 00	1,234 91		55,992 96	120,099 11
5	19	3,012	60	4,791	2	6,500 00	190 00	127 00	70 00	31,803 18	4,000 44
6	24	3,840	200	16,000		1,200 00	300 00	187 50	1,570 00	36,029 54	9,113 96
7	3	480	4	320		5,250 00	10 00	30 00	3,628 00		800 00
8						70 00					
9	5	1,440	26	2,015		850 00				2,035 25	2,615 52
10						200 00			129 00		4,995 00
11						40 00			5 00		
12	86	27,520	68	10,880		18,790 00	440 00	746 00		2,766 90	15,495 73
Totals.....	323	91,180	971	123,787	3	33,900 00	1,870 00	3,248 66	5,870 05	170,442 06	201,672 57

* \$820 homestead and pre-emption entries, in Icelandic Reserve, not collected at Winnipeg Agency.
 † Of this amount, \$220 was remitted H.O. by Primitive Methodist Colonization Co.

Receipts—Concluded.		EXPENDITURE.										
		Hay Permits.	Entries for Cancelled Lands.	Wood Lots.	Total Receipts.	Salaries.	Travelling Expenses.	Contingencies.	Total Expenses.			
\$	cts.	\$	cts.	\$	cts.	\$	cts.	\$	cts.	\$	cts.	
15 00		280 00		340 00		20 00		5,624 04		279 00		5,903 04
6 00		2,040 00		6,000 00		234 72		2,150 00		520 75		2,702 50
60 50		4,935 06		499 60		.....		1,870 00		300 40		2,228 90
43 50		3,782 51		911 46		.....		2,749 16		780 92		3,530 08
.....		580 50		60 00		40 00		1,992 00		24 00		2,204 95
.....		2,865 26		70 00		.....		2,298 00		188 95		2,914 19
.....		.....		.....		.....		1,152 00		5 00		1,510 31
.....		.....		.....		.....		1,140 00		214 95		1,522 50
.....		.....		.....		.....		1,900 00		86 35		2,089 95
.....		.....		.....		.....		6,000 77		.....		2,064 53
.....		.....		.....		.....		5,574 00		29 00		1,363 90
.....		.....		.....		.....		1,906 00		273 50		6,013 11
73 70		3,200 00		1,770 00		.....		3,767 54		150 83		
197 70		17,683 32		19,651 06		294 72		27,056 74		875 88		34,057 96

† This amount is not added up in the total of receipts.
 § Of this amount, \$178.80 should be charged to the Bell Farm.

No. 3.

OFFICE OF THE DOMINION LANDS COMMISSION,
WINNIPEG, 31st October, 1884.

SIR,—I have the honour to submit, through you, for the information of the Honourable the Minister of the Interior, a report on my duties during the past twelve months.

During the month of November, when you were absent at Ottawa, and subsequent to your return early in December, it was necessary for me to remain in your office. It was therefore the 7th of January before I was able to proceed to Prince Albert, to investigate and report upon the claims of old settlers in that vicinity. This investigation lasted until late in February, and I did not reach Winnipeg until the 7th March.

While at Prince Albert, the Crown Timber and Dominion Lands Offices were inspected by me; and the office at Brandon was inspected on my way back to Winnipeg.

From the date of my return to Winnipeg until late in May, I was in the office here preparing reports on the Prince Albert investigations, and occupied with other duties connected with the business of the Land Board.

In June, in company with yourself and the Deputy Minister, I visited the Rocky Mountains in the vicinity of the Canadian Pacific Railway; and afterwards drove with you from Calgary to Fort McLeod, and from thence *via* the Coal Banks to Medicine Hat.

Early in July I went to Edmonton to investigate claims preferred to land in that vicinity by persons who had settled prior to survey. About the 1st of August I proceeded to Battleford, to do work of a similar nature to that at Edmonton. On my return to Edmonton, I investigated claims in St. Albert, at Fort Saskatchewan and on the Sturgeon River.

While at Edmonton I inspected the offices of the Crown Timber Agent and the Edmonton and Saskatchewan Land Company.

About the middle of September I returned to Calgary, where I remained until the middle of this month, preparing reports upon the investigations of the preceding three months; and inspecting on the ground and reporting upon certain matters in the vicinity of Calgary. About the middle of the current month I came to Winnipeg; and, until a few days ago, was engaged in scheduling and forwarding to head office the results of the investigations of the past four months. Since the 20th of this month I have been in the Mountains in connection with my duties as Superintendent of Mines.

Saskatchewan Claims.

The question of the claims of old settlers on the Saskatchewan is one of long standing; but, with the exception of the claims in the immediate vicinity of Prince Albert, nothing could be done in the matter until the surveys were completed. These surveys were not finished until this summer, and could not have been completed at an earlier date; for, had these been prosecuted in any other way than the one adopted, it would have been at a great sacrifice of both accuracy and economy.

Very full reports accompanied the evidence forwarded to the Minister so soon as the investigations were completed. The claims at Prince Albert have been finally disposed of. Those at the other points may reasonably be expected to be settled within a few weeks.

The most liberal construction possible under the circumstances was put upon all the claims; and, judging by the result at Prince Albert, it is confidently anticipated that the percentage of claimants who will be dissatisfied therewith will be very small—probably not 5 per cent.—and of these more than one-half will be only on the grounds that their claims have not had as liberal treatment as the claims of others. It may be said of these claimants—upwards of seven hundred in number—that, as a class, the “land shark” formed a very small number.

The difficulty of obtaining explicit evidence has been referred to in the special reports; and in this it need only be mentioned that this difficulty did not arise from unwillingness, but from inability.

It is somewhat remarkable that, out of the large number of cases investigated, but few were advanced through a residence on and peaceable possession of the land on the 15th July, 1870; the only points at which such were preferred being Prince Albert and St. Albert—some half dozen at the former, and about forty at the latter. This would go to demonstrate that it has been only within the past few years that any idea of making a livelihood by husbandry has occurred to the inhabitants of the district; and, when this fact is considered, the progress they have made is really wonderful. Such facts encourage the hope of a fairly successful fruition of the policy adopted in teaching the rising generation of Indians habits of industry, with a view to make them a self-sustaining people.

The claims at St. Laurent, on the south branch of the Saskatchewan, were not personally investigated by me, as the greater portion of the claimants spoke only French, and I would have required an interpreter.

With the approval of the Minister, Mr. Duck, Dominion Land Agent, who speaks the French language, was instructed to obtain the evidence of these claimants. This was revised by me, and recommendations made in each case by the Land Board.

I would particularly wish to refer to the aid extended to me by the Rev. Père Le Duc, when investigating the claims at St. Albert.

Most of the claimants could only speak Cree, and the Rev. Father acted as interpreter, and did all he could to make the investigation run smoothly and pleasantly.

The only claims now remaining are at Lac la Biche, Victoria and Battle River. Those at the latter two points can be disposed of so soon as the surveys are adjusted; probably early next spring. At the former point some delay, probably a year, must ensue in getting the surveys carried to that point, owing to its isolated position; also the survey on the ground of an Indian reserve.

There are a few other isolated cases remaining, chiefly in the vicinity of Fort McLeod; and they can be readily dealt with when the townships in which they are situated are open for entry.

Mines and Minerals.

As Superintendent of Mines, my duties have been light; and until developments take place and parties desire to acquire titles, they will probably not be very onerous. It is well that, so far, they have been light; otherwise they, or other work of mine, would necessarily have been neglected.

I have embraced every opportunity of discussing the mining regulations with miners, prospectors, and those who profess to be such; and found that they object to the amount of work required to be done each year; and to the shape of the claim; and in not being permitted to follow the veins, lodes and ledges when they depart so far from a perpendicular as to get outside the vertical side lines of the claim; and royalty.

They also contend that the expenditure of \$500 is too much to require within a year, on the ground that the season is very short, and that \$200 the first year would be sufficient. It might be advisable to make the regulations call for an expenditure of \$250 the first year, and an equal sum the second year, and admit of a person purchasing at any time after he had developed his claim to the extent of \$500.

There will of necessity be a great amount of waste lands in the mountains; and it might be expedient to permit the claims to be taken up along the veins, no matter in which direction they may run; but if so, great care must be exercised in the survey thereof, that they may be plotted so that in the future there may be no clashing of claims. It might also be well to have the regulations amended so that, when in timber, the outlines, when first staked out, should be well blazed. If above the timber line, posts should be planted so that a person standing at any one should see the one adjacent to it on each side. If that be not done, there is a possibility, in fact a probability, that these claims may be staked out overlapping each other.

If our regulations were changed so as to permit of a claim being taken up in the direction of the vein, and 40 acres in area allowed—the price of \$5 per acre being nominal—it would enable the miner to locate a claim 1,320 feet square; and assuming the dip to be 45° from a perpendicular (probably in the vast majority of cases an extreme one), he could follow his vein upwards of 930 feet before he would be outside of his vertical side lines—that is, should the vein be in the centre of his claim. If the vein were well developed, so that he could, when staking out his claim, know which way it bore from a perpendicular, he could so locate it that the vein would be at least 1,200 feet from the side line to which it tended, in which case he could follow the vein within his location about 1,700 feet.

The mines which are developed to a greater depth than that are very few. Besides, the probabilities are that, long before others than the owner are aware of the value of any claim, steps will be taken by him to procure title to the property on the valuable side.

One object of all regulation should be to prevent disputes; and it is admitted by most of those who advocate the system of following the veins outside of the vertical side lines, that such is the cause of a vast amount of litigation. They claim, however, that regulations could be so worded and administered, that such would not ensue; but such cases must necessarily be decided by the evidence of experts, which experience has shown to be very unsatisfactory. In practice it would probably be found that changing the regulations as some wish, would, in place of protecting the poor man, the object contended for, enable the rich man to ruin him through litigation.

Royalty.

That is, as you are aware, objected to: but being a point involving the policy of the Government, it would not be expedient for me to express an opinion thereon.

Petroleum.

Several claims for petroleum have been filed on the Red Deer River, in the vicinity of Tail Creek. The claimants contend strongly that forty acres is too limited an area for a petroleum claim. These contentions were brought out in a report of mine in August last, accompanying several applications forwarded to the Minister.

Gold washing on the North Saskatchewan River, from a short distance above Edmonton to twenty miles below that point, has been carried on to a greater or less extent for a number of years; and attempts have been made to obtain gold by dredges. So far it has not been a financial success; but many of the promoters are still sanguine, and propose continuing the experiment; and it is to be hoped that success will crown their efforts. These were reported on in detail in July last; since then nothing of interest has occurred.

Placer Mining by Companies.

It is worthy of consideration whether it might not be advisable to make provision for hydraulic placer mining on a large scale.

There are no doubt many points where the yield is so low that individual mining will not pay, but would be very profitable for companies. It is stated that there are several points on the benches of the Frazer River, within the "twenty-mile belt" where such could be profitably conducted; and no doubt, with the construction of the Canadian Pacific Railway through the mountains, many other points will be found.

The contention of the provincial authorities of British Columbia, that the minerals within the forty mile railway belt in that Province belong to them, has, to some extent, prevented development, and will, to a much greater extent, continue to do so. The sooner the matter is settled the better for the mining interest.

Coal.

Considerable attention has been shown to the development of coal mines; and within the very near future the supply of this mineral for Manitoba and the North-West will be obtained wholly from our own territory, and that at very low rates.

British Columbia Lands.

The three and one-half million acres of land to be obtained by the Dominion from the Provincial Government of British Columbia, would, after adding 10 per cent. for country occupied by lakes—probably a very low percentage—give a block of territory eighty-four miles by seventy-two miles.

It is desirable that, so soon as it can be done, surveys similar to that performed by D. L. S. Fawcett on the Bow River and its tributaries, should be carried out on all the streams south of the North Saskatchewan, and including it. Such being done, any mining locations, timber limits or any other points requiring location, can be cheaply and accurately determined. The geographical knowledge thus obtained would, in itself, be of very great value. The character of the country is of such a nature that it would be very expensive—in some cases well nigh impossible—to extend our system of block outlines throughout it.

If these surveys were completed as far north as where the 120th degree of longitude leaves the Rocky Mountains, a boundary line between British Columbia and the North-West Territories could be decided upon as being certain township boundaries. The present line, viz., the summit of the Rocky Mountains, being such an irregular one, would, should any valuable discoveries be made, cause great trouble and annoyances, owing to the indefiniteness of the boundary; whereas, if these surveys were completed, as suggested, the summit could be laid down, and from it a boundary agreed upon, which would have for its limit township boundaries.

Then it could be at once decided whether a claim was in the North-West or British Columbia, and much expense and annoyance could thereby be prevented.

The same principle might be adopted with reference to the "Forty-Mile Belt" in British Columbia.

C. P. R. Experimental Farms.

The anticipations respecting these, spoken of in my report of last year, have fully been realized; which, coupled with the fact of public attention being directed thereto through the visit of the British Association and many other distinguished individuals, must have a very beneficial effect on the value to be placed on a great portion of the North West intersected by that highway.

Before closing this report, I would wish to refer to the more healthy tone throughout the country in reference to the carrying out this spirit of our homestead law. This refers not only to those who now have entry, but also to those who are squatting with the intention of entering; and I attribute it wholly to the enforcement of the homestead conditions, which, as you are aware at its inception, and for some time thereafter, brought upon those who had to impose it a great amount of odium; and it does not require the gift of prophecy to foretell that, within the very near future, complaints will be largely made that those conditions were not enforced soon enough, and perhaps even now not with sufficient rigidity. We have only in this to observe what is being said upon this point through the press among our neighbors south of the 49° north latitude.

Right of Second Entry.

During the past four months you have no doubt noticed through the press that the policy of second entry has been questioned. I do not propose expressing my views

on the subject. The Department is to be heartily congratulated on the vast amount of arrears which have been wiped off during the past twelve months.

I have the honour to be, Sir,

Your obedient servant,

WM. PEARCE,

Superintendent.

A. WALSH, Esq.,

Commissioner of Dominion Lands, Winnipeg, Man.

No. 4.

EXTRACTS FROM THE REPORTS OF MR. RUFUS STEPHENSON, INSPECTOR OF COLONIZATION SOCIETIES.

The Fertile Belt Colonization Company.

The location of this colony is a most desirable one, as it is just north of the Canadian Pacific Railway land belt, and only twenty-four miles from the track itself. Moreover, the land generally is of excellent quality, and especially adapted to mixed farming; it is well supplied with wood, water and hay land.

The Temperance Colonization Society.

The location of this colony is an excellent one, the magnificent Saskatchewan River passing through it, which at Saskatoon has a width of about 900 feet, and is navigable for first-class steamers. While I was visiting this colony, the Hudson's Bay Company's steamer "Northcote," of about 200 feet in length and over 30 feet in width, arrived at Saskatoon, and passed up the river, destined for a point some hundreds of miles upwards and not far from Swift Current. I was told it was the purpose of that company, next season, to place a regular line of steamers on the South Saskatchewan River, running from Prince Albert, to connect with transportation on the main line of the Canadian Pacific Railway.

Saskatoon town site is a pleasant one, and already there are erected on it several substantial and handsome buildings, viz., School house, hotel, stores, private residences, &c, while a good ferry is provided for crossing the river. The settlers are of an excellent class, many of them being possessed of considerable means, the judicious expenditure of which will, in the near future, tend greatly to advance that portion of the North-West Territories. The total number of settlers on the even numbered sections is eighty.

Messrs. Morrow, Armytage and Beattie.

The tract allotted to this company is Township No. 29, in Range No. 15, west of the second meridian. The total number of settlers therein is thirty-two, and all appear to be in a prosperous condition. The improvements made are quite extensive, and the class of houses occupied by the settlers is remarkably good, timber for their erection being obtained conveniently from the Touchwood Hills. The soil of this township is remarkably good, and there being plenty of water, hay land and timbered bluffs, it is peculiarly adapted for mixed farming.

The Primitive Methodist Colonization Company.

The settlers in this colony have shown marked progress since my visit in 1883, as is clearly indicated in the increased quantity of breaking and cropping. Not only in respect to the greatly increased area of land brought under cultivation is improvement noticeable, but in the improved dwelling houses, barns and stables. Very little or no complaint was heard from the colonists, so far as the management by the company was concerned. The total number of *bona fide* settlers for 1884 is 107, as against ninety-two for 1883, out of which latter number must be deducted nine cancellations; so that, notwithstanding the general dullness of the season in emigration matters, this colony has advanced instead of receded in point of numbers of the settlers within its limits. A single year's favourable crop would, without doubt, produce favourable results.

The Farmers' North-West Land and Colonization Company.

The total number of entries made in the agent's books, of settlers in this colony, is twenty-one. A majority of these have made substantial improvements.

Prince Albert Colonization Company.

The land comprising the tract allotted to this company, especially that along the south or east side of the Saskatchewan River, is of remarkably good quality, having a black loamy surface, with clay sub-soil, and fairly timbered for building and fuel purposes. Good water is easily obtained, and the convenient navigation of the River Saskatchewan is an advantage, the equal of which is possessed by few other localities now opened for settlement in the North-West Territories. I observed, on my trip south from Prince Albert District, large numbers of settlers, with families, household effects and stock, wending their way along the well-beaten trail towards this section of the country.

Messrs Armstrong and Cook.

The Township allotted to this company is Township 25, in Range 2, west of the second meridian, on which there are fourteen settlers. The locality is a good one in every respect, and the settlers are doing well on their homesteads.

The Qu'Appelle Land Company.

The townships and fractional portions of townships allotted to this company are as follows, viz.:—Townships 22, in Ranges 20, 21 and 22; the south halves of Townships 23, in Ranges 21 and 22; those parts of Township 21, in Range 22, Township 22 and the south half of Township 23, in Range 23, east of Long Lake; and those parts north of the Canadian Pacific Railway belt, of Townships 21, in Ranges 20 and 21, all west of the second meridian. The lands are favourably located for settlement, possessing good soil, the beautiful Long Lake to the west, excellent water, and a fair share of wood especially for fuel purposes. The Canadian Pacific Railway runs within twenty-four miles of the southern limit of the colony, and a capital trail has been constructed along the entire distance from the most northerly townships into Regina, the Government seat of the North-West Territories. Since my visit to this colony, last year, a great improvement is observable on all sides. New roads have

been established, many new frame houses have been erected, postal facilities established, regular church services organized, stores opened, blacksmiths' shops and many other adjuncts of immediate benefit and convenience to the settlers. Besides all these, and quite as important as being an indication of the advancement of the colony, the actual number of *bona fide* settlers has increased considerably; and the quantity of land broken and under crop has more than quadrupled. Several fine herds of cattle have been imported into the colony; also excellent breeds of pigs, sheep and fowl, all of which appear to be thriving, and in the near future will prove a great source of wealth and comfort to the settlement and the surrounding country, supplying a home want hitherto greatly felt. I saw some capital fields of grain, wheat, oats, peas and barley; also, fine crops of roots of all varieties; which, I have since observed in the papers, made a very creditable exhibit at the annual fall agricultural show held at Regina. Taken altogether, this settlement is a healthy and prosperous one; and with a single usually good season for harvesting, will stand well to the front as being one of the most flourishing in the North-West Territories. The activity of the company's management, as displayed by Mr. W. H. Gibbs, jun., also speaks well for the ultimate success of the colony.

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The Saskatchewan Land and Homestead Company.

The townships in the vicinity of Crescent and Leech Lakes, and north-east therefrom, allotted to this company, are Townships 25, 26, 27, 28, 29 and 30, in Range 1; Township 26, in Range 2; and Townships 23, in Ranges 3 and 4, all west of the second meridian—nine township in all. The bulk of the settlers are to be found in Townships 23, Ranges 3 and 4, and a few in Township 26, Range 2. I may here add that there are several squatters in the other townships, mostly second homesteaders from Manitoba, some of whom have made extensive improvements; but as these had not made their entries with the local agent in due form, I have not included them in my enumeration, though I have no doubt, so soon as convenient for them to do so, they will make their entries for the lands upon which they are now resident, as they all appear to be acting in good faith, so far as I could ascertain. The total number of settlers enumerated is seventy-five, as against forty-two for the previous year, of which two were cancelled. This shows a net increase in this settlement of thirty-five homesteaders; which, all things considered, I regard as being very fair. The settlers, or nearly all of them, have progressed very well since my previous visit in 1883. Substantial improvements are visible on all sides—in the acreage broken and cropped, and in the fencing and buildings erected. Moreover, the settlers seem contented, and thoroughly imbued with a determination to make homes for themselves and their families. The company have spent a large sum of money to promote the welfare and prosperity of the settlement. In addition to the portable saw-mill of last year, they have imported a set of milling machinery for the purpose of manufacturing flour by the new roller process, denominated "The Hungarian." The mill, supplied with this machinery, is now at Crescent; it is purposed it shall be in full operation before next harvest. A mail and passenger line was regularly established and operating when I made my visit. The village of Crescent, since last year, has assumed quite a degree of importance; and now possesses several fine frame buildings, variously used as stopping houses, stores, workshops, private dwellings, &c., while several of the streets of the place are not only mapped and staked out, but regularly graded or turnpiked.

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The Scottish Ontario and Manitoba Land Company.

The lands allotted to this company comprise Townships 19 and 20, in Range 28; the north half of Township 15, and the south half of Township 16, in Range 25, all west

of the first meridian. As I reported rather fully last year respecting this colony, and the large expenditure and improvements made by this company, it is unnecessary for me to enter into any extended details this year, there being but little new to mention in this connection, nearly all the even-numbered sections having been filled in 1883. The settlers, ninety-three in number, have all made reasonable progress. The farm of the company was found to be in excellent condition, the live stock being particularly flourishing. The buildings mentioned last year as being in course of erection are now all completed, and evidences of thrift are to be seen on all sides; the store is well stocked, and the stopping house, under the management of Mr. Lossen, is first-class in every respect. The quantity of land broken by the company, since my last visit, in 1883, is eighty acres; and four miles of substantial wire fence have been erected. All the land broken last year was cropped this year: and although some of the crops were light, in consequence of the severe drought during the earlier part of the season, they generally turned out very fairly. The wheat and oats yielded magnificently.

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The Montreal and Western Land Company.

The tract allotted to this company is composed of Townships 20 and 21, in Range 1; Township 21 in Range 2; Townships 21 and 22, in Range 3; and Township 22, in Range 4, all west of the second meridian. The total number of settlers enumerated on even sections is eighty-two, against sixty-one for 1883, and three on odd numbered sections. This colony has made marked progress, since my former visit, in almost every respect, viz.:—in the number of settlers, quantity of land broken and cropped, style of buildings, postal facilities, means of communication with other localities; indeed in all material respects; and as it is bordering on the Canadian Pacific Railway belt, and in such close proximity to that road, it cannot but continue to progress in a much greater ratio during the next few years than it has done up to the present time; for the quality of the land is excellent, and its location convenient to be reached by those who desire to follow the calling of agriculture for a living. Mr. E. Dawson has purchased four sections, besides homesteading and pre-empting in this tract, on which he has begun an extensive stock farm, already having on the land a large number of cattle. Messrs. H. Hill and H. G. Brears have made extensive improvements; and Mr. George Smith, whose entry was but recently effected, was, at the time of my visit, about to leave for Michigan to bring his family, household goods and farm stock, to his new Canadian home. All these give promise of becoming valuable settlers, evidently possessing both pecuniary means and the necessary energy.

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Shell River Colonization Company.

The tract allotted to this company is composed of Townships 23 and 24, in Range 28, and Township 23, in Range 29, all west of the first meridian. The total number of entries in the township register is fifty-eight, as against fifty-one at the time of my inspection in 1883; and this increase, slight as it is, is made in the face of cancellations of the entries of eight persons, who failed to fulfil the requirements of the law; so it will be seen, all things considered, that not only has the Shell River Colonization Company retrieved the number of the settlers returned for 1883, but added seven thereto, all of whom, so far as present indications show, have "come to stay." The company have provided further for the benefit of the settlers this year; the grist mill has been in operation for nearly twelve months, and is about being enlarged and improved, by being converted into a rolling mill on the best principle.

A quantity of lumber has been sawn—sufficient for the settlers and the neighborhood—which is sold at reasonable prices. A considerable amount of employment, at good wages, has been found for those who were willing to work. The store and blacksmith's shop are available to the settlers, and also the shingle factory, where fair prices are charged. A town hall has been built for the municipality, free of charge; and many other improvements have been made since my former visit.

The York Farmers' Colonization Company.

The tract allotted to this company comprises Townships 22, 23 and 27, in Range 2; Townships 25, 26 and 27, in Range 3; and Townships 26, in Ranges 4 and 5, all west of the second meridian. The colony has progressed considerably during the past twelve months. Many of the settlers have made extensive improvements on their respective homesteads; and appear to be well pleased with their surroundings, and hopeful for the future. A portable mill, belonging to the company, has, during the past summer, supplied sawn lumber in moderate quantities to those who required it; which the company, at an expense of from \$12,000 to \$14,000, have erected on the bank of Sand River, within the town plot of Yorkton; also a good first-class extensive stone building for a steam gristing and flouring mill has been erected, the machinery for which will be perfected and set up and ready for operating early next season. Yorkton itself is developing into quite a centre for trade; there being already there a Post Office, Messrs. Reman & Co.'s general store, several offices of professional gentlemen, and a very comfortable stopping house for travellers, who are accommodated at moderate prices.

The Dominion Lands Colonization Company.

In addition to what I said last year in respect to the general excellent nature and desirability of the land in this section of the North-West Territories, there is nothing new to be mentioned this year. Settlers are gradually coming in; and the Canadian Pacific Railway lands, which lie adjoining and south of the Dominion Lands Colonization Company's lands, are being more largely taking up than they were during the year 1883; all of which goes to show that, although "booming times" are past, yet there is a steady and perceptible development of the country going on. The number of settlers having entered for homesteads, the majority of whom also made entries for pre-emptions, was, for 1883, seventy-four up to the date of my visit that year. Not a few of these settlers at that time had but recently made their entries, and the improvements on the lands were comparatively slight. Since then a few failed to go on to the lands taken up by them, and, as a consequence, these entries have been cancelled. However, a sufficient number of other entries have been made by settlers during the present year to overcome the losses of last year and leave a margin to the good; so that, considering the unusually unpropitious season in the North-West Territories for ripening grain, it may be fairly set down that this colony has kept abreast with the times in every material respect, and at present presents a cheering outlook for coming years. The total number of settlers whose locations I visited was 100. The majority of these locations have been substantially improved by buildings, breaking and cropping; the settlers thereon evidencing, by their industry, that they came there for the purpose of carving out homes for themselves and their families. Not a few of the settlers came to Canada from England with considerable means, which, in several instances, have been liberally expended in this colony, not only to the immediate benefit of the locality, where the expenditure has been made, but to the country generally. With an usually good season's crop, I have no doubt but that the Dominion Lands Colonization Company, having

excellent land in all their townships, and enjoying the advantages of the proximity of the River Qu'Appelle and the Canadian Pacific Railway, and the probable early construction of a line of railway skirting the northern sections, will stand in the first rank with those other colonization companies that have, by liberal expenditure of time, ability, energy and money, already accomplished so much in such a small space of time.

No. 5.

EXTRACTS FROM THE REPORTS OF THE INSPECTOR OF DOMINION LANDS AGENCIES ON HIS INSPECTION OF THE LOCAL OFFICES OF COLONIZATION COMPANIES.

The Qu'Appelle Land Company.

Since the report of Mr. Gordon, made on the 17th September, 1883, forty-three entries have been given by this company; of which twenty-three were homestead, and twenty pre-emption entries.

The Saskatchewan Land and Homestead Company.

There have been forty-four homestead and pre-emption entries granted in the tract allotted to this company during the present year. The Managing Director, Mr. Moore, informs me that a large number of settlers have been placed upon those portions of their lands which are still unsurveyed and not open for entry. The company are about to erect a grist mill at Crescent Lake, which will be of great convenience to settlers, and will increase the value of the surrounding lands.

The Dominion Lands Colonization Company.

Since the last inspection of this agency, made in August, 1883, thirty-five settlers have been placed upon the lands of the company, occupying an area equal to fourteen and three-quarters sections. The total number of sections in the colony for which entries have been given is thirty-nine and one-fourth, taken up by ninety-two persons. The agent informs me that those who have already made their entries are doing well, and are satisfied with their prospects; and he, as well as agents of other companies, looks for a large emigration next year.

The Montreal and Western Land Company.

The number of entries made up to the date of my inspection was eighty-one half sections and three-quarter sections; of which twenty-five half sections were taken up during the present year. The agent states that so soon as the Manitoba and North Western Railway is extended, he expects all the vacant lands will rapidly be settled; the same being of very good quality.

The Scottish Ontario and Manitoba Land Company.

This company has displayed much enterprise in their undertaking, a full account of which is contained in the report made on the 30th July, 1883. Forty-two and

three-fourths sections had been entered up to the date of former inspection; since which time four and one-fourth additional sections have been taken up, leaving only three and one-fourth sections yet to be disposed of. One of these is likely to be entered for at once, a person having already squatted upon the land, and having made improvements thereon to the extent of over \$2,000.

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The Farmers' North-West Land and Colonization Company.

The books of this company show that twenty-one homestead and pre-emption entries have been made. The agent thinks there is a prospect of a number of persons settling on the company's lands during this autumn.

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James Armstrong and John J. Cook.

The total number of even-numbered sections in this company's tract is fourteen, of which six and one-fourth are already taken up by settlers.

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The Edmonton and Saskatchewan Land Company of Canada.

The office of this company is located at Clover Bar, where they have established a first-class steel wire rope ferry, which, with approaches, cost about \$1,000. The ferry is free to the public. They have erected a good frame boarding house, 26 by 30, costing \$3,000; carpenter and blacksmith shop, 30 by 50, costing \$1,500; a first class store, 30 by 50, costing \$4,500; and a barn in course of erection, 30 by 60, to cost \$2,000. They have on the ground five working horses, one sulky plough, one common plough, one sulky rake, two waggons, one mowing machine, four spring-tooth harrows, one seeder and one sleigh; also, a blacksmith's shop and tools, for the accommodation of the settlement as well as the company. They have broken 160 acres, and expect this season to break 200 acres in all. They have brought in 400 bushels of red Fife spring wheat, which was sold to settlers at cost, and time given for payment, the company agreeing to take wheat in lieu, at the market value when delivered.

They have a lot of stock on the road now, consisting of one stallion; six brood mares; one bull and six cows, all thoroughbred Durhams; one boar and seven sows, Berkshire; and about twenty first-class sheep. I think it will be admitted by any fair-minded judge that the steps this company have already taken, and probably will continue to take, must be of great advantage to this settlement.

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The Touchwood-Qu'Appelle Land and Colonization Company.

The number of entries in this tract, since the last inspection, is twenty-four; and the total number of sections already taken up is fifty-two and one fourth. The agent is sanguine that next year's return of settlers will be very satisfactory.

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The Primitive Methodist Colonization Company.

The total number of entries, subsequent to the last inspection, is thirty-six; the number of cancellations carried into effect is eight, the lands affected having all been re-entered. The agent reports that the settlers in the colony are very prosperous, and are well satisfied with their holdings and surroundings.

The York Farmers' Colonization Company.

The General Manager of this company has shown much enterprise in the settlement of the colony. A large number of persons settled upon this company's tract during the year 1883, and there have been twenty entries made during the present year. A large stone grist mill is being erected on the company's land, which will be of great benefit to the settlers.

No. 6.

VICTORIA, B. C., 10th December, 1884.

SIR,—I beg to submit the following short report on the matters connected with the Department of the Interior in British Columbia, with the charge of which I have the honour to be entrusted.

Pursuant to your instructions upon the passage of the Settlement Act by the Legislature of British Columbia, and of the confirmatory Statute by the Parliament of Canada, I proceeded to take over the lands within the railway belt, conveyed to the Dominion by those Statutes.

For this purpose, in December last, I engaged the services of Mr. H. B. W. Aikman, then Registrar-General of this Province, to superintend the necessary work of determining—upon examination of the records—what lands within the railway belt had been alienated from the Crown under the land laws of British Columbia, in order to ascertain the particular lands remaining unappropriated within the limits granted by British Columbia to the Dominion; and which, accordingly, are to be taken over and dealt with by the Department.

In this work, Mr. Aikman, with three assistants, has been since engaged; the labour of searching all the land records, extending back over a period of twenty-five years, and of copying and summarizing them, having kept him and his staff fully occupied.

The past history of the titles to the lands within the railway belt is now, however, nearly completed; and we shall soon be in a position to determine, on reference to our land record books, exactly what lands are at the disposal of the Department; and to furnish copies of these books to the district land agents, with plans of the disposable lands in accordance therewith.

Numerous applications in respect to Dominion Lands in British Columbia have been received by me during the past three years.

These applications have all been acknowledged, and filed; and in the cases—which were very frequent—in which the descriptions of the lands applied for were vague, endeavour has been made, by correspondence, to ascertain and define exactly what particular lands were intended to be applied for, and, as far as practicable, their boundaries.

Assurance has been given to applicants for homestead rights of the sale of 160 acres of agricultural lands at \$1 per acre to each homestead settler, on the terms and conditions of the circular letter which I submitted for your consideration, and which was approved by you and authorized to be issued by me; and all such applicants for homestead lands have been referred by letter to the homestead clauses of the Dominion Lands Act, 1883; which clauses were published in the *British Columbia Gazette* last March, with a notice addressed by me to homestead settlers, to the effect that these or similar clauses would govern homestead rights in British Columbia, except as regards pre-emption.

As regards timber:—Temporary rights of cutting timber in accordance with the conditions and requirements submitted by me for your consideration by letter of 30th November, 1883, and which were approved and authorized by you, by telegram to me of 16th February, last, have been granted to several applicants; but have, so far

as I am informed, been only put into operation in the New Westminster District, and particularly in the instances of the concessions to the Dominion Saw Mill Company, and the Royal City Planing Mills Company.

These two companies have cut timber from Dominion Lands, according to returns made by them and verified by our Timber Inspector, Mr. Macdonnell, to the amount of 5,000,000 feet, B.M.

The dues to be paid to the Department on timber so cut, are secured by substantial bonds, and will be collected so soon as I am instructed what scale of charge has been determined to be imposed on Dominion timber in British Columbia.

Nearly 5,000,000 more feet, B.M., of timber has been also cut by others from Dominion Lands, in New Westminster District, and is subject to payment of dues at the rates to be determined by you.

According to your instructions, a general survey of the Dominion Lands within the railway belt has been undertaken.

Mr. E. A. Wilmot was placed in charge of this survey in September last; and has now employed under him, as surveyors, Mr. A. J. Hill, Mr. Summerfield, and Mr. Reiffenstein. The two latter gentlemen are engaged in sub-division work in the neighbourhood of Port Moody and St. Mary's Mission, respectively; while Mr. Wilmot, with Mr. Hill, is occupied in determining and laying down, as a general base for these surveys, the line of the Canadian Pacific Railway from Port Moody eastwards, throughout the Province, in which work they have now progressed to a distance of about 180 miles from Port Moody. All these parties are still in the field. This survey was so lately commenced, and the season has been so unfavorable of late that but comparatively little progress has been made up to this time; but a good foundation is laid for next year's operations on a larger scale, should you think fit so to direct.

I append a copy of a report to me from Mr. Aikman, which deals somewhat more in detail with some of the matters herein referred to, and gives particulars as to the number and acreage of applications for lands, volume of correspondence, &c.

I have the honour to be, Sir,

Your obedient servant,

JOSEPH W. TRUTCH,

Resident Agent of Canada for British Columbia.

The Honourable

Sir DAVID L. MACPHERSON, K.C.M.G.,
Minister of the Interior,
Ottawa.

VICTORIA, B.C., 9th December, 1884.

SIR,—Pursuant to your instructions of the 1st day of December, 1883, I at once commenced the work of investigating the records of the Provincial Land Department, as a preliminary step towards the taking over of the lands conveyed to the Dominion by the Act of the 19th December, 1883.

To this end an office was furnished in the post office building, and the following officers were employed, under my immediate direction, viz.:—Mr. John McKenzie, draughtsman; Mr. S. A. Fletcher, Clerk of the Records; and Mr. H. J. Campbell, Assistant Clerk of the Records.

The initiatory work was directed towards ascertaining and identifying the lands disposed of by the Provincial Government, under Crown grant or by pre-emption, prior to the 3rd day of August, 1878, the date on which the railway lands were placed under reservation by the Government of British Columbia, so as to define the lands which passed to the Dominion under the Act mentioned. This involved the examination and the investigation of the whole of the records of the Provincial

Land Department, covering a period of twenty-five years; a task of considerable difficulty, owing to the voluminous nature of these records, and the various methods of survey and disposition of land permitted by a number of local enactments; amongst others, that of allowing the pre-emption of plots of unsurveyed land, irrespective of any system, size or shape, and in any locality.

This work, I may say, is now almost completed, except a few matters with respect to pre-empted lands, chiefly in New Westminster district, which still remain in abeyance, as they can be more satisfactorily dealt with, and at less expense, at a later period. Under the Provincial land system, occupation by the pre-emptor or his agent and improvements to the extent of \$2.50 per acre, gave a good holding title and the right to a Crown grant whenever the lands were surveyed. There was neither a true limit in which the pre-emptor could be compelled to obtain a certificate of improvements and complete his purchase, nor any provision for an official inspection of pre-emptions, under which abandoned or unoccupied claims might be cancelled. Hence, the books of the Land Department show a number of pre-emption records, which appear, *prima facie*, valid; but which may, on further investigation, be found to have been abandoned. In the meantime these lands apparently remain as disposed of by the Provincial Government, subject to transfer, on proof of abandonment by the pre-emptor. This proof it is purposed to obtain by furnishing a list of these pre-emptions to the Dominion Homestead Inspector, when appointed; so that he, when inspecting Dominion homesteads, can also inspect these claims and procure the necessary evidence on which to obtain their cancellation by the Provincial Minister.

With the foregoing exceptions, the land alienated by the Government of British Columbia has been ascertained.

The field notes of the Colonial and Provincial surveys in New Westminster and Yale districts have been copied into suitable books and compared with the originals.

Maps of the different townships have been prepared, on the scale required by the Dominion Lands Act, 1883, on which the lands alienated by Crown grant or by pre-emption have been distinguished by the colour yellow; the surveyed lands passing to the Dominion, by the colour pink; and Indian reserves by brown.

Record books for the surveyed lands have been opened in numerical order, and all applications for these lands have been therein entered under the particular lot or quarter-section to which they respectively relate. Alphabetical index books of letters, inwards and outwards, have also been opened and kept duly entered up.

A total of 1,923 applications for purchase, homestead entry and timber rights, have been received, filed and entered; and 2,325 letters have been sent and indexed.

The applications for purchase and homestead entry cover an area of 155,595 acres of surveyed and 72,098 acres of unsurveyed land, making a total of 227,693 acres; and the applications for timber-cutting rights cover an area of 161,653 acres. Many of the applications are, no doubt, merely speculative, and not having been made under any statutory or Departmental (Provincial) regulations, it is impossible, at present, to distinguish the *bona fide* applicant from the speculative. A large percentage of these applications will probably be abandoned or withdrawn, so that the average above mentioned cannot be relied upon from a statistical point of view.

I have the honour to be, Sir,

Your obedient servant,

H. B. W. AIKMAN.

To the Honourable

JOSEPH WILLIAM TRUTCH, C. M. G.,

Dominion Government Agent, Victoria, B.C.

No. 7.

TIMBER, MINERAL AND GRAZING LANDS.

DEPARTMENT OF THE INTERIOR,
TIMBER, MINERAL AND GRAZING LANDS OFFICE,
OTTAWA, 22nd December, 1884.

SIR,—I have the honour to submit the fifth Annual Report of the Timber, Mineral and Grazing Lands Office of the Department of the Interior.

Statements showing the revenue, amounting to \$104,616.55, derived from Crown timber, mineral and grazing lands, for the Departmental year ending 31st October, last, are appended hereto, together with the reports of the Crown Timber Agents at Winnipeg, Edmonton, Calgary and Prince Albert.

The total amount of dues collected for timber within the Winnipeg agency amounts to \$76,371.02, a decrease of \$1,938.75 from the previous year. In view, however, of the depression in the timber trade, and the reduction in the price of lumber, this result is not unsatisfactory. The reduction in the price of lumber correspondingly reduced the Government royalty about 15 cents on every 1,000 feet, B.M., sold. If the price of lumber had remained the same as in the previous year, the revenue of this year would have been equal to that of last year.

The territory under the supervision of Mr. E. F. Stephenson, the Crown Timber Agent at Winnipeg, comprises that portion of the provisional district of Assiniboia, east of the third principal meridian, the Province of Manitoba, and all Dominion lands east of that Province.

In 1883, local agents were appointed in different parts of this district to issue permits to homesteaders to cut a certain quantity of house timber, rails, fence-posts and wood; also to watch territory for which timber licenses have been issued; and to protect the Crown domain generally. These officers have rendered good service; and the convenience to the settlers of having persons in their midst authorized to issue permits, instead of having to send to Winnipeg, is greatly appreciated by them.

The agents in question send monthly returns of their collections to Winnipeg, which are examined there and transmitted to this Office. The remuneration they receive for their services is 25 per cent of the collections made by them.

Connected immediately with the office in Winnipeg are two clerks; also three forest rangers, who, under the direction of the agent, render valuable service in making seizures of timber cut illegally, examining and reporting on saw-mills, and performing other important duties.

The total amount of dues collected for timber within the Edmonton agency is \$7,253.84, being \$1,222.05 less than the previous year. This reduction is accounted for by the fact that prior to the 26th of June, 1883, the Crown Timber Agent at Edmonton collected dues for timber cut on territory subsequently included in the Prince Albert agency. The price of lumber at Edmonton during the year was from \$25 to \$30 per 1,000 feet, according to the quality.

The Edmonton Timber agency comprises that portion of the provisional district of Alberta, north of the Height of Land, between the North Saskatchewan and the Red Deer Rivers.

In addition to Mr. Thomas Anderson, the agent, there is one forest ranger attached to this agency.

The total amount of dues collected for timber within the Calgary agency during the year, amounts to \$5,581.79, being \$56,814.82 less than the previous year. The large amount of \$62,426.61, collected for timber within this agency during the year 1883, was greatly due to the bonuses received for ten timber berths on the Bow and Kananaskis Rivers, aggregating \$49,030. During the past year no timber berths situated in this district have been disposed of, which accounts for the large reduction in revenue for the year, from this source.

The quantity of lumber manufactured during the year, in this district, was 878,119 feet, B.M.

The returns from mill owners show that lumber sold at Calgary for \$30 per 1,000 feet; at Fort McLeod for \$20 per 1,000 feet; and at Cypress Hills for \$20 per 1,000 feet.

The Calgary timber district, of which Mr. C. L. Gouin is agent, comprises that portion of the provisional district of Assiniboia, west of the third principal meridian, and that portion of the provisional district of Alberta, south of the Height of Land, between the North Saskatchewan and the Red Deer Rivers.

One forest ranger is also attached to this agency.

The total amount of dues collected for timber within the Prince Albert agency, during the year, is \$4,088.90. In the previous year, from the 26th of June—the date on which the agent commenced duty within that agency—to the 31st of October, the dues collected amounted to \$1,500. The amount collected this year bears a very fair proportion to the collections made within the corresponding four months of last year.

The quantity of lumber manufactured during the year, in this district, was 643,725 feet, B.M.

The returns from mill owners show that lumber sold at Prince Albert from \$30 to \$48 per 1,000 feet, and at Battleford for \$31.

The Prince Albert district is composed of the provisional district of Saskatchewan.

Mr. D. J. Waggoner is agent. Two forest rangers are employed in connection with his office, one residing at Prince Albert, the other at Battleford.

Sawmill returns received at the head office show the following quantities of building-material as having been manufactured during the year:—

Sawn lumber	28,687,814 feet B.M.
Shingles	652,500
Laths	892,400

Seventy-seven yearly licenses to cut timber, over a total area of 2,238 square miles, have been issued during the year. The areas licensed in the Province of Manitoba and the three provisional districts are as follows:—

Manitoba	1,299 square miles.
Alberta	581 " "
Assiniboia	17½ " "
Saskatchewan	341 " "

A large majority of the berths in Manitoba under license are situated on the Duck and Riding Mountains, the shores of Lakes Winnipeg and Winnipegosis, and east of Range 8, east of the first principal meridian. In the district of Alberta all the berths under license, with the exception of one, are situated west of the fifth principal meridian, chiefly on the Red Deer River, the Clear Water River—a tributary of the North Saskatchewan River—and on that river itself. Several berths are also situated on tributaries of the Old Man's River, above Fort McLeod.

The surveyors' reports show that the best belts of timber in the district of Assiniboia, of large enough dimensions for building purposes, are situated on the Cypress Hills. There is also a large quantity of timber interspersed throughout this district, of a sufficient size to supply the settlers with house logs, fence rails and fuel for many years. The only berth at present under license, in the said district, is situated on the western slope of the Cypress Hills, about twenty-four miles south of the line of the Canadian Pacific Railway.

The berths under license in the district of Saskatchewan are situated on streams north of Prince Albert—tributaries of the North Saskatchewan River—and on the western slope of the Porcupine Hills. There is also one berth on the shore of Turtle Lake, an expansion of a stream flowing into the north side of the North Saskatchewan River, about ten miles above Battleford. Messrs. Colridge & Oliver, the licensees of the berth in question, have erected a mill at the mouth of the said creek; and commenced last September to manufacture the logs from this limit into lumber.

In addition to the 2,238 square miles in Manitoba and the North-West Territories, under yearly license, an area of 687 square miles is covered by 21-year leases, which were issued prior to the regulations of the 11th of November, 1881.

There are, at the present time, forty-one saw mills in Manitoba and the North-West Territories operating under Government license; the motive power of thirty-six of them being steam, the remainder water.

The number of saw mills in Manitoba is thirty. The situation of these mills, and other information concerning the same, are set forth in detail in Schedule B, attached to the report of the Crown Timber Agent at Winnipeg.

Alberta has seven saw mills within its precincts—

Two at Edmonton.

One at Fort Saskatchewan and one at St. Albert.

One at Calgary.

Two near Fort McLeod.

In the district of Assiniboia, the saw mill at the western end of Cypress Hills is the only one operating under Government license.

There are three mills in the district of Saskatchewan—two at Prince Albert, and the other near Battleford, hereinbefore mentioned.

The number of timber berths applied for during the year is 548, nearly 200 less than in the previous year. A great many of these applications are for berths on the eastern slopes of the Rocky Mountains, and on Dominion lands along the line of the Canadian Pacific Railway, in the Province of British Columbia.

A copy of the regulations governing the granting of yearly licenses to cut timber on Dominion lands, approved by His Excellency the Governor General in Council, on the 8th of March, 1883, is attached to this report.

These regulations are not applicable to the Dominion lands in British Columbia, and separate regulations for the disposal of the timber on the said lands are now under consideration.

Clause 4 of the Timber Regulations provides that the party to whom a license shall be promised, shall, before the issue of the said license, and before the said party shall cut any timber, cause to be made, at his own expense, under the instructions of the Surveyor-General, a survey of his timber berth, by a duly qualified Dominion lands surveyor; and the plan and field notes of such survey deposited on record in the Department of the Interior.

During the year sixty-seven returns of surveys of timber berths have been examined in this office. As a general rule the timber berths, so far, are situated in unsurveyed territory, or in other words, in territory not yet surveyed in accordance with the rectangular system of survey of this Department.

The information derived, without any outlay on the part of the Government, from these returns of survey, with regard to the topographical features of different portions of the country, has been of great service in preparing general maps of Manitoba and the North-West Territories.

Mining Lands other than Coal.

The total number of applications for mining lands, other than coal, received at this office up to the 31st of October, last, is 361.

The majority of the locations applied for are situated on streams—tributaries of the Bow River—between Padmore on the line of the Canadian Pacific Railway, and the summit of the Rocky Mountains. A few applications have been received for locations on Big Island, Lake Winnipeg, and on streams immediately opposite that island, on the eastern shore of the said lake.

It has been reported to this Department that a company, known as the International Mining, Smelting and Manufacturing Company of Minneapolis, the assignees of Messrs. Wolf and Anderson, the discoverers of two iron locations on Big Island, have commenced active operations on the locations in question; and are

about to erect a substantial dock on the south-eastern shore of Big Island, and also a tramway across the island to connect the two locations.

Coal Mining Lands.

The number of applications for coal mining locations received up to the 31st October, 1884, was 370.

In 1882 nearly all the applications received were for coal lands in what is known as the "Souris coal district." Eleven leases, for the term of twenty-one years each, were issued to mine coal on locations of 320 acres each, situated within this district.

The applications received during the years 1883 and 1884 are for lands situated within other coal districts; which districts are described in the copy of the regulations for the disposal of coal lands in the North-West Territories and the Province of Manitoba, attached to this report.

In the months of March and May last, the coal regulations of the 2nd of March, 1883, were amended as follows:—

1. An alteration in the description of the Belly River coal district.
2. "Saskatchewan River coal district" changed to the "South Saskatchewan River coal district."
3. An addition of two new coal districts, namely:—the North Saskatchewan River coal district, and the Cascade coal district.
4. The price of lands within the Cascade coal district fixed at \$20 per acre cash, and the lands within all the other coal districts at an upset price of \$10 per acre cash.
5. Competition is invited when there is more than one applicant for the same location.
6. Coal lands situated outside of the organized coal districts may be sold to applicants at the price and on the terms which would apply if the lands were within an organized coal district.

The revenue derived from coal lands during the year is \$1,141.30. Owing to the surveys of the townships within the several coal districts not having been completed, this Department was not in a position to sell the lands. The surveys of a majority of the townships within the said districts will be confirmed this winter, in consequence of which a very fair revenue from coal lands during the ensuing year may be anticipated.

The only companies who have as yet mined coal to any great extent are the Saskatchewan Coal Company, whose mine is situated near Medicine Hat, and the North-West Coal and Navigation Company, carrying on operations on the Belly River.

Mr. Stephenson, the Crown Timber Agent at Winnipeg, in his report states that the Saskatchewan Coal Company are selling coal in the Winnipeg market at \$7.50 per ton; the result of which is that cordwood has fallen in price almost 50 per cent.

Grazing Lands.

The number of leases of grazing lands in the district of Alberta issued by this Department is fifty-seven, covering an area of 2,782,690 acres. Forty-one of the lessees have cattle on their ranches.

The regulations under which these leases were issued, are those embodied in the Dominion Lands regulations of the 1st of January, 1882, which are as follows:—

Pasturage Lands.

16. Under the authority of the Act 44 Vic., cap. 16, leases of tracts for grazing purposes may be granted on the following conditions:

(a.) Such leases to be for a period of not exceeding twenty-one years, and no single lease shall cover a greater area than 100,000 acres.

(b.) In surveyed territory, the land embraced by the lease shall be described in townships and sections. In unsurveyed territory, the party to whom a lease may be promised shall, before the issue of the lease, cause a survey of the tract to be made, at his own expense, by a Dominion lands surveyor, under instructions from the Surveyor-General; and the plan and field notes of such survey shall be deposited on record in the Department of the Interior.

(c.) The lessee shall pay an annual rental at the rate of \$10 for every 1,000 acres embraced by his lease; and shall within three years from the granting of the lease, place on the tract one head of cattle for every ten acres of land embraced by the lease, and shall during its term maintain cattle thereon, in at least that proportion.

(d.) After placing the prescribed number of cattle upon the tract leased, the lessee may purchase land within his leasehold for a home farm and corral, paying therefor \$2 per acre in cash.

(e.) Failure to fulfil any of the conditions of his lease, shall subject the lessee to forfeiture thereof.

17. When two or more parties apply for a grazing lease of the same land, tenders shall be invited, and the lease shall be granted to the party offering the highest premium therefor, in addition to the rental. The said premium to be paid before the issue of the lease.

The revenue derived from grazing lands during the year was \$10,640.50.

In the month of October last, an Order in Council was passed prohibiting sheep grazing within that section of the North-West Territories, bounded as follows:—On the south by the international boundary line; on the west by the summit of the Rocky Mountains; on the north by the High River and its North Fork to the Bow River; thence along the Bow River to the eastern boundary of the provisional district of Alberta; and on the east by the said eastern boundary.

The following schedule shows the names of the lessees of grazing lands who have cattle on their leaseholds, the numbers of their ranches, and the areas covered by their leases.

No. of Ranches.	Name of Lessee.	Area in Acres.
1	Mount Head Ranche Co.....	44,000
2	North-West Cattle Co.....	59,000
3	Ryan & Whitney.....	3,000
11	Alex. Begg.....	1,440
12	W. Mitchell.....	42,000
15	F. W. de Winton.....	15,000
22	Stewart Ranche Co.....	23,000
23	G. R. Davies.....	10,000
25	Rocky Mountain Cattle Co.....	73,500
26	Anglo-Canadian Ranche Co.....	64,000
28	Jones, Inderwick & McCaul.....	100,000
30	Orrin F. Main.....	22,000
31	Military Colonization Co.....	92,000
33	G. F. Wachter.....	7,000
34	Eastern Townships Ranche Co.....	33,000
35	F. S. Stimson.....	55,000
35	Moore & Martin.....	33,000
36	C. Martin.....	66,000
37	Halifax Ranche Co.....	100,000
38	William Steed.....	10,000
42	Cochrane Ranche Co.....	100,000
43	do.....	34,000
44	J. M. Browning.....	55,000
45	E. A. Baynes.....	12,000
48	Alex. Stavely Hill.....	80,000
55	Winder Ranche Co.....	50,000
56	Bell Bros.....	5,000
57	Ives & Sharp.....	5,000
62	Brunskill & Geddes.....	13,000
65	Bell & Patterson.....	6,000
66	M. Gallagher.....	6,500
67	E. H. Maunsell.....	6,500
74	Sir John Walrond.....	100,000
77	Oxley Ranche Co.....	100,000
80	Viscount Boyle.....	5,000
82	Walrond Ranche Co.....	100,000
87	W. S. Lee.....	25,000
91	Muirhead Ranche Co.....	22,000
93	Garnett Bros.....	20,000
94	F. W. Godsall.....	20,000
95	D. E. Akers.....	5,000
96	W. F. N. Scobie.....	12,000
97	T. B. H. Cochrane.....	55,000
98	G. R. Davies.....	47,000
99	J. McFarland.....	13,000
100	Alfred L. Staunton.....	8,000
101	Alberta Ranche Co.....	27,750
		1,785,690

The following is a statement of correspondence, applications received, and returns examined in the office at headquarters during the year :—

Number of letters received	3,930
“ “ sent	4,565
“ timber berths applied for	548
“ mill sites “	12
“ applications for coal locations	100
“ “ mining “	95
“ “ for grazing lands	39
“ returns from mills received and verified	138
“ licenses for timber berths drawn	77
“ returns of permits received and verified	147
“ instructions issued for surveys of timber berths	36
“ returns of surveys of timber berths received and examined	67
“ leases for grazing lands drawn	12
Total number of pages of various schedules prepared for information of the Minister of the Interior and his Deputy	526

I have the honour to be, Sir,

Your obedient servant,

G. U. RYLEY,

Clerk of Timber, Mines and Grazing Lands.

The Deputy of the
Minister of the Interior, Ottawa, Ont.

STATEMENT of Receipts on account of Crown Timber, for the twelve months ending 31st October, 1884.

Month.	Royalty on Returns of Sales.	Bonus and Ground Rent.	Permits.	Seizures, Dues and Fines for Trespass.	Total.
1883.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
November	1,430 30	1,715 41	681 21	386 21	4,213 13
December.....	22 21	4,417 45	433 75	.....	4,873 41
1884.					
January.....	789 82	5,475 92	3,090 70	265 47	9,621 91
February.....	744 96	2,981 08	643 79	4,090 01	8,459 84
March.....	1,579 47	2,853 19	407 50	744 18	5,584 34
April.....	782 89	4,054 31	142 44	929 42	5,909 06
May.....	1,103 66	3,843 50	469 19	462 37	5,878 72
June.....	1,276 26	499 22	1,444 35	369 25	3,589 08
July.....	569 25	4,643 53	1,271 57	692 59	7,176 94
August.....	1,763 00	773 06	83 74	133 50	2,753 30
September.....	1,403 77	713 78	16,426 72	306 94	18,851 21
October.....	6,056 13	2,261 80	7,086 15	900 84	16,304 92
Total.	17,521 72	34,232 25	32,181 11	9,280 78	93,215 86
Canadian Pacific Railway Account settled at head office....					6,419 63
School lands.....					36 50
Grand Total.....					99,671 99

G. U. RYLEY,
Clerk of Timber, Mines and Grazing Lands.

DEPARTMENT OF THE INTERIOR,
OTTAWA, 31st October, 1884.

STATEMENT of Receipts on account of Mineral, Grazing and Hay Lands, for the twelve months ending 31st October, 1884.

Month.	Rents from Coal Lands.	Mineral Lands other than Coal Lands.		Rents from Grazing Lands.	Royalty from Stone Quarries.	Dues on Permits to cut Hay.	Total.
		Fees paid by Applicants for Mining Locations.	Fees paid by Applicants for Certificates of Assignments.				
1883.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
November				2,134 00	14 03		2,148 03
December				2,055 00			2,055 00
1884.							
January				599 80	29 16		628 96
February				25 00			25 00
March	218 90			315 00			533 90
April		10 00	4 00	101 16			115 16
May	240 00			1,270 00			1,510 00
June				1,057 64	4 00		1,061 64
July	82 40			841 00			923 40
August				269 90			269 90
September		5 00		1,939 50		73 70	2,018 20
October				32 50		42 50	75 00
Total	541 30	15 00	4 00	10,640 50	43 19	120 20	11,364 19
Sales of coal lands	600 00						

G. U. RYLEY,

Clerk of Timber, Mines and Grazing Lands.

DEPARTMENT OF THE INTERIOR,
OTTAWA, 31st October, 1884.

REGULATIONS governing the granting of Yearly Licenses to cut Timber on Dominion Lands, under the provisions of section 52 of the Dominion Lands Act, 1879, approved by His Excellency the Governor General in Council, on the 8th of March, 1883.

1st. The area of timber berth to be covered by a yearly license shall not exceed fifty square miles; and not more than one berth shall be given to an individual or firm. Any departure from this rule, which special circumstances may render expedient, shall be made only with the sanction of the Governor in Council.

2nd. Licenses shall be granted under the following conditions:—

(a.) The licensee shall pay a ground rent of five dollars (\$5) per square mile.

(b.) Within a month after the date of the Order in Council granting a timber berth, the party in whose favour it is passed shall pay the rent for the year in advance, the said rent to bear interest at the rate of 6 per cent. per annum from that date until the same is paid.

(c.) The licensee shall pay a royalty of 5 per cent. on the amount of the sales of all products of the berth.

(d.) When applications for licenses conflict, berths shall be laid off and described as the Minister of the Interior may direct, and tenders shall be invited for the same. Parties tendering will be required to state the sum or bonus per square mile, which they will pay in addition to the ground rent and royalty; and the limit will be awarded to the party offering the highest bonus.

(e.) The licensee shall have in operation, within a year from a date to be fixed in the license, and keep in operation for at least six months of each year of his holding, a saw-mill capable of cutting daily at least 10,000 feet, board measure, of lumber.

3rd. When a licensee has fully complied with all the above conditions, and where no portion of the timber berth is required for settlement or other public purpose, of which the Minister of the Interior is to be the judge, the license may be renewed for another year, subject to such revision of the annual rental and royalty to be paid therefor as may be fixed by the Governor in Council.

4th. In unsurveyed territory the party to whom a license shall be promised shall, before the issue of said license, and before the said party shall cut any timber, cause to be made, at his own expense, under the instructions of the Surveyor-General, a survey of his timber berth by a duly qualified Dominion land surveyor; and the plan and field notes of such survey shall be deposited on record in the Department of the Interior.

In surveyed territory berths shall consist of township sections, their legal subdivisions or fractions thereof.

A. M. BURGESS,

Deputy of the Minister of the Interior.

REGULATIONS for the disposal of Coal Lands in the North-West Territories, and the Province of Manitoba, approved by His Excellency the Administrator of the Government in Council, on the 2nd March, 1883, with the amendments thereto, approved by His Excellency the Governor in Council, on the 26th March and the 13th May, 1884.

1st. The following districts have been set apart and the lands therein withdrawn from ordinary sale and from settlement, and declared to be Coal Districts, the same to be known as those of the Souris River, the Bow River, the Belly River, the South Saskatchewan River, the North Saskatchewan River and the Cascade Coal Districts, the said districts, for the present, to be composed as follows:—

I.—*Souris River Coal District.*

Townships 1 and south halves of 2, Ranges 4, 5 and 6, west of second meridian.

"	1, 2, 3,	"	7, 8, 9, 10,	"	"
"	1, 2, 3, 4,	"	11,	"	"
"	1, 2, 3, 4, 5,	"	12, 13,	"	"
"	2, 3, 4, 5,	"	14,	"	"
"	3, 4, 5,	"	15,	"	"
"	4, 5,	"	16,	"	"
"	5.	"	17,	"	"

II.—*Bow River Coal District.*

Townships 19, 20, 21, Ranges, 18, 19, west of fourth meridian.

"	20, 21, 22,	"	20, 21,	"	"
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III.—*Belly River Coal District.*

Townships 8, 9 and 10, Range 21.

Those portions of Townships 8 and 9 not included in the Blood Indian Reserve, and the whole of Township 10, in Range 22; those portions of Townships 8 and 9 not included in the Blood Indian Reserve, and the whole of Township 10, in Range 23, all west of the fourth principal meridian.

IV.—*South Saskatchewan River Coal District.*

Townships 11, 12, 13, Ranges 2, 3, 4, 5, 6, 7, 8, 9, 10, west of fourth meridian.

"	14, 15, 16,	"	2, 3, 4, 5,	"	"
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V.—*North Saskatchewan River Coal District.*

Townships 50 and 51, and the south half of Township 52, Range 25.

“ 50 “ 51, Range 26.

“ 50 “ 51, “ 27.

“ 50 “ 51, in the fractional portion of Range 28, all west of the fourth principal meridian.

Also Townships 50 and 51, Range 1.

“ 50 “ 51, “ 2.

“ 50 “ 51, “ 3.

“ 50 “ “ 4.

All west of the fifth principal meridian, in the Provisional District of Alberta.

VI.—*Cascade Coal District.*

The North-west quarter of Township 25, Range 11.

“ South-west “ “ 26 “ 11.

“ North-east “ “ 25 “ 12.

“ South-east “ “ 26 “ 12.

All west of the fifth principal meridian, in the provisional District of Alberta; but excluding therefrom that portion of the said described area which is covered by the right of way and station grounds of the Canadian Pacific Railway.

2nd. The surveys of the lands within the said coal districts will be completed as soon as possible, and thereafter the lands will be periodically offered for sale by tender or public auction—the lands within the Cascade Coal District at an upset price of \$20 per acre, cash, and the lands within all the other Coal Districts at an upset price of \$10⁰⁰ per acre, cash.

(a.) Not more than 320 acres shall be sold to one applicant.

(b.) When there is more than one applicant for the same coal location, the Minister of the Interior may invite competition between the several applicants, or offer the land for sale at public competition, by tender or by auction, as he may think expedient, at the upset price of coal lands in the district in which such coal location is situated.

(c.) When applications are made to purchase coal locations situated outside of the organized coal districts, the Minister of the Interior may sell the same to the applicants at the price and on the terms which would apply if the lands were within an organized coal district, and with due regard to the quality of the coal which the said lands may be found to contain.

3rd. With respect to leases which have already been granted, each lessee who has fulfilled the conditions thereof may, within two years from the date of the Order in Council authorizing his lease, convert the leasehold into freehold, by paying in cash the upset price placed by the Minister of the Interior on the lands in the coal district wherein the said leasehold is situated; but the lease shall be null and void in all cases where the conditions have not been fulfilled by the lessee, especially the conditions contained in clause 5 of the said regulations, which are as follows:—“ That failure to commence active operations within one year and to work the mine within two years of the commencement of the term of the lease, or to pay the ground rent or royalty, shall subject the lessee to forfeiture of the lease and resumption of the land by the Crown.”

4th. In cases where the Minister of the Interior satisfies himself that companies, or persons, have expended considerable sums of money in exploring for coal within the limit of any district for which they may have applied under the regulations of the 17th December, 1881, the said lands may be sold to such companies or persons at the upset price fixed for lands in the coal district in which such tract may be situated.

5th. The boundaries beneath the surface of coal mining locations shall be the vertical planes or lines in which their surface boundaries lie.

6th. The rights of lessees, and of persons in favour of whom Orders in Council authorizing leases have been passed, shall not be affected by these regulations.

A. M. BURGESS,

Deputy of the Minister of the Interior.

DEPARTMENT OF THE INTERIOR, CROWN TIMBER OFFICE,

WINNIPEG, 31st October, 1884.

SIR,—I have the honour to submit my Annual Report of the business transacted within the Winnipeg District for the year ending 31st of October, 1884, to be read in connection with which are the following detailed statements, viz. :—

A. Statement showing revenue derived from timber dues.

B. The number of saw-mills operating under Government license in the Province of Manitoba and in Assiniboia, as far west as the third initial meridian, and in what is known as the "Disputed Territory," in the Dominion of Canada, together with the quantities of building material manufactured, sold and on hand by each lessee respectively.

C. General office returns, and other information respecting the work of this office.

Considering that an unusual depression has existed in the lumber trade of the North-West and the adjoining States of the Union since my last return, it is gratifying to observe that, on comparing the returns of the timber sold during the year just closed with those of the previous year, they so nearly agree.

The explanation, however, may be found in the fact that large stocks were carried over from the previous year; and to the more important fact that our lumbermen, having increased facilities for manufacturing and shipping, have been able to sell at a price which has completely shut out American competition, except in a few restricted lines. The Americans enjoyed an almost uninterrupted monopoly of the timber trade during the early days of the country's development; but now our lumbermen are able, owing to the liberal timber policy of the Government, to furnish the settlers with lumber at nearly all points along the line of railways at prices very little in advance of the rates current in the older Provinces.

The revenue derived from Crown timber for the year just closed amounts to \$82,289.02.

The timber operations of the Canadian Pacific Railway Company having been transferred to the Calgary District, the large revenue hitherto derived from that source will, this season, appear to the credit of that agency.

The increased revenue from timber cut in trespass shows that the forest rangers are vigilant in protecting the public domain. The settlers generally are well satisfied with the present timber permit regulations. During the year the large number of 1,068 permits to cut timber have been issued. That the present free allowance to homesteaders is amply sufficient for the needs of the average homesteader is found in the fact that out of 700 homesteaders' free permits returned to me under affidavit, only sixteen show permittees to have cut in excess of their complement.

Although this district is highly favoured with timbered lands equally distributed, yet too much care cannot be exercised in preventing unnecessary waste. Some time must elapse before our new country is so served with railways as to furnish coal to the majority of the settlers, and thus save the waste of timber for the purposes of fuel. I am pleased, however, to be able to inform you that already the benefits of our coal industries are beginning to be felt along the line of railway. As a result of the Saskatchewan Coal Company (operating at Medicine Hat) selling coal in the Winnipeg market at the reduced figure of \$7.50 per ton, cordwood has already fallen from \$8 and \$10 a cord to \$3.50 and \$5. I would direct your attention to the returns, hereto appended, under Schedule "B," giving the comparative prices of lumber sold at the principal points in my district during the year 1883-84.

The local agencies established last year have continued to prove of great benefit to the settlers, and have facilitated the operations of my district. The various agents have co-operated with me in preventing trespass and diffusing a knowledge of the permit regulations amongst the settlers, as well as furnishing me with valuable information, from time to time, from their respective localities.

Great care has been exercised in avoiding all unnecessary expenditure, and the business of my office has, I think, been conducted as economically as possible, consistent with efficiency.

I have the honour to be, Sir, Your obedient servant,

E. F. STEPHENSON, *Crown Timber Agent.*

A. M. BURGESS, Esq., Deputy of the Minister of the Interior.

SCHEDULE A.

STATEMENT of Receipts on account of Crown Timber, &c., for the Twelve Months ending 31st October, 1884.

Month.	Royalty on Returns of Sales.	Bonus and Ground Rent.	Permits.	Seizures, Dues and Fines for Trespass.	School Lands.	Stone Quarried.	Total.	Amounts collected at Head Office.	Grand Total.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
1883.									
November.....	937 91	215 41	126 30	386 21		14 03	1,679 86	250 00	1,929 86
December.....	22 21						22 21	4,167 45	4,189 66
1884.									
January.....	535 69	1,369 52	1,461 26	265 47	31 50	29 16	3,692 60	3,755 40	7,448 00
February.....	744 96	1,931 08	445 04	4,080 01			7,211 09	560 00	7,761 09
March.....	1,284 03	783 82	323 89	186 64			2,578 42	1,107 50	3,685 92
April.....	341 38	712 50	140 94	929 42			2,124 24	605 00	2,729 24
May.....	1,025 80	130 00	365 74	462 37	5 00		1,988 91	3,061 00	5,049 91
June.....	1,276 26	144 22	525 06	369 25			2,314 79	250 00	2,564 79
July.....	566 83	1,057 63	1,259 37	592 59			3,476 52	551 85	4,028 37
August.....	1,783 00	397 81	83 74	133 50			2,378 05	75 00	2,453 05
September.....	1,403 77	188 78	16,426 72	306 94			18,326 21		18,326 21
October.....	6,056 13	1,889 40	5,861 56	562 38			14,369 47	1,835 45	16,204 92
Totals.....	15,958 02	8,820 22	27,019 62	8,284 82	36 50	43 19	60,162 37	16,208 65	76,371 02
Collected at Head Office.....	14,138 10		1,224 59	315 96					
Canadian Pacific Railway account settled at Head Office.....					36 50	43 19			
Grand Total.....	15,958 02	22,958 52	28,244 21	9,130 78					82,289 02

E. F. STEPHENSON,
Crown Timber Agent.

CROWN TIMBER OFFICE,
WINNIPEG, 31st October, 1884.

SCHEDULE "B," showing the Number of Saw Mills in the Province of Manitoba and the Districts of Keewatin and Assiniboia, under Government License, for Year ending 31st October, 1884.

Name of Owner or Owner and Assignee.	Where Situated.	Kind of Power.	Horse Power.	Capacity per 12 hours.	Commenced Operations	Description of Timber.	Location of Limit.	Quantity of Lumber manufactured during Year ending 31st October, 1884.	Quantity of Lumber sold from amount on hand 31st October, 1883, and manufactured to 31st October, 1884.	Quantity of Lumber on hand 31st October, 1884.	Quantity of Shingles manufactured during Year ending 31st October, 1884.	Quantity of Shingles sold from amount on hand 31st October, 1883, and manufactured to 31st October, 1884.	Quantity of Shingles on hand 31st October, 1884.	Quantity of Laths manufactured during Year ending 31st October, 1884.	Quantity of Laths sold from amount on hand 31st October, 1883, and manufactured to 31st October, 1884.	Quantity of Laths on hand 31st October, 1884.	Remarks.
Adams & Schneider	Winnipeg River	Water	62	10,000	1879	Spruce	Limit "C," Winnipeg River	600,000	956,000	444,000							Mill not running this season on account of low water.
1 Armitage & McCulloch	Minnedosa	Steam	25	6,000	1880	do	Townships 19 and 20, Range 20, W	110,000	208,841	117,319		193,500	34,250		72,682		No mill erected.
Armitage, J. S.							Township 19, Range 22, W										No mill erected.
Bergin & Co., Jno							Whitemouth River										Returns not received.
Boulton, C. A.	Shell River	Steam	16	3,000	1883	Poplar	Shell River										
Brouse, Geo. J., & Co.	Badthroat River	Water	90	7,000	1879	Spruce	Badthroat River	76,000	26,000	50,000	63,750	63,750					
Brown, Rutherford & Co.	Fisher Bay	Steam	30	10,000	1880	do	Fisher Bay	1,300,000	1,100,000	1,600,000							
Bulmer, F. T. & Co.	Keewatin (Lake of the Woods)	do	80	50,000	1884	Red and white pine	Crow Lake	1,150,276		1,150,276				61,000		61,000	
Cameron, Alex.	Rolling River	Water	25	6,000	1878	Spruce and poplar	Riding Mountains	50,040	100,089	23,930							
Dick, Banning & Co.	Hole River	Steam	25	6,000	1879	Spruce	Hole River	839,058	892,214	1,446,344							No mill erected.
Douglas, David						do											
Douglas, John Wm.	Rapid City	Steam	20	4,000	1879	do	Riding Mountains	298,843	243,545	59,952	80,500	80,500					
Drake & Rutherford	Fisher River	do	70	40,000	1883	do	Fisher River	400,000	744,335	423,141				31,300	90,750		
Fox, Thomas L.	Desford	do	18	3,000	1881	Poplar	Turtle Mountain	161,649	161,344	70,305	231,250	292,500	73,750				Limit abandoned.
Ferguson, McQuarrie & Grigg						Spruce	Swan River										Mill machinery at Brandon not erected.
Hudson's Bay Co.	Riding Mountain House	Steam	16	3,000	1880	do	Riding Mountains		94,453								
Jonasson & Frederickson Bros	Icelanders River	do	40	15,000	1881	do	Icelanders River	614,877	1,024,433	349,955				276,000	256,350	131,150	
2 Kent, James	Birtle	do	25	6,000	1880	do	Bird Tail Creek	580,826	444,143	818,871	220,000	212,375	138,625	10,600	14,100		
Keewatin Lumbering & Manfg. Co	Keewatin Mills	Water	400	120,000	1880	Red and white pine	Lake of the Woods	4,275,798	3,217,210	6,308,589	1,932,000	2,940,250	1,663,000	1,319,700	1,575,700	1,085,000	
3 Leacock, E. P.	Bird Tail Creek	Steam	15	2,000	1880	Spruce	Bird Tail Creek										
Likely, John	Mouth Little Bear Creek, Winnipeg River	do	16	3,000	1884	do	Jumping River, Lake Winnipeg										Commenced operations September last. Returns not received.
Mitchell & Byers	Sewell	do	16	3,000	1880	do	Township 10, Range 6, W		16,096	41,904		13,000	64,250				
4 Macaulay, W. J.	Keewatin	Water	100	60,000	1881	Red and white pine	Lake of the Woods and Rainy Lake	532,489	444,277	88,212	202,000	20,000	64,250	111,000	111,000		
5 McFadyen, D.	Odanah	Steam	50	15,000	1880	Spruce	Riding Mountains	594,289	442,201	514,439	527,900	311,750	410,750	74,900	100,000	42,200	
McKay, James W.	Carberry	do	25	3,500	1880	do	Township 10, Range 15, W	100,000		100,000							
McDonald & Shields	Vermillion Bay	do	75	30,000	1883	do	Eagle Lake	4,259,484	789,260	2,470,224							
North-West Timber Co.	Selkirk	do	75	35,000	1883	do	West Shore of Lake Winnipeg	1,187,569	1,077,949	377,673		83,000		13,000	108,000		
Rainy Lake Lumber Co.	Rat Portage	do	95	60,000	1883	Red and white pine	Rainy Lake	1,755,839	1,274,084	483,755	359,000	359,000		497,700	368,200	129,500	New mill erected, 1883.
do	Fort Francis	do	80	15,000	1874	do	Fort Francis	436,895	76,085	391,810							Mill removed to Rat Portage not in use.
6 Ross, A. W.		do	55	25,000													Mill machinery purchased not erected.
Ross, Crawford	Fort Rillce	do					Stony Creek, Assiniboia River										Mill in course of erection.
Ross, David	Whitemouth	do	35	10,000	1880	Spruce	Whitemouth River	870,000	1,531,133	843,867							
Shields et al.	Brandon	do	35	12,000	1881	do	Shell River	2,302,357	1,796,153	904,700							
Smith, Samuel	Desford	do	20	3,500	1881	Poplar	Turtle Mountain	214,476	247,129	ab't. 10,000	259,500	259,500		20,000	8,350	11,650	
Sprague, D. E.	Winnipeg	do	45	20,000	1882	Pine	Kosseau River	2,209,865	2,299,369	1,303,727				265,000	142,000	123,000	
Stubbs, Wm	Lake Winnipeg	do	75	30,000	1883	Spruce	Ebb and Flow Lake	650,000	359,859	290,141	40,000	20,000	20,000	20,000	15,200	4,800	
Stubbs, W. H. jun.	do	do	75	30,000	1883	do	Limit "D," Winnipeg River										Mill not used this season on account of financial difficulties.
Watts, Alfred	Norquay	do	16	3,000	1882	Poplar and oak	Township 7, Range 9, W	376,461	99,152	289,214	43,250	273,250	23,250				
Whimster & Kayll	Strathclair	do	25	6,000	1880	Spruce and poplar	Riding Mountains	80,000	152,394	145,166	107,000	75,200	335,000				
Williamson & Harrison	Wakopa	do	25	6,000	1880	Poplar	Turtle Mountain	72,307	61,894	28,304	147,500	147,500		17,000	16,050	950	
Totals								26,078,098	19,927,632	22,146,918	4,312,750	5,527,125	2,762,875	2,715,200	2,878,382	1,589,250	

1. Assigned to John W. Douglas.
2. do Federal Bank of Canada
3. do do do
4. do Dick & Banning.
5. do Jermyn & Bolton.
6. do Federal Bank of Canada.

Certified correct.

E. F. STEPHENSON,
Crown Timber Agent.

SCHEDULE C.

GENERAL OFFICE Return for twelve months ending 31st October, 1884.

Description of Return.	Number.	Compared with Previous Year.	
		Increase.	Decrease.
Number of letters written.....	2,826	637	
do circulars sent.....	1,321		
do letters received.....	1,853		208
do permits issued, homesteaders' free.....	822		
do do subject to dues.....	246		
do seizures made.....	202	28	
do mill returns received and verified.....	116		2
do leases cancelled.....	2		

COMPARATIVE prices of Lumber sold at principal points in the Winnipeg District during the Years 1883 and 1884.

Place.	Kind.	1883.	1884.
Winnipeg.....	Pine per M. ft.....	\$18 00 to \$25 00	\$15 00 to \$25 00
do	Spruce and tamarac per M. ft.....	12 00 " 18 00	10 00 " 15 00
Brandon.....	do do	16 00 " 22 00	15 00 " 20 00
Moosomin.....	Pine do	25 00 " 28 00	18 00 " 25 00
do	Spruce and tamarac do	23 00 " 25 00	15 00 " 18 00
Regina.....	Pine do	28 00 " 30 00	20 00 " 30 00
do	Spruce and tamarac do	26 00 " 28 00	18 00 " 24 00
Moose Jaw.....	Pine do	28 00 " 30 00	20 00 " 30 00
do	Spruce and tamarac do	26 00 " 28 00	18 00 " 24 00
Selkirk.....	do do	10 00 " 16 00	8 00 " 12 00
Rapid City.....	do do	25 00 " 30 00	15 00 " 24 00
Minnedosa.....	do do	22 00 " 28 00	15 00 " 24 00
Birtle.....	do do	20 00 " 30 00	15 00 " 24 00
Turtle Mountain.....	Poplar.....	15 00 " 20 00	15 00 " 30 00

E. F. STEPHENSON,
Crown Timber Agent.CROWN TIMBER OFFICE,
Winnipeg, October 31st, 1884

CROWN TIMBER OFFICE,
EDMONTON, 31st October, 1884.

SIR,—I have the honour to submit the following Report of the work of the Crown Timber Office, Edmonton, for the year just closed.

Statements showing the revenue derived from Crown timber; the number of saw-mills operating under Government license in the Edmonton district, together with the quantities of building material manufactured and sold by each licensee respectively, during the year; and other information regarding the business of this office will be found hereto appended.

In the last report which I had the honour to make, I noticed the general depression in business. I am now happy to inform you that a slow but sure improvement has taken place.

We are now reaping the benefit of the Canadian Pacific Railway being so near; we have a fortnightly mail, which has been very punctual; also two lines of stages, which are both generally full of passengers going to and returning from the railroad at Calgary. The steamboats plying on the North Saskatchewan River, which formerly had a monopoly of the freight and passenger traffic between here and Winnipeg, are now deserted, the railway having taken their place. The traders get their goods by way of Calgary, at a much less cost of freight and with more certainty than by way of water.

Mr. Pearce, the late Inspector of Agencies, now Superintendent of Mines, visited Edmonton last summer, took evidence in all conflicting claims, and established a land office.

The trail between here and Calgary has been considerably improved; bridges have been built over the Black Mud River and Wolf Creek, and wire rope ferries over the Bow and Red Deer Rivers. The North-West Council has given \$1,000 towards building bridges on the same trail over the Battle and Blind Man Rivers. A considerable number of settlers have gone into the Red Deer River District, and settlement is gradually working its way towards Edmonton.

The quantity of lumber sawn is considerably more than last year, being 1,087,872 feet, B. M., as compared with 385,859 feet the previous year.

The prices of all necessaries, although still high, have fallen fully 50 per cent since the railway was built as far as Calgary; and the famine prices we had to pay within the last two years will never occur again.

The washing for gold in the North Saskatchewan River, by manual labour, has been carried on much more extensively this year than formerly. The undertaking has been very profitable, each man averaging from \$4 to \$10 per day. Two companies, with machinery, tried it, but failed. The gold is flour gold of the finest description. Coarse gold has never been found on the Saskatchewan.

I have the honour to be, Sir,

Your obedient servant,

THOMAS ANDERSON,

Crown Timber Agent.

To the Deputy of the Minister of the Interior,
Ottawa.

SCHEDULE A.

STATEMENT of Receipts on account of Crown Timber, for the Twelve Months ending 31st October, 1884.

Month.	Royalty on Returns of Sales.	Bonus and Ground Rent.	Permits.	Dues and Fines for Trespass.	Total.	Amounts collected at Head Office.	Grand Total.
1883.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
November .....	.....	.....	87 76	.....	87 76	.....	87 76
December. ....	.....	.....	422 25	.....	422 25	.....	422 25
1884.							
January .....	.....	.....	534 45	.....	534 45	101 00	635 45
February .....	.....	.....	1 50	.....	1 50	250 00	251 50
March .....	.....	.....	25 36	.....	25 36	750 00	775 36
April .....	.....	.....	0 50	.....	0 50	2,486 81	2,487 31
May .....	.....	50 00	82 45	.....	132 45	602 50	734 95
June .....	.....	.....	919 29	.....	919 29	.....	919 29
July	1 62	.....	12 20	.....	13 82	184 00	197 82
August .....	.....	.....	.....	.....	.....	.....	.....
September .....	.....	.....	.....	.....	.....	275 00	275 00
October .....	.....	.....	1,618 05	.....	1,618 05	.....	1,618 05
Totals.....	1 62	50 00	3,703 81	.....	3,736 43	4,649 31	8,404 74
Collected at Head Office.	.....	4,649 31	.....	.....	.....	.....	.....
	1 62	4,699 31	3,703 81	.....	3,736 43	4,649 31	.....
Amount collected by agent prior to 1st November, 1883, and received at Head Office subsequent to that date.....	.....	.....	.....	.....	.....	.....	467 15
Amount received by agent prior to 31st October, 1884, but not received at Head Office until after that date.....	.....	.....	.....	.....	.....	.....	8,871 89
Grand Total.....	.....	.....	.....	.....	.....	.....	1,618 05
	.....	.....	.....	.....	.....	.....	7,253 84

THOS. ANDERSON,
Crown Timber Agent.

CROWN TIMBER OFFICE,
EDMONTON, 31st October, 1884.

SCHEDULE B.

GENERAL OFFICE Return for twelve months ending 31st October, 1884.

Description of Return.	Amount.	Compared with the Previous Year.		Remarks.
		Increase.	Decrease.	
Expense of working office.....	\$319 77			
Number of letters written.....	370	48		
do do received.....	221	79		
do permits granted.....	75		10	
do seizures made.....	3		2	
do mill returns received.....	7		1	
do leases or licenses cancelled.....				H. S. Moore's lease ^{is} now in the Prince Albert District.
Names of Parties whose Leases or Licenses were Cancelled.				Remarks.
.....				

THOMAS ANDERSON,
Crown Timber Agent.

CROWN TIMBER OFFICE,
EDMONTON, 31st October, 1884.

SCHEDULE C, showing the Saw Mills in the EDMONTON Crown Timber Agency operating under Government License, during the Year ending 31st October, 1884.

Name of Owner or Owner and Assignee.	Where Situated.	Kind of Power.	Horse Power.	Capacity per 12 hours.	Commenced operations.	Description of Timber.	Logs Cut at.	Quantity of Lumber manufactured during Year ending 31st October, 1884.	Quantity of Lumber sold from amount on hand 31st October, 1883, and manufactured to 31st October, 1884.	Quantity of Shingles manufactured during Year ending 31st October, 1884.	Quantity of Shingles sold from amount on hand 31st October, 1883, and manufactured to 31st October, 1884.	Quantity of Lath manufactured during Year ending 31st October, 1884.	Quantity of Lath sold from amount on hand 31st October, 1883, and manufactured to 31st October, 1884.
Hudson Bay Co	Edmonton	Steam	40	10,000	1880	Spruce.....	On the North Saskatchewan	Ft., B.M. 416,111	Ft., B.M. 135,714	Ft., B.M. 300,000	Ft., B.M. 13,000	Ft., B.M.	Ft., B.M.
Hardisty & Frazer.....	do	Steam	30	10,000	1880	Spruce.....	do	480,814	470	195,500	13,000	.....	.....
St. Albert Mission	St. Albert	Water	20	5,000	1882	Spruce.....	Egg Lake District.....	170,098	20,000	495,500	13,000	.....	.....
Lamoroux Bros.....	Fort Saskatchewan.....	Steam	20	5,000	1883	Spruce.....	On the North Saskatchewan	20,849	156,184	.....	.....	.....	.....
								1,087,872					

THOS. ANDERSON,
Crown Timber Agent.

CROWN TIMBER OFFICE,
EDMONTON, 31st October, 1884.

CROWN TIMBER OFFICE, CALGARY, 7th November, 1884.

SIR,—I have the honour to submit the following Report of the work of the Crown Timber Office, Calgary, for the year just closed.

Statements showing the revenue derived from Crown timber, and the number of saw mills operating within this agency, together with the quantity of building material manufactured and sold by each mill owner respectively, during the year, and other information regarding the business of this office, will be found hereto appended.

I have the honour to be, Sir,

Your obedient servant,

C. L. GOUIN,
Crown Timber Agent.

The Deputy of the Minister of Interior,
Ottawa.

SCHEDULE A.

STATEMENT of Receipts on Account of Crown Timber, for the Twelve Months ending 31st October, 1884.

Month.	Returns under License.	Bonus and Ground Rent.	Permits.	Dues and Fines for Trespass.	Total.	Amounts collected at Head Office.	Grand Total.
1883.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
November	492 39	.....	.....	.....	492 39	750 00	1,242 39
December .....	.....	.....	.....	.....	.....	.....	.....
1884.							
January .....	.....	.....	.....	.....	.....	747 14	747 14
February .....	.....	.....	.....	.....	.....	250 00	250 00
March .....	.....	.....	.....	.....	.....	250 00	250 00
April .....	.....	.....	.....	.....	.....	441 51	441 51
May .....	.....	.....	.....	.....	.....	.....	.....
June .....	.....	.....	.....	.....	.....	.....	.....
July .....	.....	.....	.....	.....	.....	2,600 75	2,600 75
August .....	.....	.....	.....	.....	.....	.....	.....
September .....	.....	.....	33 51	.....	33 51	.....	33 51
October .....	.....	.....	15 00	.....	15 00	50 00	65 00
Collected at Head Office.	492 39 442 26	..... 3,750 00	48 51 747 14	..... 150 00	540 90	5,089 40	5,630 30
	934 65	3,750 00	795 65	150 00	.....	.....	.....
Amount received by agent prior to 31st October, 1884, but not received at Head Office until after that date.....	.....	.....	.....	.....	.....	.....	48 51
Canadian Pacific Railway Co, account, settled at Head Office.....	.....	.....	.....	.....	.....	.....	5,581 79 501 63
Grand Total.....	.....	.....	.....	.....	.....	.....	6,083 43

C. L. GOUIN,
Crown Timber Agent.

CROWN TIMBER OFFICE,
CALGARY, 31st October, 1884.

SCHEDULE B.

GENERAL Office Return for Twelve Months ending 31st October, 1884.

Description of Return.	Amount.	Compared with the previous year.		Remarks.
		Increase.	Decrease.	
Expense of working office.....	\$872 74		\$75 25	
Number of letters written.....	182	138		
do received.....	127	89		
Number of permits issued.....	29	16		
do seizures made.....	1			
do mill returns received.....	6			
do licenses cancelled.....				

C. L. GOUIN,
Crown Timber Agent.

CROWN TIMBER OFFICE,
CALGARY, 31st October, 1884.

SCHEDULE C, showing the Saw Mills in the Calgary Crown Timber Agency, operating under Government License, during the Year ending 31st October, 1884.

Name of Owner or Owner and Assignee.	Where situated.	Kind of Power.	Horse Power.	Capacity per 12 hours.	Commenced operations.	Description of Timber.	Location of Limit.	Quantity of Lumber manufactured during the Year ending Oct. 31, 1884.	Ft., B.M.	Quantity of Lumber sold from amount on hand, Oct. 31, 1883, and manufactured to Oct. 31, '84.	Quantity of Shingles manufactured during Year ending Oct. 31, 1884.	Ft., B.M.	Quantity of Shingles sold from amount on hand, Oct. 31, 1883, and manufactured to Oct. 31, '84.	Quantity of Lath manufactured during Year ending Oct. 31, 1884.	Quantity of Lath manufactured during Year ending Oct. 31, 1884.	Quantity of Lath sold from amount on hand, Oct. 31, 1883, and manufactured to Oct. 31, '84.
James Walker ...	Calgary, Alberta	Steam ...	20	10,000	Feb., 1883	Spruce and red fir.	Calgary, Bow River Mill.	643,119	549,481	373,500	345,000	90,200	46,800			
Louis Sands	Cypress Hills, Assinboia.	do ...	75	10,000	May 15, '84	Pine and spruce...	Cypress Hills.	235,000	766	63,500	.....	87,000	.....		
Peter McLaren ...	Old Man's River, Alberta.	Water .....	.....	2,500	Jan. 21, '82	Red fir, spruce and an inferior kind of pine.	.....	.....	374,267	.....	185,125	.....	.....	
N.W. Coal and Navigat'n Co.	Porcupine Hills, Beaver Creek, Alberta.	Steam ... (Mill closed down in June, 1884.)	20	About 5,000	Fall of 1882.	Pine	Porcupine Hills.	.....	.....	.....	.....	.....	.....
Totals .....	.....	.....	.....	.....	.....	.....	.....	878,119	924,504	437,000	530,125	177,200	46,800

C. L. GOUIN,
Crown Timber Agent.

CROWN TIMBER OFFICE,
CALGARY, 31st October, 1884.

CROWN TIMBER OFFICE,
PRINCE ALBERT DISTRICT, 25th November, 1884.

SIR,—I have the honour to submit the following Report of the work of the Crown Timber Office, Prince Albert, for the year just closed.

Statements showing the revenue derived from Crown timber, the number of saw-mills operating under Government license in the District of Saskatchewan, together with the quantities of building material manufactured and sold by each licensee respectively during the year, and other information regarding the business of this office will be found hereto appended.

I am pleased to inform you that a spirit of enterprise is quite noticeable in the direction of manufacturing the products of the forest into lumber, shingles and lath. The timbered lands on the north side of the North Saskatchewan River, in this District, which lie in such close proximity to the garden of the great "North-West," will eventually yield a large revenue to the Crown; and will also benefit the many thousands of people who will be attracted to this portion of the country, owing to the inestimable advantages it affords.

Besides Messrs. Moore & Macdowall's large saw-mill and the one owned by Mr. Thomas McKay, both situated at Prince Albert, a number of portable mills have been erected, one at Battleford, one at Saskatoon, and another at Frog Lake near Fort Pitt. Mr. McKay, during the last four months, has manufactured 31,700 feet, B.M., of lumber; also 113,000 shingles. Nearly all the lumber has been disposed of at prices varying from \$30 to \$40 per thousand.

In consequence of low water in the stream flowing from Messrs. Colridge & Oliver's berth into the North Saskatchewan River, that firm was prevented from having, this season, a supply of lumber to meet the great demand at Battleford and the surrounding district.

The rapid progress made in lumbering during the last few months plainly shows that so soon as the welcome sound of the locomotive is heard in this remote district, a bright and happy future will be in store for lumbermen.

D. J. WAGGONER,

Crown Timber Agent.

The Deputy of the Minister of the Interior
Ottawa.

SCHEDULE A.

STATEMENT of Receipts on account of Crown Timber for the twelve months ending
31st October, 1884.

Month.	Royalty on Returns of Sales.	Bonus and Ground Rent.	Permits.	Dues and Fines for Trespass.	Total.	Amounts Collected at Head Office.	Grand Total.
1883.							
November.....			329 35		229 35	500 00	829 35
December.....	295 44		11 50		306 94	250 00	556 94
1884.							
January.....	254 13		18 50		272 63	250 00	522 63
February.....			51 21		51 25		51 25
March.....	77 86	268 75	58 25		404 86	250 62	655 48
April.....			1 00		1 00	250 00	251 00
May.....			21 00		21 00		21 00
June.....						105 00	105 00
July.....						350 00	350 00
August.....						300 25	300 25
September.....			146 00		146 00	250 00	396 00
October.....						50 00	50 00
Received at Head Office.....	627 43	268 75	636 85		1,533 03	2,555 87	4,088 90
	627 43	2,824 62	636 85				

D. J. WAGGONER,
Crown Timber Agent.

CROWN TIMBER OFFICE,
PRINCE ALBERT, 31st October, 1884.

SCHEDULE B.

GENERAL Office Return for the twelve months ending 31st October, 1884.

Description of Return.	Amount.	Compared with the Previous Year.		Remarks.
		Increase.	Decrease.	
Expense of working office.....	£835 10			
Numbers of letters written.....	653			
do do received.....	428			
do permits issued.....	190			
do seizures made.....	2			
do mill returns received.....	9			
do leases or licenses cancelled .....	.....		
Names of Parties whose Leases or Licenses were Cancelled.				Remarks.
.....				
.....				

D. J. WAGGONER,
Crown Timber Agent.

CROWN TIMBER OFFICE,
PRINCE ALBERT, 31st October, 1884.

SCHEDULE C.

STATEMENT showing the Saw Mills in the Prince Albert Crown Timber Agency operating under Government License, during the Year ended 31st October, 1884.

Name of Owner or Assignee.	Where Situated.	Kind of Power.	Horse Power.	Capacity per 12 hours.	Commenced operations.	Description of Timber.	Location of Limit.	Quantity of Lumber manufactured during Year ending 31st October, 1884.	Quantity of Lumber on hand, 31st October, 1883, and manufactured to 31st October, 1884.	Quantity of Shingles manufactured during Year ending 31st October, 1884.	Quantity of Shingles on hand, 31st October, 1883, and manufactured to 31st October, 1884.	Quantity of Laths manufactured during Year ending 31st October, 1884.	Quantity of Laths on hand, 31st October, 1883, and manufactured to 31st October, 1884.
Moore & Macdowall.	Prince Albert, N. W. T.	Steam	75	35,000	1876	Spruce, pine and poplar.	Sturgeon River	305,103	465,693	212,000	378,162 3/4	None	385 balls.
Thomas McKay.	Prince Albert, N. W. T. ....	.....	16	5,000	.....	Spruce and poplar.	.....	317,067	229,850	113,600	95,000	do	.....
Colridge & Oliver....	Battleford, N. W. T.	Steam	50	15,000	1881	Pine and poplar....	Turtle Lake....	21,555	21,555	82,250	82,250	do	.....
							Total	643,725	717,098	407,750	255,412 3/4	.....	.....

D. J. WAGGONER,
Crown Timber Agent.

CROWN TIMBER OFFICE,
PRINCE ALBERT, 31st October, 1884.

No. 8.

DEPARTMENT OF THE INTERIOR,
ORDNANCE AND ADMIRALTY LANDS BRANCH,
OTTAWA, 15th December, 1884.

SIR,—I have the honour to report on the operations of this branch for the fiscal year dating from the 30th June, 1883, to 30th June, 1884.

Four schedules are annexed, viz. :—

A. Statement of sales made during the year.

B. Statement showing the several localities from which moneys have been received.

C. Statement showing amounts received each month.

D. Statement of sales cancelled under the provisions of the Act 23 Vict., cap. 2, sec. 20.

There were but few sales during the year. At Grand Falls, N.B., twenty-three lots were sold by auction. At Pittsburg (Kingston Mills), Penetanguishene, Kingston and Kingston the sales were made to parties whose claims to special consideration had been recognized by the Minister of the Interior, under authority of certain Orders in Council. At Ottawa ten lots, previously rented under lease, were, upon payment of the "consideration money" specified in the several leases of the said lots, redeemed, and have since been patented.

The greatest forbearance having been exercised by this Department towards the many purchasers of Ordnance Lands in arrears, without producing any satisfactory results, it was decided, after due notice had been forwarded to the several parties interested, to cancel sundry sales, which had been made some years since, of lands situated at Fort Erie, Kingston, Toronto, Chambly and Amherstburg. It will be seen, upon reference to the statement lettered D, that at the date of cancellation the amounts due in each locality exceeded, in the aggregate, the price for which the lots were originally sold; indicating, I think, clearly and conclusively, that it was not the intention of the said parties to perfect their respective purchases.

I am pleased to be in a position to state that a marked improvement in the financial operations of this branch has taken place since the opening of the present fiscal year. The receipts for the five months ended 30th November, amounted to \$11,437.89, while for the corresponding period of last year the receipts were only \$6,417.14. The increase has, in a great part, resulted from a sale of Ordnance lots situated on the property known as the "Herchmer Farm," in the city of Kingston. The sale referred to was held on the 15th October and two following days. Eighty-eight lots, varying in size from a-fifth to a quarter of an acre and comprising a total area of 20.03 acres, were sold for \$16,215 (average per acre, \$310.75), of which amount \$4,102 was paid down at time of sale.

There were no sales reported during the year, of lands appertaining to the estate of the Bank of Upper Canada.

The general business of this branch has experienced no decrease; on the contrary, it has increased considerably. During the fiscal year 530 letters were received; 750 letters (including several lengthy reports), 200 notices and statements of account forwarded to tenants and purchasers in arrears; fifty seven drafts for letters patent prepared; sixty three assignments registered; 198 warrants issued for bank to receive moneys—in addition to the keeping of upwards of 1,000 accounts.

In conclusion, I reiterate the statement made by me in my last annual report that: "It would be impossible to present an accurate statement of the large amount of labour performed in this office, or description of the quality of that labour, embracing, as it does, the consideration of conflicting claims, errors in surveys, preparation of numerous and varied reports, &c., &c."

I have the honour to be, Sir,

Your obedient servant,

WILLIAM MILLS,

In charge of Ordnance and Admiralty Lands.

The Deputy of the Minister of the Interior. Ottawa.

A.

STATEMENT of Sales made during the Fiscal Year ended 30th June, 1884.

Locality.	Number of Lots sold.	Amounts sold for.		Amount received on Account.	
		\$	cts.	\$	cts.
Grand Falls, N.B	23	8	538	208	82
Pittsburg	7a. 2r.	52	50	30	00
Penetanguishene	1	10	23	10	23
Queenston	2	40	00	40	00
Kingston	2	400	00	80	00
Ottawa	10	1,569	65	1,569	65
Totals	28 lots and 7a. 2r.	2,907	76	1,938	70

P. G. KEYES,
Acting Accountant.

DEPARTMENT OF THE INTERIOR,
ORDNANCE LANDS OFFICE,
OTTAWA, 1st October, 1884.

B.

STATEMENT showing the several Localities on account of which moneys have been received during the Fiscal Year ended 30th June, 1884.

Locality.	Amount.	Locality.	Amount.
	\$ cts.		\$ cts.
Amherstburg	320 00	Brought forward	6,124 92
Chambly	1,318 75	Niagara	415 79
Carillon	1 60	Navy Island	200 00
Chatham, Q.	50 00	Ottawa	5,798 46
Elmsley	9 70	Oxford	1 60
Gloucester	49 44	Prescott	290 48
Grenville	0 20	Penetanguishene	10 25
Kingston City	2,806 22	Queenston	90 00
Kingston Mills	30 00	South River	10 00
Longueuil	310 00	Sorel	1,041 90
Montreal	836 00	Sarnia	40 00
Nepean	1 00	Walford	23 20
Nova Scotia	0 25	Registration fees	92 10
New Brunswick	291 76		
Carried forward	6,124 92	Total	14,138 70

P. G. KEYES,
Acting Accountant.

DEPARTMENT OF THE INTERIOR,
ORDNANCE LANDS OFFICE,
OTTAWA, 1st October, 1884.

C.

STATEMENT of Receipts on account of Ordnance and Admiralty Lands for the Fiscal Year ended 30th June, 1884.

Date.	Receipts.	Registration Fees.	Rent or Interest.	Principal.	Total Amount.
1883.		\$ cts.	\$ cts.	\$ cts.	\$ cts.
July.....	To receipts for month	25 70	718 20	931 74	1,675 64
August.....	do		513 67	155 00	668 67
September...	do		558 39	712 56	1,270 95
October.....	do		992 91	142 00	1,134 91
November...	do		1,418 97	248 00	1,666 97
December...	do		536 51	551 24	1,087 75
1884.					
January.....	do		414 75	1,138 50	1,553 25
February.....	do	26 00	461 06	669 50	1,156 56
March.....	do		178 71	326 15	504 86
April.....	do		250 75	611 44	862 19
May.....	do		1,672 54	241 97	1,914 51
June.....	do	40 40	439 79	162 25	642 44
	Total.....	92 10	8,156 25	5,890 35	14,138 70

P. G. KEYES,
Acting Accountant.

DEPARTMENT OF THE INTERIOR,
ORDNANCE LANDS OFFICE,
OTTAWA, 1st October, 1884.

D.

STATEMENT of Sales cancelled during the Fiscal Year ended 30th June, 1884, under the provisions of the Act 23 Vic., cap. 2, sec. 20.

Locality.	Number of lots Cancelled.	Amount sold for.	Amount due 30th June, 1884.
		\$ cts.	\$ cts.
Fort Erie.....	7	556 25	744 04
Kingston.....	4	1,020 00	1,312 80
Toronto.....	2	3,915 00	5,426 19
Chambly.....	7	1,225 00	1,292 05
Amherstburg.....	15	18,826 00	22,144 85
Total.....		25,542 25	30,919 93

P. G. KEYES,
Acting Accountant.

DEPARTMENT OF THE INTERIOR,
ORDNANCE LANDS OFFICE,
OTTAWA, 1st October, 1884.

No. 9.

DEPARTMENT OF THE INTERIOR,
ACCOUNTANT'S BRANCH,

OTTAWA, 19th December, 1884.

SIR,—I beg to report as follows on the reorganization of this branch of the Department, and on the general work performed in this office during the fiscal year ending 30th June, and the Departmental year ending 31st October, 1884.

According to instructions I received when appointed Accountant of this Department, in April, 1883, a new set of books for Dominion Lands accounts was opened on the 1st July, 1883. The new system was rendered necessary by the rapid increase of business, and formulated in view of meeting the requirements of the demands for information and various statements in connection with the different services.

The experience of more than one year has proven that the change from the old method of keeping books by single entry is one upon which we can congratulate ourselves. In addition to the changes effected in the Dominion Lands accounts, a new and distinct set of books, not previously kept in this office, has been opened for each of the following sub-heads of expenditure under the control of this Department, viz.:—Civil Government, Expenses of Government of the North-West Territories, Expenses of Government for the District of Keewatin.

The statements of our expenditure, appearing in the Public Accounts prepared every year for Parliament by the Finance Department, are now furnished by this office.

All charges against our appropriations are now made only through this office. Our revenue, also, is only credited in the same manner. The system of contingency accounts with our outside offices has been simplified and made uniform. All salaries are now paid from head office. A duplicate of every account paid is kept on record in this office.

The accounts of this Department have become both extensive and important, entailing considerable extra labour and care, showing an increase in last fiscal year of nearly 50 per cent. in the number of cheques issued, as compared with the preceding fiscal year; causing a corresponding increase in the number of entries in our books.

The increase of business of this Department, as applied specially to accounts, may be better illustrated by the following comparative statement between fiscal years 1879-80 and 1883-84:—

Fiscal Years.	Gross Annual Transactions.	Number of Ledger Accounts.	Number of Book Entries.
	\$ cts.		
1883-84.....	2,014,078 00	1,315	29,867
1879-80.....	268,282 00	230	4,780
Increase in 1883-84....	1,745,796 00	1,085	25,083

During the Departmental year 230 letters have been written, 185 special statements, 350 reports and 286 bank deposits have been made. The whole work of this branch is performed by a comparatively small staff of officers, viz.:—Three permanent clerks, one of whom was appointed only in March, 1884, and two extra clerks.

Hereto annexed you will find a statement of receipts on account of Dominion Lands, for the Departmental year ending 31st October, 1884, showing the revenue by months from all sources :—

The Gross Cash Revenue is	.	.	.	.	\$823,842 02
Scrip redeemed.	.	.	.	.	28,395 80
Warrants..	.	.	.	.	9,600 00
					<u> </u>

Respectfully submitted,

J. A. PINARD,

Accountant.

The Deputy of the Minister of the Interior, Ottawa.

STATEMENT of Receipts on account of Dominion Lands, for the Year

Month.	Homestead Fees.	Pre-emption.	Improvements.	General Sales of Land.	Timber Dues, &c.	Rents from Grazing Lands.
1883.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
November.....	2,252 74	1,630 00	34 00	20,665 94	3,711 22	2,134 80
December.....	1,640 00	1,110 00	88 00	23,124 24	4,439 66	2,055 40
1884.						
January.....	2,460 00	1,850 00	42 50	129,353 69	9,068 96	599 80
February.....	2,250 00	1,480 00	296 50	29,276 46	9,597 49	25 00
March.....	1,840 00	1,400 00	95 25	21,059 64	5,633 94	315 00
April.....	4,300 00	3,520 00	726 66	23,137 38	5,909 06	101 16
May.....	3,230 00	2,635 00	284 75	20,332 65	5,725 77	1,270 00
June.....	6,650 00	4,235 00	605 95	69,885 76	3,676 42	1,857 64
July.....	2,425 00	1,710 00	194 00	15,982 78	6,181 85	841 00
August.....	3,960 00	2,829 80	399 50	29,292 10	3,804 09	269 50
September.....	3,250 00	2,710 00	424 75	17,637 24	19,143 48	1,939 50
October.....	2,520 00	1,730 20	253 50	25,769 56	16,304 92	34 50
	36,777 74	26,840 00	3,445 36	425,517 43	93,196 86	10,642 50

DEPARTMENT OF THE INTERIOR,
OTTAWA, 19th December, 1884.

commencing 1st November, 1883, and ended 31st October, 1884.

Rents from Coal Lands.	Royalty from Stone Quarries, Hay Permits, &c.	Sales of Colonization Lands.	Map Sales, Office and Registration Fees, &c.	Surveyors' Examination Fees.	Interchange of Entries, Inspection Fees, &c.	Miscellaneous.	Total.
\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
.....	14 03	145,026 21	49 25	140 00	20 00	.....	175,677 39
.....	.....	20,157 25	80 70	.....	60 00	.....	52,754 85
.....	29 16	.....	314 84	.....	.....	.....	143,718 94
.....	.....	2 35	374 20	.....	40 00	.....	43,342 00
218 90	.....	656 00	103 82	.....	130 00	.....	31,452 55
.....	.....	.....	81 40	.....	170 00	.....	37,945 66
240 00	.....	2,481 75	84 70	.....	230 00	.....	36,514 62
.....	23 00	7,244 21	166 76	390 00	400 00	45,766 53	140,101 27
82 40	38 50	.....	6 00	.....	150 00	.....	27,611 53
.....	26 20	886 22	151 50	.....	325 00	.....	41,944 31
.....	10 00	328 00	29 75	.....	260 00	.....	45,732 72
.....	42 50	.....	31 00	.....	360 00	.....	47,046 18
541 30	183 39	176,781 99	1,473 92	530 00	2,145 00	45,766 53	823,842 02

Scrip redeemed during the Departmental Year, from 1st November, 1883, to 31st October, 1884 \$28,395 80
Warrants (60) redeemed..... 9,600 00
\$861,837 82

J. A. PINARD,
Accountant.

APPENDIX A.

STATEMENT of Entries, affecting Dominion Lands, which were made during the Year commencing 1st November, 1883, and ending 31st October, 1884, at the Head Office and the Agencies of the several Colonization Companies.

Office.	Homesteads.		Pre-emptions.		Sales.		Hudson Bay Co.		Special Grants.		C.P.R.		Total Entries.	
	No.	Area in Acres.	No.	Area in Acres.	No.	Area in Acres.	No.	Area in Acres.	No.	Area in Acres.	No.	Area in Acres.	No.	Area in Acres.
Head Office.....	14	2,400	16	2,560	.....	.....	2	1,598,748 59	23	4,066 63	82	192,390 37	107	1,795,205 59
Primitive Methodist Colonization Co	36	5,760	28	4,480	.....	.....	.....	.....	.....	.....	.....	.....	30	4,960 00
York Farmers' do	20	3,160	17	2,680	.....	.....	.....	.....	.....	.....	.....	.....	61	10,240 00
Dominion Lands do	29	4,640	13	2,080	.....	.....	.....	.....	.....	.....	.....	.....	37	5,840 00
Saskatchewan Land and Homestead Co.	109	17,440	98	3,880	.....	.....	.....	.....	.....	.....	.....	.....	42	6,720 00
Qu'Appelle Land and Colonization Co.	10	1,600	10	1,600	.....	.....	.....	.....	.....	.....	.....	.....	207	21,320 00
Temperance Colonization Co.	9	1,440	9	1,440	.....	.....	.....	.....	.....	.....	.....	.....	20	3,200 00
Wm. Fahy and J. Wilkinson	6	960	5	800	.....	.....	.....	.....	.....	.....	.....	.....	18	2,880 00
Morrow, Green, Armytage & Beattie Co	1	160	1	160	.....	.....	.....	.....	.....	.....	.....	.....	11	1,760 00
Montreal and Western Land Co	11	1,760	10	1,600	.....	.....	.....	.....	.....	.....	.....	.....	2	320 00
Armstrong & Cook Colonization Co	16	2,560	16	2,660	.....	.....	.....	.....	.....	.....	.....	.....	21	3,360 00
Shell River Colonization Co.	19	3,040	19	3,040	.....	.....	.....	.....	.....	.....	.....	.....	32	5,120 00
Montreal and Western Colonization Co.	14	2,240	12	1,920	.....	.....	.....	.....	.....	.....	.....	.....	38	6,080 00
Fertile Belt Colonization Co.	19	3,040	12	1,920	.....	.....	.....	.....	.....	.....	.....	.....	26	6,080 00
Edmonton and Saskatchewan Colonization Co.	35	5,600	27	4,320	.....	.....	.....	.....	.....	.....	.....	.....	62	9,920 00
Scottish Ontario and Manitoba Land and Colonization Co.	15	2,080	10	1,600	.....	.....	.....	.....	.....	.....	.....	.....	26	3,840 00
Touchwood and Qu'Appelle Colonization Co.	15	2,400	10	1,600	.....	.....	.....	.....	.....	.....	.....	.....	25	4,000 00
	359	57,240	301	36,320	.....	.....	.....	.....	.....	.....	.....	.....	82	192,390 37
							2	1,598,748 59	23	4,066 63	82	192,390 37	768	1,888,925 59

WM. M. GOODEVE,
Acting Chief Clerk of Patents.

DEPARTMENT OF THE INTERIOR,
OTTAWA, 2nd January, 1885.

APPENDIX B.

ABSTRACT of Letters Patent issued from the Department of the Interior, covering Lands in Manitoba and the North-West Territories, between 1st November, 1883, and 31st October, 1884.

Nature of Grants.	1883-84.		1882-83.	
	Number of Patents.	Area in Acres.	Number of Patents.	Area in Acres.
Homestead	1,812	288,365	1,818	292,715
Sales	1,547	317,768	2,000	437,366
Half-breed allotments	90	21,600	200	48,000
Military bounty grants	5	480	9	1,440
North-West Mounted Police grants	10	1,600	21	3,360
Grants under Manitoba Act.	196	30,172	182	23,188
Commutation of right of common, &c.....	119	11,027	96	6,606
Special grants	19	7,520	13	4,813
Hudson Bay Company grants.....	16	38,685	2	13,853
Canadian Pacific Railway grants.....	82	192,387	.....	.....
Totals.....	3,896	909,604	4,341	831,341

WM. M. GOODEVE,
Acting Chief Clerk of Patents.

DEPARTMENT OF THE INTERIOR,
OTTAWA, 2nd January, 1885.

APPENDIX C.

MEMORANDUM of Registration Districts for which Lists of Patents, up to 31st December, 1883, have been prepared, under the provisions of the 78th section of the Act 46 Vic., Cap. 17.

Names of Districts.	No.	Sheets.	Period.
Lisgar	1	22	1st January to 31st December, 1883.
Manchester	1	32	do do
Carrillon	1	9	do do
Morris	1	10	do do
Lorette	1	15	do do
D'Iberville	1	12	do do
Selkirk	1	33	do do
Marquette	1	35	do do
Dufferin	1	68	do do
Portage la Prairie	1	23	do do
Norfolk	1	28	do do
Rock Lake	1	48	do do
Westbourne	1	18	1st July, 1882, to 31st December, 1883.
Beautiful Plains	1	26	do do
Minnedosa	1	41	1st January to 31st December, 1883.
Brandon	1	20	do do
Turtle Mountain	1	10	1st July, 1882, to 31st December, 1883.
Souris River	1	3	do do
Dennis	1	8	1st January to 31st December, 1883.
Snoal Lake	1	34	do do
Russell	1	15	do do
North-West Territories districts	4	37	do do
Totals	25	547	

WM. M. GOODEVE,
Acting Chief Clerk of Patents.

DEPARTMENT OF THE INTERIOR,
OTTAWA, 2nd January, 1885.

PART II.

DEPARTMENT OF THE INTERIOR,
TECHNICAL BRANCH, OTTAWA, 9th December, 1884.

SIR,—I have the honour to submit the following report on the operations of this branch during the twelve months ending 31st October, 1884.

The correspondence has been as follows:—

Letters received..... 3,333
Letters sent..... 3,343

The number of townships sub-divided during the year is about 300, with an area of 6,400,000 acres. Most of these townships are between Carlton and Fort Pitt, some between Edmonton and Calgary, and a few near Fort Walsh. They consist, generally, of mixed woods and prairie, and contain good water in abundance. With a few exceptions, the soil is first-class farming land. The cost for sub-division alone is estimated at \$190,000, or 3 cents per acre. This figure is higher than formerly. The increase is due to the nature of the country, which is less open and more broken by lakes than the great plains along the railway line. The work was performed entirely by contract, at certain rates per mile, fixed in advance for each township, by Order in Council. Forty-eight surveyors were employed. Their names, together with the description of each contract, are given in the schedule herewith.

In addition to the above, thirteen surveyors were employed on outline surveys, establishing the exterior lines of townships. The number of miles surveyed is estimated at 3,900, and the cost about \$80,000, or \$20.50 per mile. In 1883 the cost of outline surveys was about \$20 per mile. The reason of the higher rate is the same as for sub-division surveys, viz.:—the nature of the country, but the cost has not increased in proportion to the difficulty of the work. This gratifying result is due to the reduction in the number of surveyors employed, which enabled the Department to take none but those possessed of the highest qualifications. A body of surveyors more efficient than those now engaged on outline surveys could not be desired.

Town plot surveys were made at Calgary by Mr. A. W. McVittie, at Point Douglas, Winnipeg, by Mr. Geo. McPhillips, and at Silver City, Alberta, by Mr. G. W. Vaughan.

In 1883 the township lines were extended into the Peace River district. Owing to the difficulty of the communications they proved so expensive that it was decided not to continue, for the present, the extension there of the regular surveys; but to send explorers for obtaining, at a moderate cost, accurate information concerning the country.

The reports of these explorers will make it possible to draw instructions for the prosecution of the township surveys, so as to make them in the cheapest manner, and only where they will prove of immediate use.

For that purpose Mr. Wm. Ogilvie explored the Athabasca and Peace Rivers, and made accurate measurements of 1,050 miles. The report of his exploration, and also a previous report on the same district are appended. They contain interesting information on a country of which little is known.

Another explorer, Mr. O. J. Klotz, scaled the Saskatchewan and Nelson Rivers from Prince Albert to York Factory, and measured, during the season, 850 miles. His plans will help to correct the topography of our maps which, in certain parts, are very defective. His report is appended, and is well worth perusal.

The cost of these explorations is about \$4 per mile.

Two examiners of survey contracts were appointed for inspecting in the field the work of the contractors. Their reports show a decided improvement on former years, due, in the first place, to the appointment of examiners; and also to the fact that surveyors who had not given satisfaction in the past were refused further employment.

At the request of the North-West Council, some of the old trails in the Prince Albert District were surveyed and permanently located by Mr. Milner Hart. It is proposed to continue next year the survey of the most important trails in the Terri-

tories. This, I believe, is desired by everyone having to travel in the settled districts.

As a whole, the result of the year's operations is satisfactory; the surveys are generally good, and the work has been performed at a moderate cost.

The sub-division surveys are now completed, so far as required for the immediate wants of settlers, and the outlines of townships have been surveyed over a much larger extent of territory, where the sub-division into sections can be made at once, should new settlements be formed.

The enormous increase in the surveys of 1883 has necessitated a corresponding increase in the clerical force of this branch, for examining the plans, field notes and accounts of surveyors, before accepting their work; hence the large payments which appear in the Public Accounts for extra clerks and extra work.

The reports of the Inspector of Surveys, of the Examiners of Survey Contracts, of the Explorers and of the Road Surveyor, are appended.

A new arrangement has been adopted for the classification of the reports of township surveyors, which will facilitate reference to the description of any particular township. It is proposed to print those descriptions in pamphlet form, instead of, as hitherto, in the Annual Report. The great bulk of these descriptions, owing to the increase of the surveys, necessitated this change.

Meetings of the Board of Examiners for Dominion Land Surveyors were held in November, 1883, and May, 1884.

The following candidates passed the requisite examination, and were granted commissions as Dominion Land Surveyors:—

Joseph A. Coté, Montmagny, Que.
 John Swan, Montreal.
 Duncan Macpherson, Montreal.
 Charles A. Bourget, St. Alphonse, Que.
 John Causley, Ottawa.
 John P. Mullarkey, Aylmer, Que.
 Ernest W. Hubbell, Kingston, Ont.
 Thomas D. Greene, Ottawa.
 Alex. W. Kippen, Perth.
 Henry C. Godorm, Portage la Prairie, Man.
 Fred. W. Norton, Orillia.
 Henry R. McEvoy, St. Mary's, Ont.
 Ormond Fletcher, Quebec City.
 Charles E. Forgues, Murray Bay, Que.
 Bryce J. Saunders, Montreal.

Preliminary certificates were granted to the following candidates:—

C. E. Bourgeault,	W. G. Forlong,
A. P. Low,	J. L. Bond,
S. W. Genest,	G. W. R. White,
T. W. Chalmers,	M. W. Fraser,
Frederick Ritchie,	H. A. Longley,
E. A. Bleakney,	H. J. Donnelly,
Thomas Tremblay,	J. N. A. Hamel,
George H. Ogilvie,	H. B. Strange,
C. F. Marsan,	W. F. Van Buskirk,
D. J. O'Keefe,	F. L. Crawford,
C. E. Cartwright,	E. P. Goodwin,
E. J. Walsh,	

A commission as Dominion Topographical Surveyor was granted to John McAree, D.L.S., of Toronto.

I have the honour to be, Sir,

Your obedient servant,

A. M. BURGESS, Esq.,

Deputy of the Minister of the Interior.

E. DEVILLE,

Chief Inspector of Surveys.

SCHEDULE showing Dominion Land Surveyors employed during the Year ending
31st October, 1884.

Surveyor.	Province, &c.	Description of Survey.
EXPLOREERS.		
Ogilvie, Wm., D. T. S....	Ottawa, Ont.....	Exploration of Peace and Athabasca Rivers.
Klotz, O. J.....	Preston, Ont.....	Exploration of Saskatchewan and Nelson Rivers.
OUTLINE SURVEYORS.		
Bray, Edgar.....	Oakville, Ont.....	Meridian Township outlines between 4th Initial Meridian and Range 10, and between the 14th and 15th Base Lines.
Belanger, P. R. A.	L'Islet, Que	Meridian Township outlines, between 4th Initial Meridian and Range 8, and between the 12th Correction Line and the 14th Base Line; also Meridian outlines between the 12th and 13th Bases, and between Ranges 10 and 15, west of 3rd Initial Meridian.
Cotton, A. F.....	Ottawa, Ont	Meridian Township outlines, between 13th and 16th Base Lines, and between Ranges 9 and 14, west of 4th Initial Meridian; also the 16th Base Line, from Range 10 to Range 14 inclusive.
Dufresne, J. I.....	St. Thomas de Montmagny, Que.....	Meridian Township outlines, between 12th and 14th Base Lines, and between Range 9, west of the 3rd Initial Meridian and the 4th Initial Meridian; also eastern boundaries of Townships 29, 30, 31 and 32 in Range 2, west of the 3rd Initial Meridian.
Fawcett, Thomas, D.T.S.	Gravenhurst, Ont....	Extension of the Township system and establishment of corner monuments along the Bow River Valley and the C.P.R., line, from the Gap to the summit of the Kicking Horse Pass; also along the upper valley of the Bow River to its source; also along the valley of the Cascade River, Devil's Head Creek and Devil's Head Lake; also sub-division of some sections on Cascade River for coal locations; also survey of the eastern boundaries of Townships 27 and 28, Range 2; Townships 29 and 30, Ranges 5 and 6; Townships 23, 24, 25 and 26, Ranges 6 and 7, and Townships 23, 24, 25 and 26, Range 8, all west of the 5th Initial Meridian.
Garden, James F.....	Toronto, Ont.....	Township outlines, between 10th and 12th Base Lines, and between 4th Initial Meridian and Range 10.
Kains, Tom.....	St. Thomas, Ont.....	Meridian Township outlines, between the 13th Base and Correction Line, and between Ranges 14 and 22, west of the 4th Initial Meridian; also a survey of the old settlement at Victoria, and connection of the settlement survey at Fort Saskatchewan with the Township system.
Miles, C. F.....	Toronto, Ont.....	Meridian Township outlines, west of the 4th Meridian, between 10th and 12th Base Lines, from Range 20 to Range 27.
Magrath, C. A., D.T.S....	Aylmer, Que.	Meridian Township outlines west of 4th Initial Meridian, between the 14th and 16th Base Lines, and between Ranges 8 and 21; also 16th Base Line, from Range 15 to Range 20 inclusive.
McLean, J. K.....	Mount Forest, Ont...	Meridian Township outlines between the 8th and 10th Base Lines, from Range 7 to Range 19, west of 4th Initial Meridian.
McArthur, J. J.....	Aylmer, Que.....	Meridian Township outlines between the 12th and 14th Base Lines, and between Range 22, west of 4th Initial Meridian and the 5th Initial Meridian; also, Meridian outlines between the same Base Lines west of the 5th Initial Meridian.

SCHEDULE showing the Dominion Land Surveyors employed, &c—*Continued.*

Surveyor.	Province, &c.	Description of Survey.
OUTLINE SURVEYORS— <i>Continued.</i>		
Ord, L. R.....	Toronto, Ont.....	Meridian Township outlines between the 8th and 10th Base Lines, from Range 19, west of the 4th Initial Meridian, to Range 4, west of the 5th Initial Meridian.
Wilkins, F. W., D.T.S....	Norwood, Ont.....	Meridian Township outlines between 8th and 10th Bases, from Range 19, west of 3rd Meridian, to Range 5, west of the 4th Meridian.
EXAMINERS OF SURVEY CONTRACTS.		
Hermion, R. W.....	Rednersville, Ont....	
Webb, A. C.....	Brighton, Ont.....	
ROAD SURVEYOR.		
Hart, Milner.....	St. Mary's, Ont.....	Survey of trails in the District of Prince Albert.
SUB-DIVISION SURVEYORS.		
Aylen, C. P.....	Aylmer, Que.....	Townships 21 and 22, in Ranges 7, 8 and 9, west of the 4th Meridian.
Beatty, W.....	Delta, Ont.....	Townships 47 and 48, in Ranges 24 and 25, and Township 45, in Range 24, west of the 4th Meridian.
Bigger, C. A.....	Ottawa, Ont.....	Township 9, in Range 17; Townships 9, 10 and 11, in Ranges 18 and 19; Township 12, in Range 19, and Townships 7 and 10, in Range 21, west of the 4th Meridian. Re-survey of Townships 19, in Ranges 20, 21 and 22, west of 4th Meridian; also, examination of Calgary Town Plot survey.
Boivin, E.....	Chicoutimi, Que.....	Townships 7, in Ranges 25, 26 and 27, and Townships 8, in Ranges 23, 24, 25 and 26, west of 3rd Meridian; also re-survey of Township 20, in Range 18, and Township 19, in Range 19, west of 4th Meridian; also survey of east boundaries of Townships 5 and 6, in Ranges 25, 26, 27 and 28, west of the 3rd Meridian.
Bourgeault, A.....	St. Jean, Port Joli, Que.	Township 7, in Range 29; Townships 8, in Ranges 27, 28, 29 and 30, west of the 3rd Meridian; and Township 8, in Range 1, west of the 4th Meridian.
Bourgeois, John.....	Three Rivers, Que...	Townships 25, in Ranges 19 and 20, and Townships 25 and 26, in Ranges 26, 27 and 28, west of the 3rd Meridian.
Brabazon, S. L.....	Portage du Fort, Que	Townships 25 and 26, in Range 29, west of the 4th Meridian; Townships 25 and 26, in Ranges 1 and 2, and Township 26, in Range 3, west of the 5th Meridian.
Brunelle, F. E.....	Somerset, Que.....	Townships 27 in Ranges 26 and 27, west of the 3rd Meridian.
Burke, Joseph.....	Winnipeg, Man.....	Townships 47 and 48, in Ranges 25 and 26, and Township 48, in Ranges 27 and 28, west of the 3rd Meridian.
Burrows, J. J.....	Ottawa, Ont.....	Township 27, in Range 2, and Townships 27 and 28, in Ranges 3 and 4, west of the 3rd Meridian.
Carre, Henry.....	Brockville, Ont.....	Township 49, in Range 28, and Townships 50, in Ranges 25, 26, 27 and 28, west of the 3rd Meridian.
Crawford, W.....	Winnipeg, Man.....	Township 41, in Range 16; Townships 41 and 42, in Range 17, and Townships 43, in Ranges 17 and 18, west of the 4th Meridian.

SCHEDULE showing Dominion Land Surveyors employed, &c.—Continued.

Surveyor.	Province, &c.	Description of Survey.
SUB-DIVISION SURVEYORS— <i>Continued.</i>		
Charbonneau, M. J.	St. Boniface, Man....	Townships 36, 37, 38 and 39, in Ranges 26, 27 and 28, and Township 40, in Range 27, west of 4th Meridian; and Townships 37 and 38, in Range 1, west of the 5th Meridian.
Deane, M.	Lindsay, Ont.	Townships 27 and 28, in Range 9, and Townships 29 and 30, in Ranges 8 and 9, west of the 3rd Meridian.
DeChesne, L. M.	St. Roch, Que.	Townships 39 and 42, in Range 13, and Townships 40, 41, 42 and 43, in Range 14, west of the 3rd Meridian.
Doupe, Joseph.....	Winnipeg, Man.	Townships 18 and 19, in Ranges 7 and 8, and Township 18, in Range 9, east of the Principal Meridian.
Drummond, Thos.....	Montreal, Que.....	Townships 45, in Ranges 16 and 17; Townships 46, in Ranges 18 and 19, and Townships 49, in Ranges 26 and 27, west of 3rd Meridian.
Du Berger, C. C.....	Murray Bay, Que.....	Township 33, in Range 5, and Townships 32, 33 and 34, in Range 6, west of the 3rd Meridian
Dumais, P. T. C.....	Ottawa, Ont.....	Townships 41, 42, 43 and 44, in Range 15, and Townships 41 and 42, in Range 16, west of the 3rd Meridian.
Foster, F. L.....	Windsor, Ont.....	Township 41, in Range 7, and Townships 42 and 43, in Ranges 6 and 7, and traverse of lakes in Townships 47 and 48, in Ranges 4 and 5, west of 3rd Meridian.
Freeman, N. R.....	Queen's Co., N.S....	Townships 43 and 44, in Ranges 24 and 25, and Township 44, in Range 22, west of the 4th Meridian.
Gore, T. S.	Regina, Assiniboia.	Townships 29 and 30, in Ranges 17, 18 and 19, west of the 2nd Meridian.
Gosselin, L.	Quebec	Townships 27 and 28, in Ranges 27 and 28, west of the 4th Meridian; Townships 27 and 28, in Range 1, and Township 28, in Range 2, west of the 5th Meridian.
Kerr, James.....	Queen's Co., N.B....	Townships 44, in Ranges 18 and 19, and Townships 43 and 44, in Range 23, west of the 4th Meridian.
Kirk, J. A.	Stratford, Ont.....	Townships 43, in Ranges 26, 27 and 28, and Townships 44, in Ranges 27 and 28, west of 4th Meridian.
Leclerc, C. F.	St. Jean Port Joli, Q.	Township 45, in Range 20, and Townships 45 and 46, in Ranges 21 and 22, west of the 3rd Meridian.
Lucas, S. B.	Peace Hills, Alberta.	Townships 50 and 51, in Range 3, and Township 50, in Range 4, west of the 5th Meridian.
Lett, C. A.....	Emerson, Man.....	Townships 35, 36 and 37, in Range 9, and Townships 37, in Ranges 10 and 11, west of the 3rd Meridian.
McArthur, James	Aylmer, Que.....	Townships 47, 48 and 49, in Ranges 23 and 24, west of the 3rd Meridian.
McLatchie, John.....	Winnipeg, Man.....	Townships 24, 25 and 26, in Range 17; Townships 24 and 25, in Range 19, and Township 25, in Range 20, west of the 1st Meridian.
McMartin, G. E.....	St. Andrews, Que....	Townships 45, 46 and 47, in Ranges 27 and 28, west of the 3rd Meridian.
McPhillips, George.....	Winnipeg, Man.....	Townships 25 and 26, in Range 18, Townships 6, in Ranges 25 and 27, west of the 1st Meridian.
McPhillips, R. C.....	do	Townships 19, in Ranges 4, 5, 6 and 8, and Township 19, in Range 8, west of the 2nd Meridian.
Michaud, J. L.	Matane, Que.....	Townships 42, in Ranges 17 and 18, Townships 43 and 44, in Range 18, and Townships 44 and 45, in Range 19, west of the 3rd Meridian.
O'Dwyer, J. S.....	Granby, Que.	Township 45, in Range 23, and Townships 46, in Ranges 23, 24, 25 and 26, west of the 3rd Meridian.
Purvis, Frank	Eganville, Ont	Townships 34, 35 and 36, in Range 7, and Townships 35, 36 and 37, in Range 8, west of the 3rd Meridian.
Reilly, W. R.....	Wardsville, Ont	Townships 51 and 52, in Ranges 25, 26, 27 and 28, west of the 3rd Meridian.
Robertson, H. H.....	Montmagny, Que	Township 39, in Range 12, and Townships 40 and 41, in Ranges 12 and 13, west of the 3rd Meridian.
Ross, George.....	Beaverton, Ont.	Townships 21, 22 and 25, in Range 3, and Townships 25 and 26, in Range 4, west of the 5th Meridian.

SCHEDULE showing Dominion Land Surveyors employed—*Continued.*

Surveyor.	Provinces, &c.	Description of Survey.
SUB-DIVISION SURVEYORS— <i>Continued.</i>		
Roy, G. P	Quebec	Townships 23 and 24, in Range 28, Townships 25 and 26, in Ranges 26 and 27, and Townships 27, in Ranges 25 and 26, west of the 4th Meridian.
Selby, H. W.....	Toronto, Ont.....	Townships 44 and 45, in Ranges 6 and 7, west of the 3rd Meridian.
Snow, J. F.	Ottawa, Ont.....	Townships 7, in Ranges 1 and 2, and Townships 8, in Ranges 2, 3, 4 and 5, west of the 4th Meridian. Resurvey of Townships 19, in Ranges 23 and 24, west of the 4th Meridian.
Stephens, H. H.	Owen Sound, Ont.....	Townships 31, in Ranges 6, 7 and 8, and Townships 32, in Ranges 7 and 8, west of the 3rd Meridian.
Talbot, A. C.....	Montmagny, Que.....	Townships 48, in Ranges 20, 21 and 22, and Townships 49, in Ranges 21 and 22, west of the 3rd Meridian.
Towle, C. E.....	Lennoxville, Ont.....	Townships 31 and 32, in Range 9, and Townships 33 and 34, in Ranges 8 and 9, and Township 33 in Range 7, west of the 3rd Meridian.
Vincent, F.	Murray Bay, Que.....	Townships 38 in Ranges 8, 9, 10 and 11, and Townships 39, in Ranges 8 and 9, and Townships 35 and 41, in Range 6, west of the 3rd Meridian.
Wagner, Wm.	Ossowa, Man.	Townships 18, in Ranges 1 and 2, and Townships 19 and 20 in Ranges 1, 2 and 3, west of the 1st Meridian.
Wheeler, A. O.....	Collingwood, Ont....	Townships 31, 32 and 33 in Ranges 18 and 19, and Township 32, in Range 17; also resurvey of east boundary of Township 32 in Range 19, west of 2nd Meridian.
TOWN PLOT SURVEYORS.		
McVittie, A. W.	Calgary, Alberta.....	Town plot, Calgary, Alberta.
McPhillips, George.....	Winnipeg, Man.....	Town plot, Point Douglas, Manitoba.
Vaughan, G. W.....	do	Town plot, Silver City, Alberta.

E. DEVILLE,

Chief Inspector of Surveys.

DEPARTMENT OF THE INTERIOR,
TECHNICAL BRANCH,
OTTAWA, 9th December, 1884.

DEPARTMENT OF THE INTERIOR.

TECHNICAL BRANCH, 9th December, 1884.

SIR,—I have the honour to submit the following Report of my operations during the past summer.

Under your instructions I proceeded to Winnipeg in April last, to meet the surveyors of township outlines, who assembled there on 13th April.

Some two weeks having been spent in Winnipeg, I then visited the wintering depot near Moose Jaw, and arranged for the distribution of horses and outfits to surveyors. A number of the horses not required for this purpose were reserved for freighting supplies and iron bars, while the remainder, together with a large number of carts, harness, and other articles of outfit were left behind to be sold at the auction sale.

I then went to the other depot at Calgary and inspected the outfits there. The surveyors who had that place for their starting point had already selected their horses and outfits, and nothing remained therefore but to take stock of what were left, and to leave them for the auction sale.

On 20th May, I left Swift Current with my party and drove to Battleford, reaching there on the 31st. As this place was to be my headquarters for two months, I had to obtain a building for my office. This was at first a difficult thing to find, as the scarcity of timber, owing to the deficiency of water in the rivers in the spring, and the growth of the town, had combined to make buildings much in demand. I succeeded, however, in renting an unfinished house belonging to Mr. Gillis. Afterwards through the kindness of Mr. Rae, the Indian Agent, I obtained quarters in his house.

During July I made a trip to Prince Albert, where I succeeded in selling some provisions which had been lying there and at Carlton over winter. At Battleford I had previously sold at auction a number of horses, carts, &c., at good prices.

On 2nd August I left Battleford for Edmonton, in company with you. We took the northern route *via* Fort Pitt and Victoria, and reached Edmonton in seven days. Arrived there, you proceeded to Calgary, while I waited for the sale which was to take place on the 15th.

A few days after the sale I proceeded to Calgary, and, after some stay there, to Ottawa, reaching here on 15th September.

On my arrival in Winnipeg in April, I found that the 35,000 section posts then being made under contract for the use of surveyors during the season were nearly completed. Their distribution without delay to points where they were required was important. The contractor was bound to deliver them at Calgary, Medicine Hat, Swift Current and Moose Jaw, all points on the railway line; but as the greater number were required at more northerly points, it had been proposed to ship them by the North-West Navigation Company's steamers, direct from Winnipeg, to points on the North Saskatchewan River.

On enquiry of the Navigation Company's agent at Winnipeg, however, I found that he would not guarantee their delivery in any reasonable time. Further, our experience in shipping supplies by water in past years had been unfavourable. I, therefore, deemed it advisable to allow the posts to be left at the above named railway stations, and to have them freighted thence overland to their destinations. At the same time it became apparent that the great number of horses, &c., which would be left at Moose Jaw after all the surveyors had been outfitted, could not be sold at good prices; while, if some of them were taken to distant points, sales might be made of small lots at much better prices. Considering thus, with your authority, I outfitted a freighting party, with about fifty horses and carts. During the season they carried a large number of posts and several cart loads of surveyors' provisions from Swift Current to Battleford and Sounding Lake. Posts were also freighted from Battleford to Fort Pitt, and from Calgary to Edmonton and Victoria, while some ten or twelve tons of provisions, which had been forwarded from Winnipeg, in 1882, by the Saskatchewan River steamers, and which were still lying at Victoria, were brought from that place to Edmonton.

Auction sales of Government property were held at Moose Jaw on 21st May, at Calgary on 29th and 31st May, at Battleford on 2nd July, and at Edmonton on 15th August. All these sales, except that at Battleford, were conducted by Mr. J. H. Metcalfe, as auctioneer. Several minor private sales were also made during the season. Altogether, there were sold, out of the survey outfits and stores, 132 horses, ninety carts, seventeen buck-boards, a number of sets of cart harness, and other articles of outfit; and, at the Edmonton sale, the provisions brought from Victoria, as above mentioned.

Tenders were called for, according to your instructions, by advertisement in the Calgary, McLeod, Moose Jaw and Regina newspapers, for the wintering of the remainder of the survey horses and outfits—that is, those at that time in use in the field by surveyors and myself. As before, two places were selected as depots—Calgary and Moose Jaw. On my arrival at Calgary in the fall, I opened the tenders which were there awaiting me, and having made the requisite enquiries as to the persons tendering, I forwarded the papers to you, at Ottawa, for decision.

The surveying work of this year being so much reduced in quantity as compared with previous years, gave me, of course, much less correspondence than formerly. The letters received numbering 220, and those sent 200. My being off the line of railway also, and in a place only reached by the mail once in two weeks, made it frequently less inconvenient for surveyors to communicate directly with the Head Office than with me. However, my location in the Saskatchewan valley enabled me to complete much of the outstanding business of the Department in that distant region, and to collect together and dispose of all the Government property which had, during two years of surveys, become scattered at different places.

In conclusion, I may mention that while in the discharge of my duty, this summer, I travelled in the North-west Territories some 2,000 miles by rail, and 1,000 with horses. Passing over the trail between Swift Current and Battleford, which was new to me, I was agreeably surprised to find the soil to be of the very finest quality for wheat raising, especially between the south branch of the Saskatchewan and Eagle Hill Creek, while the slopes of the Eagle Hills, near Battleford, contain much rich farming land. Of the great fertility of the North Saskatchewan Valley throughout, from Prince Albert to Edmonton, it is needless for me to speak, well known, as it is, by the reports of surveyors, explorers, tourists and others.

I have the honour to be, sir,

Your obedient servant,

W. F. KING,

Inspector of Surveys.

The Chief Inspector of Surveys,
Department of the Interior,
Ottawa.

REPORT OF A. C. WEBB, EXAMINER OF CONTRACT SURVEYS.

I have the honour to submit the following general Report on my examination of contract surveys during the season of 1884.

The territory which came under my observation during the past season was principally in the vicinity of the fifth initial meridian, and extended from Township No. 6, northward to Township No. 49. The greater portion of this area, with the exception of that part lying south of Township No. 33 and east of Range 3, west of the fifth initial meridian, is wooded country, and therefore presented difficulties in travelling. Nearly all the country included in my examinations of last year consisted of open prairie lying between Swift Current and Medicine Hat, and extending from Township No. 12 northward to Township No. 25, being traversed by the Canadian Pacific Railway. The soil, generally, in the last mentioned district, is quite inferior to that

which came under my immediate observation during the past season. In the latter, vegetation was most luxuriant, and the country, in all respects, is in my opinion admirably adapted to stock raising and other agricultural pursuits.

Thousands of head of excellent looking stock may already be seen in the Calgary and McLeod ranching districts, while, doubtless, their numbers will, in the near future, be largely increased. The crops of wheat, oats, &c., also vegetables of various kinds, were, at the time I saw them, in excellent condition, and gave promise of a most bountiful yield.

Many portions of this part of the North-West Territories appear to be underlaid with beds of coal.

I had one beautiful illustration of this fact at Sir A. T. Galt's coal mine, at "The Coal Banks," on the Belly River, on the 9th of August last. While giving our horses their mid day rest at this place, we were, through the kindness and civility of the manager, Mr. Stafford, conducted a distance of 900 feet into this excellent coal mine.

From observations on this and a few other occasions, I was led to the conclusion that the question of fuel for the North-West would be definitely settled so soon as these natural resources are thorough developed.

The timber met with during my season's trip was principally in the northern portions of the territory examined, and consisted chiefly of spruce, tamarac and poplar, the latter predominating, but being useful only as fencing and fuel. Still further west is an excellent timber-producing region, as shown by the thousands of logs which I observed floating down the mountain streams.

It may not be out of place here to state that, with a few exceptions, the surveys examined by me this year have been much better executed than those of 1883.

I would also say, if I may be allowed to suggest, that the surveys should, at a very early date, be extended over at least all that part of the western territories which came under my notice during the past season; as it contains such excellent soil, and is rapidly filling up with a very creditable class of settlers.

REPORT OF R. W. HERMON, EXAMINER OF CONTRACT SURVEYS.

I have the honour to submit the following general remarks in reference to subdivision surveys and other matters of interest which came to my notice during the past season's service in the North-West Territories.

Surveys.

The general character of the surveys compares very favourably with those of other seasons. There were but very few cases where faults of much significance occurred; and even in those (some two or three instances) the errors were not nearly so gross as I have had occasion to notice in former seasons' work.

This is probably the result of the more careful selection of the persons to whom the surveys are entrusted.

There is still room for improvement in several matters of detail, such as the marking of the tin plates, where I noticed frequent minor errors. This part of the survey should be always done by a thoroughly competent hand, and done only at the section corners where the plates belong.

Marking in camp, and sending the plates out by persons who do not clearly comprehend the system of survey, leads frequently to the misplacing of the plates, which renders them at once, not only useless, but mischievous.

Again, in the matter of the mounds and pits, there is often noticeable a want of care and skill, which arises from the surveyor not giving personal attention to the matter, and entrusting it to raw or unskilled hands.

Contracts.

I am of opinion that it would be found more satisfactory to those surveyors who may be employed under the contract system, to make the amount of work under each one's care large enough to occupy the whole season. The expenses of going out to and returning from the work would be the same. The cost of horses and outfit would be no more, and men could be engaged on more favourable terms for the whole summer than for two or three months. Besides that, the men would become more conversant with their duties, and better work would be the result.

This course would naturally tend to reduce the number employed, and thus enable the more careful and skillful to secure the proper reward for their merits.

However, I merely make the above suggestions, thinking they would prove entirely satisfactory to the Department, if adopted.

The "Big Plains."

In passing northward from Medicine Hat towards Battleford, I anticipated some difficulty in the matter of water and pasture, from the representations of some of the maps, which described the region as "The Great Plains; soil poor; herbage scanty; no water" (Dawson's map, 1882). This I found to be entirely an error. On the contrary, we found the soil good, in general excellent, the herbage abundant, fresh and green in August, and plenty of good fresh water in latrelets and ponds everywhere. In fact, with the exception of timber, the entire region appears highly suited for settlement.

Cypress Hills.

This region I found in general very stony and hilly, with abundance of cypress timber of considerable size, but badly fire-killed; and plenty of good herbage, making it a good locality for stock farming.

McLeod to Walsh.

Surface rolling pure prairie; some timber in river bottoms and along streams; soil first and second-class.

Calgary to McLeod.

A beautiful country, with fine rolling surface; soil in general excellent, and well watered by numerous streams flowing down from the mountains; abundant growth of grasses; timber everywhere within easy reach; in all, a very desirable section of the Territories.

Battleford.

The country around about Battleford, for a long distance, is very good. The soil in general of a sandy loam, passing in places into clay loam, with clay subsoil; plenty of good fresh water, and a fair supply of building timber, with plenty of smaller timber for fencing and fuel. This is a good region for mixed farming.

The Crops.

The spring of 1884 set in rather drier than usual. Grain sowed early on well prepared fallows of the previous autumn matured well and abundantly "A No. 1" grain; but that sown later or on lands "back set" in the spring, dried out so that part of the seed did not germinate till after the June rains, and, of course, such failed to mature in time to escape the September frosts.

The growth of all kinds of cereals, as well as root crops, was excellent.

When the people learn to adapt their farming operations to the requirements of the seasons and soil, all kinds of produce can be grown with as much certainty as in the older eastern Provinces.

REPORT ON EXPLORATORY SURVEY TO HUDSON'S BAY, 1884.

In accordance with instructions, dated 3rd March, 1884, received, I proceeded by rail as far as Swift Current, where I arrived on the 6th of May.

The next day I had my two canoes and outfit conveyed to the South Saskatchewan, thirty miles distant. The following day was employed in putting the canoes in order, as also the outfit.

On the 9th of May we pushed from the shore and paddled down stream towards the Forks, where the survey is to begin. The river was very low and the water muddy; snow was still lying in secluded spots, but anemones in bloom and the poplar was budding. After passing the mouth of the Swift Current Creek, the river expands, and sandbars become numerous, so that it is frequently difficult to judge which channel to follow, and in consequence sometimes found ourselves stranded. Approaching the Elbow, the land falls, and on the north side is sandy. The south banks, south of the Elbow, measured 180 feet in height. Camping near here it was interesting to see the work of the beaver. Trees a foot in diameter he neatly cuts down as if with a chisel; willow brush he apparently mows down, and by a path carries it to the river; he will dig small canals inland from the river, into which he drags the wood cut into pieces, all to be floated down stream to his house, composed thereof, which serves him for his winter supply of food. The large coulées found in the Saskatchewan, west of the 4th Initial Meridian, are not met with here. Neither coal nor any rock formation was seen in the cut banks up to the Forks. The mosquito, although an unimportant factor in a civilized community, but not to the explorer in the North-West, made his advent on Sunday, the 11th day of May.

Ducks, geese and swans are numerous in the shallow water amongst the sandbars in the river. In the clay cut banks are frequently seen the holes of the bank swallow, and on the out banks the projecting nests of the cliff swallow (*hirundo lunifrons*). When from a sandbar an island is formed, the first vegetation to spring up is willow. On windy days the sand from the bars is almost blinding, and combined with rough water makes progress slow. The water in the river seems to be in a constant state of ebullition, and flowing along with a spiral movement, causing innumerable miniature whirlpools. The strong current continually acting upon the clay banks washes them away, only to be deposited somewhere else. For this reason we find large land slides covered with trees tumbling into the river. At Moose Woods the high banks on each side recede, and the river expands into a large basin full of islands and sandbars, and difficult it is here to distinguish the main channel. A little above Saskatoon, where the banks are 80 feet high, it resumes its ordinary character, and is almost devoid of bars, although now and again a large boulder is found in mid channel. At Batoches' Crossing it was learned that the 1½ inch wire ferry cable there, which had been stretched during the winter from shore to shore, and was 27 feet at its lowest point above the ice, yet in the spring freshet was carried away by the ice. From the telegraph crossing to some miles below Batoches', large quantities of ice were still lying on the shore—16th May. The river sides become more densely wooded below the latter point, although of small size only; a few evergreen spruce, the first seen on the river, make their appearance here also. Farm houses dot the river from Saskatoon downwards. There was a general fire raging in the woods on both sides of the river, presenting a dismal sight as seen from the water, which became distressing when we heard shouting, and paddling to the opposite shore found a woman with her children sitting at the waters' edge, having fled from their burning log cabin. The husband was away from home. They were rescued from their perilous position. Through Township 45 the river again

widens, and has islands and sandbars, below which it contracts; the current increases and a number of large boulders are found in mid channel, which, in course of time, will have to be removed, if the river is to be utilized for navigation; although it is doubtful whether this latter, as a commercial enterprize, would prove a success. At Puckahn—Hudson's Bay Post—the banks are about 60 feet high; they become lighter in colour and more friable as we descend the river. The settlers along the river catch sturgeon of 3 feet and over.

Except the few evergreens seen a few miles below Batoches', none were again seen until some miles below Puckahn, whence they increase, but still forming a small proportion of the wood—poplar—of which none is large enough for timber or lumber. About fifteen miles below Puckahn the rapids begin, and are more or less continuous to the Forks. At the bends of the river they are the most noticeable; many projecting boulders in the channel were found also in this stretch. Approaching the Forks, the banks again rise, and the prominence between the north and south branches is 200 feet high, and sandy. The numerous evergreens here mingled with the light green foliage of the poplar and birch, and with the flowers, make an agreeable change from the monotonous prairie. In this vicinity a settler has farmed for six years without sustaining any loss by summer frosts.

From this point—the Forks—the survey proper begins, extending along the Saskatchewan and Nelson Rivers to Hudson's Bay.

Descending the Saskatchewan from the Forks, a stronger current is found, although no apparent difference in the general width, which is here about 750 feet, from the South Branch. For quite a distance do the waters of the North Branch and South Branch flow together ere they mingle, that of the former being by far the clearer of the two.

The banks are broken clay cut banks about 80 feet in height, and partially covered with spruce, some a foot in diameter. The shores are still strewn with ice, and snow is still deep in the gorges—24th May. One long stretch of ice barrier on the shore measured 18 feet on its vertical face; nevertheless, the vegetation looked luxuriant on both sides. We have spruce, poplar, birch, alder, cherry, hazel and willow, and a profusion of flowers. The general level of the country for about 100 miles below the Forks, is from 200 to 300 feet above the river, although the immediate banks are mostly far less. The banks being exclusively a sandy clay, erosion is great, and, following it, land slides, some of which are of considerable extent. Some were seen where the tops of the high spruce trees would just reach the foot of their former position. One slide occurred at a station just as we had left it, burying the picket under tons of earth. This constant wear and carrying-off of silt must necessarily produce change in the course of the river, and tend to elevate the bottom thereof where the river expands into large basins, as Cedar Lake, Cross Lake and, finally, Lake Winnipeg.

Twenty-four and a half miles below the Forks is Fort à la Corne, a Hudson's Bay Company's trading post. It is named after a French trader who established a post there for himself about the beginning of this century, but fled from an attack by the hostile Blackfeet Indians. It is situated on the south side, on a bench about 30 feet above the river; to the rear the hill rises 260 feet. The post consists of four log buildings, enclosed by a stockade, beside some Indian wigwams. The country around the post is wooded with poplar, spruce, tamarac and birch; the first predominating, and averaging 9 inches in diameter; the Balm-of-Gilead 15 to 18 inches; the spruce 10 to 12 inches, although some will make 18-inch boards; the tamarac 7 inches, and attaining a height of 120 feet; and the birch 7 to 12 inches. To the south-west of the fort there is some open country, with good farming land, where wheat grows well and matures when fall ploughing is done and timely seeding in spring, being then not affected by summer frost. It is harvested in September; barley in August; the former yielding 30 bushels to the acre. Vegetables do splendidly, as also all root crops. Potatoes yield over 100 bushels per bushel of seed; they are planted about the 20th May. Ploughing commences not till May, on account of the frost, which penetrates 4 feet, being far less than in Manitoba. The soil is about 18 inches in

depth, with a clay subsoil; then sand; then blue clay; then a layer of sand again, when water is reached, which occurs on the high bank (plateau) about 15 feet beneath the surface. Winter sets in about the middle of November, although by the middle of October there is sleet and snow; and it breaks up about the 10th of April, when the snow leaves the ground. June is the hottest month, and in July the most rain falls. From records there appears to be a cycle of dry and wet years, of ten years each. The Saskatchewan breaks up between the 15th and 20th of April; and after the spring freshet it commences to rise about the 6th of June, continuing for ten days, when it reaches its highest mark in the year, thereafter falling. Another rise occurs in August, the lowest water being in September. The difference in height between high and low water (here) is from 15 to 20 feet.

The hunt affords the Indian muskrat, beaver, moose, deer, mink, marten, fisher, otter, black bear (and an odd grizzly), and lynx; in the river they catch sturgeon, whitefish, pike, suckers, goldeyes and perch; from the first the squaw takes out the isinglass and trades it at the post. We were refused a sturgeon for fear that we might throw the offal into the river and destroy the fishing—such is the Indian's belief. Amongst the numerous birds is also found the humming bird.

Continuing from Fort à la Corne down stream, the river preserves a uniform width of about 900 feet, and has no sandbars. Five miles below the fort are La Corne's Rapids, at which the steamers occasionally are obliged to make use of a head line to pull up. Several iron springs were found on the north bank, and in the vicinity strong deflections of the magnetic needle were observed.

Fires were raging in the woods in all directions, burning the dead wood and killing a good deal of standing timber. On Sunday, 1st June, we were hurriedly driven by fire from our camping place and forced across the river, which side soon thereafter also caught fire from the burning cinders driven by a high wind. We covered our things with wet blankets, and ourselves sat at the river's edge, and for a time in the river, keeping wet cloths over the mouth to facilitate breathing. Volumes upon volumes of hot smoke rolled upon us; and for a time it appeared as if the "Exploratory Survey to Hudson's Bay" would come to a sad end here. We sat up all night and anxiously watched the fiery element eating around us. By morning we were safe, but still enveloped in much smoke, so that the attempt to proceed with the survey proved futile. The roar of the fire reminded one of Niagara, save that in the latter the crashing sound is wanting. The two succeeding days fire and smoke prevented much progress; similarly the then two following days, which were rainy, which had the beneficent effect, at least, of partially subduing the fires.

Sixty-five miles below the Forks begin the Nepawin Rapids; a short distance above them, at a steep hill, driftwood was found 40 feet above the water. After the last of these rapids, which are of little consequence, is passed, the immediate banks of the river decrease in height and are more sloping, the woods coming near the water's edge, and the high land receding from the river on each side; neither is the current so strong as in the first seventy miles from the Forks, and in consequence thereof sandbars are met and the width of the river increased. The word Nepawin means in Cree "to look searchingly into the distance." It has been applied to the rapids, as it was on the adjoining high banks (the last along the river) that the squaws would gather and "searchingly look down the river" at the time when they expected their husbands to return from distant York Factory with the Hudson's Bay Company's boats laden with goods for the inland posts.

The woods continue of the same kind, although the greater part of the poplar is second growth. It was found that the fire had caused a great deal of destruction of timber; the half charred tall spruce having no tap roots, and the others being only superficial, are thereafter easily blown down. Such an extent of fire as this year's has not been known for a long time, and with a continuation of dry seasons, must tend to the utter destruction of the forests, which, for their fuel and timber, are of incalculable value to the North-West.

The action of the ice attracted attention; the transporting capacity thereof in spring freshets is very great. How it plunges and jams, scooping up at points or

bends tons of earth and sand and stones, carrying them on its back till stranded, as found by us. One peculiar formation of a sandbar about 200 hundred acres in extent was found to have been formed by the above transporting property, the ice being stranded in a jam, where it slowly melted and deposited its load. Much of it (ice) was still lying in heaps in the river—6th June—covered with sand, and looked as if it were dumpings from an excavation.

We are now ninety miles below the Forks; the river continues to widen, and islands and sandbars become numerous, the former looking rather pretty in the large sheet of smooth water. The islands are all wooded; in fact, the most of them were, at no very remote date, part of the mainland, which is here subject to overflow. There are no longer high clay cliffs to be seen; the banks are low and vertical (cut banks) and are constantly dropping into the water, and with them the trees, giving rise to snags. The farther we go down the river the sandier the soil becomes, but the timber is good, mostly poplar and spruce. Ducks, geese and swans have seldom been seen on the river since leaving the Forks. It was noticed that the black-knot is destroying the wild cherry. The guelder-rose or snowball tree is common here, and very pretty when in bloom. The spruce woods and groves are comparatively free from underbrush in distinction from the poplar ones. Many of the spruce trees will make two standard logs, some three. The best spruce is found to the north of the river and east of Tobin's Rapids, which are 120 miles below the Forks. Here for a few miles we have high banks again and stony shores, and the river is free of islands, but thereafter the cut banks, sandbars and islands continue. Some spruce were measured and found to be over 3 feet in diameter.

From the low nature of the land, the river in high water cuts new channels, and sands up old ones, continually changing the geography. A conspicuous instance of this is the Cut Off, 139 miles below the Forks, across Mosquito Point. The water, after passing through the Cut Off, flows up its old bed, and the bulk thereof passes through another channel, about seven miles long, into the Sturgeon River, and thence into Pine Island, or Cumberland Lake, from which it again joins the main Saskatchewan. In low water this route is now used by steamboats. It is about nine years since the Cut Off was made, and fourteen years ago there was not enough of water in the Sturgeon River (that part between lake proper and river proper) for York boats to carry the Hudson's Bay Company's supplies to their post at the junction of the Sturgeon and Saskatchewan channels. The Sturgeon has well defined banks for about twenty miles below the above named channel; it then separates between islands and swamps to Pine Island Lake. This latter name is a misnomer, the woods on the islands and north shore being spruce, and not pine. A short distance above the Cut Off there is another channel, known as the Sepenock; draining part of the Saskatchewan into the Carrot River, which empties into the Saskatchewan near The Pass, about 130 miles farther down.

The general elevation of the banks above the river is about 10 feet; and when rises of 20 to 30 feet occur, as they have done (shown by driftwood along the high banks near the Nepawin Rapids), a vast extent of country is inundated and covered with silt. The tract of country subject to inundation, lying between Tobin's Rapids and Cedar Lake, may be estimated at 8,000 square miles. Growing trees were found, with their base 10 feet below the ground, as exhibited along the cut banks. These 10 feet, of course, are river silt, and such appears to be the greater part of this lower country. At the Cut Off the first elm, ash and maple (*negundo*) were noticed, also a profusion of large ferns; the whole of which continues downwards, but decreasing in quantity and size. With the appearance of these different kinds of wood the spruce becomes scarce. An absence, or nearly so, of grass, is very noticeable along the banks and in the woods; the ground in the latter, from the Cut Off downwards, being covered with equisetum. All along the cut banks we see wood buried under many feet of earth. It would not be surprising to find, in a few years, the bed of the river, from the Cut Off to the discharge from Cumberland Lake, a distance of over fifty miles, completely filled with sand, and dry, and the Sturgeon River carry the water of the Saskatchewan, as it already partially does. Along the river the size of the

trees, in a large measure, depends upon the time that the land has emerged from the water. In this silt formation no stones are seen. The Indian is obliged to carry stones in his canoe for setting his net. Difficulty was frequently experienced in setting up the instrument along the cut banks, as the top thereof is often inaccessible, and in high water there is no beach whatever. In high wind the drifting sand from the bars resembles a blizzard in January. In the woods there is no soil, as generally understood; beneath the few dry leaves lying on the ground is sandy silt. About opposite the head of Sepecock Channel there is an elevation called Pasquatinas, meaning, in Cree "the little bare hill;" Sepecock meaning "a narrow channel making an island." Before reaching the mouth of the Big Stone River spruce has entirely disappeared; the woods are thin and appear to be devastated by ice and water, and marshes are found on each side near the river. The Big Stone River is distant 193 miles from the Forks; it is one of the outlets of Cumberland Lake, and from 3 to 4 chains in width. When a rise in the Saskatchewan takes place, the current in the former is changed into the lake, as shown by ice and trees floating into the lake from the Saskatchewan. The name is derived from a big stone which lies in mid-channel at the outlet of the lake. About half a mile south-east of this outlet is Cumberland House, an old Hudson's Bay Company's trading post, and the centre of a large district, over which Mons. Horace Belanger is the genial factor. It overlooks Cumberland Lake, but, from the low lands adjoining, can scarcely be called picturesque. There are numerous islands in the lake, but none near. Besides the Hudson's Bay Company's buildings, which are surrounded by a stockade, there is a Roman Catholic Mission and a number of houses of half-breeds. Indians there are not many here. The "thick-wood" Indians, as distinguished from the "plains" Indians, are never in as large bands as the latter, being scattered throughout the woods. This place is of some note, through the visit of Sir John Franklin, Capt. Lefroy and other scientific men. The first named, the Arctic explorer, presented Cumberland House with a brass sun dial, which, upon request of the factor, I readjusted in the meridian.

Farming country there is none around here, the most of the land being subject to inundation, and the few high ridges are generally stony. At the fort vegetables and potatoes mature and do very well. Wheat also has been successfully grown, being seldom subject to summer frost. The principal woods are near the river, and consist of smooth bark poplar, rough bark poplar and spruce, (in this order). To the north of the lake, where the land rises and becomes rocky, it is principally spruce, averaging about 14 inches in diameter, some over 2 feet. The difference in height on Cumberland Lake, between high and low water, is about 7 feet. The highest water mark on the lake is reached in the beginning of July, and the lowest in October. Last spring all the ice from the Saskatchewan (above the Cut Off) passed down the the Sturgeon River and through the lake, and in the preceding fall no water flowed down the Saskatchewan from the Cut Off to the Big Stone River. The general height of the lake is much more now than formerly, as shown by the remains of the old stockade around the fort, the former being now, in high water, several feet submerged. Near the fort is a row of large loose stones, forming three sides of a square, the origin of which is unknown. There appears to be a cycle of high and low water of five or six years' duration each, as observed here. It is expected that there will be two years more in the present cycle of low water. There seems to be no connection between high and low water and dry and wet seasons, of which latter no cycle has been noticed, for there may be very deep snow in winter, but, nevertheless, low water in the following spring, or the reverse—very little snow and high water thereafter. The sole cause of high water is attributed to heat and rains in the Rocky Mountains, whence the waters of the South Branch and North Branch of the Saskatchewan take their rise amidst the snow-capped mountains. The most rain falls in the month of June. The depth of the snow in winter is about 3 feet. The river is open to the 1st of November, but not free of ice. Until then York boats are used. Winter sets in about the 15th November, and breaks up about the middle of April. The United States Government presented Cumberland House with some meteorological instruments, amongst them a self-registering minimum spirit thermometer graduated

to 50° below zero, Fahrenheit; but it was found that in extremely cold weather the needle or index (registering) would stick in the angle of the tube, *i. e.*, the cold was greater than 50° below zero. The Big Stone River never freezes, or only a thin sheet of ice, which is generally melted the following day.

The Saskatchewan clear of ice opposite Cumberland House, mouth of Big Stone River:—

1870.....	April 23	April 23	} Ice leaving St. Lawrence opposite Montreal.
1871.....	April 23	April 8	
1872.....	May 3	May 1	
1873.....	May 3	April 25	
1874.....	May 4	April 25	
1875.....	May 9	May 3	
1876.....	May 10	April 27	
1877.....	April 30	April 17	
1878.....	April 18	Mar. 30	
1879.....	April 16	April 24	
1880.....	May 10	April 17	
1881.....	May 1	April 21	
1882.....	May 3	April 11	
1883.....	April 28	April 27	
1884.....	April 27	April 22	

Especially during high water does the Saskatchewan hold a great deal of solid matter in suspension; but since its main channel is now through Cumberland Lake, a large shallow basin, a great deal of this matter is deposited in the lake, and the water leaves it much clearer than when entering. Fish (sturgeon, whitefish and pike) in the lake are said to be getting scarcer; but whether this is really so, or only apparently so, is not certain, as more fishing is done now than formerly, and on the same grounds. The other principal discharge of the lake, beside the Big Stone, is the Tearing River, a stream 4 to 5 chains in width. Its name is significant of its current.

While at Cumberland (15th June) two Indian messengers arrived with the packet or mail from Du Brochet, a Hudson's Bay Company's post, at the northern extremity of Reindeer Lake, and belonging to the Cumberland district, and distant over 300 miles to the north. They were fourteen days making the journey, and travelled mostly on the ice, hauling their canoe after them. When they left Du Brochet the lake was still covered with ice, although near the shore there was a small open channel; but when crossing the Churchill River, it was found clear of ice. At Cumberland, 14 feet beneath the soil, a layer of limestone rock is met.

Resuming our course downwards on the Saskatchewan, from the mouth of the Big Stone, it continues narrow and shallow, varying from 6 to 9 chains in width, although its volume is greatly increased by the affluence of the latter. About seven miles below the confluence, Birch Portage, on the south side, is passed; it leads to Birch River, which falls into the Carrot River. By means of short portages one can reach any point in this lower country, especially on the north side of the river, as it is one network of lakes and channels. We find mudbars now, principally, instead of sandbars. Several miles below Birch Portage there is a stony point on the north side of the river. This is noteworthy simply because, in the preceding seventy-four miles, not a single stone is met.

Eastward of the Big Stone, and on the south side of the Saskatchewan, there is some good-sized wood, smooth and rough bark poplar; but this is only of limited extent; thereafter the woods become thin and broken, being subject too much to the floods. Elm, ash and maple give way to poplar, and poplar to willow. There is no spruce on the river here, and not met until we reach the stony ridge near The Pass. The cut banks are from 5 to 6 feet in height. All crafts, except steamboats, going up stream are towed, *i. e.*, are hauled by a line, as this is easier, although hard work, than paddling or rowing.

At a certain place, two years ago, water was seen falling over the cut banks from adjoining lakes and marshes into the Saskatchewan. Now (21st June), at the same place, there is a channel 2 chains wide, through which the water flows from the Saskatchewan. This anomalous phenomenon of the water changing its direction of current between the river and adjoining lakes is explained in this manner: In the June freshets the river rises more rapidly than the lakes and marshes, the latter covering a very large area; consequently, an overflow will fall into the lakes; when the river recedes, the reverse takes place, and the current in the connecting channel changes. It is also found that the cut banks are higher than the land immediately behind them. This is caused by the driftwood, débris and sand being jammed and lodged in the willow bush, thus forming an additional embankment.

About 270 miles below the Forks is situated The Pas, on the south side of the river, on a stony ridge (not of fluvial origin), which extends south-westerly to the Pasquia Mountains, which latter are seen in the distance. Pas means "narrow" and Pas-quia "narrow ridges or bluffs." Besides the Hudson's Bay Company's buildings here there is a large frame mission church (Church of England) for the Indians, and a neat parsonage belonging thereto—the church was erected in 1840; also some Indian houses. On the ridge grow some spruce and tamarac, besides poplar. The grey willow is found everywhere along the river. The firewood used at The Pas is obtained by catching driftwood, such being easier than drawing it with dogs from the scattered woods. The Indians obtained the birch bark for their canoes from the Pasquia Mountains (hills would be a more appropriate term). The action of the water in the course of time is well illustrated here. Forty years ago a lad could throw a stone from the banks of the parsonage across the river, where it is now 14 chains wide. Within a few years an island, upon which the Hudson's Bay Company's powder magazine was kept, has disappeared. The banks where formerly houses of the company stood (in front of the present post) have been washed away. The same fate is rapidly approaching the parsonage close by, and it is only a question of time when there will be no more Pas. Here empties the Pasquia, a stream nearly 2 chains in width, into the Saskatchewan. Along its east side runs the stony ridge, for about thirty-five miles, where there is a break of about four miles, being low, wet ground, and thence it continues to the Pasquia Mountains. The general direction of the wind is from north to north-east; east wind brings rain. By observation here there appears to be a period of seven years of high water and seven years of low water; 1884 is the second year of low water. In 1878 the water was so high that no landing could be had along the river from Cumberland to near here; for a number of years previous there was a similar flood. During high water canoes and York boats can go from The Pas to Cumberland without utilizing the main river at all. About three miles above The Pas there are two sharp bends in the river, whereby two large eddies are formed, which sometimes prove troublesome to steamboats even. These eddies make a good fishing ground, and the squaws avail themselves thereof. In this vicinity there are quite a number of log houses belonging to the Indians, but in the summer are mostly unoccupied, as the Indian prefers living out-doors. They have quite a band of cattle, and raise potatoes in small patches. Farming land there is none.

About one and a-half miles above The Pas the Carrot River discharges its waters into the Saskatchewan. It is about 4 chains in width, and for seventy-five miles up its course it flows between narrow embankments, lakes and marshes being on each side thereof. Beyond this distance the land rises and good farming country is met. The whole of the country between the Sepenock Channel, Pasquia River and Cedar Lake is lake and marsh, with the exception of the stony ridge already alluded to. This vast area is the home of the musquash or muskrat, the annual catch being about 200,000.

Leaving The Pas we leave the stony shore and spruce, and again have the cut banks of river deposit. Woods there are none; the banks are covered with willow and some poplar, which latter is found in scattered small groves, enough to furnish steamboat fuel. About nineteen miles below The Pas a large channel, known as the

Moose Lake River, leaves the Saskatchewan. This channel is at present used by the steamboats instead of the main river from here, the former having more water throughout, the latter separating into numerous channels farther down, and thereby decreasing the volume of water in any one. We find this noble Saskatchewan, known in the Far West as a big river, to dwindle down to about 200 feet in width.

The first outcrop of rock (limestone) on the river is found $311\frac{1}{2}$ miles below the Forks. Twenty-one miles further down, at the foot of the Kettle Island, considerable of the lost water is regained. Opposite is Kettle Point, where there is another outcrop of limestone rock. This is one of the very few available places in high water for the Indian to "boil" his "kettle," hence the name.

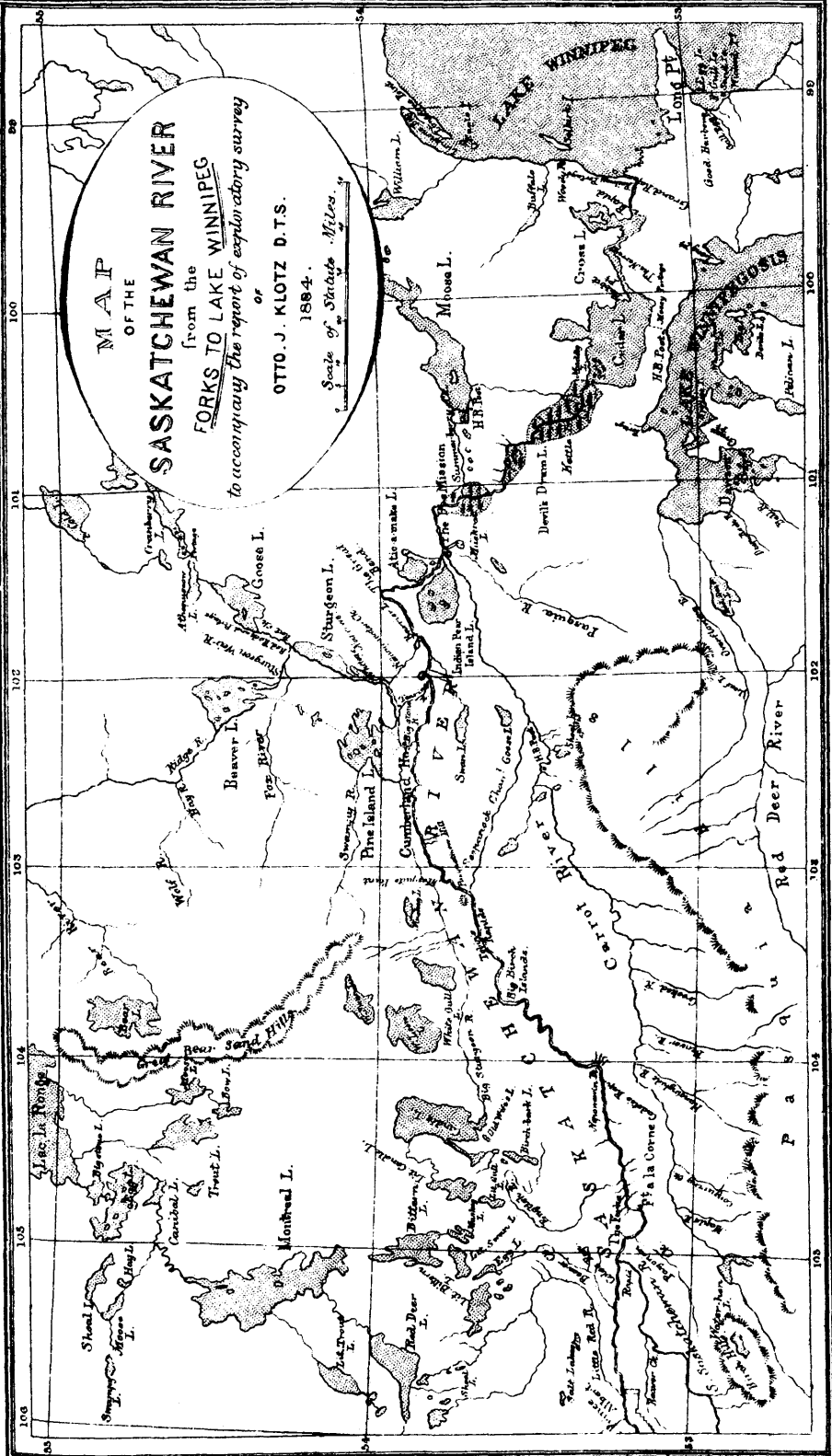
The extent of visible marsh, especially to the south, increases till we find it bounding the horizon, looking like an endless field of grain, the reeds attaining a height of 10 feet, although the average is 6 feet. As we descended the river after having left the high prairie plateau, the banks of the river gradually decrease in height until they finally disappear. In this distance of over 200 miles the land is gradually rising, or better said, is gradually being made annually by deposit (silt) from the matter carried in suspension by the river; so that in time this vast marsh land and shallow lakes will be changed to wood lands; but from the sandy nature of the deposits, it is very questionable whether it will become good farm lands. The land higher up stream emerges first, as the more matter in suspension in the river exists there. As far as the foot of Kettle Island the river has well defined banks, grown with willow at least, although within a chain there may be a marsh or lake adjoining, but below this point such is not the case. For about six miles it meanders through a vast marsh, willows not yet having taken root, the land being too low (at the time of passing, an inch above the water). At the end of this distance one of the channels of Moose Lake River again joins the Saskatchewan; the banks rise to 2 feet above the water and are thickly wooded. For some distance spruce has lined the horizon to the south and east. Two miles below the last channel the main or steamboat channel of Moose Lake River discharges its waters. The river forks off at so many places that it is difficult to know which course to follow, not knowing whether one will land in an endless marsh or lake, or come into the main river again. Moose Lake River might with propriety be called the Saskatchewan. It must not be confounded with Moose Lake Creek, which discharges the waters of Moose Lake into Moose Lake River.

About a mile before Cedar Lake, the channel that runs through Muddy Lake joins the survey channel. This distance is called Chemahawin, meaning the "seining place"; along it Indians are living and the Hudson's Bay Company have a winter post. The Indians are living almost solely on fish, chiefly sturgeon, which attain a length of 6 feet. Here outcrops of limestone are found, as also woods adjoining the shores; the principal wood being spruce, the others poplar and birch. On the south side the land rises about 25 feet above the water; the ground is stony, but potatoes grow well where sufficient soil can be found.

It was noticed since leaving the Forks that the vegetation was apparently at a standstill, that is in the same stage, showing that the season opens sooner farther up-stream than down-stream, although the difference in latitude is small.

We are now 347 miles from the Forks, and at the head of Cedar Lake. It presents rather a picturesque appearance, with its evergreen islands. From the name one must not infer an abundance of cedar, but simply that it occurs here (and scantily at that) amongst the spruce, and is not found further west on the river. There is also some tamarac; but there is no timber, the different kinds of wood being too small.

After being several miles from the mouth of the Saskatchewan and in the lake, the turbid water of the river becomes very clear and good. The north shore of the lake is rugged and rocky, but nowhere found to exceed 12 feet in height; and the country adjoining is flat and low, wooded, but having a scanty soil. One large bay expands into a lake of unknown extent. There are many other bays, large and shallow, furnishing poor harbours, or none at all, for navigation. Strong westerly



MAP
 OF THE
SASKATCHEWAN RIVER
 from the
FORKS TO LAKE WINNIPEG
 to accompany the report of exploratory survey
 or
OTTO. J. KLOTZ D.T.S.
 1884.
 Scale of Statute Miles.

winds were found to prevail on the lake, raising very rough water, in which case steamers do not venture to cross it. The prettiest scenery on the route is through the channel, about twenty-one miles in length, connecting Cedar Lake with Cross Lake, reminding one of the Thousand Isles. At the head of the latter lake are the Demie Charge Rapids, so named from the fact that York boats, in being towed through them, carry only half of a cargo. Adjoining the rapids is Calico Island, so called because the first steamer—"Saskatchewan"—built by the Hudson's Bay Company, that attempted to ply the river, sank in these rapids, and the whole cargo got wet, and on this island thousands of yards of calico were hung and dried. Cross Lake is about four miles in width (length unknown); it has many deep bays, and some islands. The shores are rocky and wooded, similar to the preceding lake. From the east side of the lake the Saskatchewan again resumes its course and, with an increased current, passes over the Cross Lake Rapids, and a short distance farther down over the Roche Rouge Rapids, so named from the colour given by the moss and lichens on the limestone rock; and finally the waters rush wildly over the Grand Rapids, and, three miles beyond, empty into Lake Winnipeg, distant 416 miles from the Forks. The Grand Rapids are about three miles long. At these rapids the river contracts to less than 8 chains in width, and the limestone walls to 20 feet in height, and on the north side, the superimposed marly earth is double that height. On this side, running from below the foot of the rapids to a point on the river a short distance above the head of the rapids, is the pioneer railroad in the North-West, built by the Hudson's Bay Company. It is narrow gauge and three and three-quarters miles in length, the motive power being the horse. Vessels from Winnipeg land goods at the eastern terminus, and after transhipment over the railroad, are taken from the western terminus by the steamers to the various points on the Saskatchewan, as far as Edmonton.

Having completed this part of the exploratory survey, and taking a retrospect, we find the country passed over divided into three great divisions:—

1. The prairie and woodland plateau, extending from the far west to the foot of Tobin's Rapids.

2. The silt or river deposit area, stretching from the last point to Chemahawin, being over 200 miles, in which distance the banks decrease from 10 feet to final disappearance. At the western extremity where the land is comparatively high, it is very well wooded and good timber found; such is not the case towards its eastern limit.

3. The rocky country—extending from the west side of Cedar Lake to Lake Winnipeg—being all wooded; but much thereof is brûlé, and furnishing little or no merchantable timber.

Steamboating will for all times be precarious and uncertain on the lower Saskatchewan, and especially so for boats of large draught, which appears to be a defect of those now plying the river. The flat-bottom Upper Missouri steamboats are far better adapted for such water.

DISTANCES FROM FORKS OF SASKATCHEWAN.

	Miles.
To Fort à la Corne.....	24½
La Cornes Rapids.....	29½
Cadotte's Rapids.....	62¼
Nepawin Rapids.....	65½
Devil's Point.....	84
Rowan's Island.....	97
Pemican Point.....	98¾
Big Birch Island.....	99
Tobin's Rapids.....	120¼
Squaw's Rapids.....	125
Pasquatines Point.....	135½
Sepenock Channel.....	135¾

Cut Off.....	139 $\frac{1}{4}$
Big Nigger Bar.....	154 $\frac{1}{2}$
Elm Portage.....	188 $\frac{3}{4}$
Big Stone River.....	192 $\frac{3}{4}$
Cumberland House.....	200
Tearing River.....	211 $\frac{1}{2}$
The Barrier River.....	224 $\frac{1}{4}$
Top of Great Bend.....	241
The Big Eddies.....	253
The Big Eddies (fishing ground).....	266 $\frac{1}{2}$
Carrot River.....	268
The Pas.....	269 $\frac{3}{4}$
The Little River.....	274 $\frac{1}{2}$
Moose Lake River.....	288 $\frac{1}{2}$
Medicine Tent Point.....	290 $\frac{3}{4}$
First Rock Formation.....	311 $\frac{1}{2}$
The Wooden Tent.....	322 $\frac{1}{2}$
Kettle Island (foot).....	332 $\frac{3}{4}$
Moose Lake River (steamboat).....	341 $\frac{3}{4}$
Chemahawin, Cedar Lake.....	346 $\frac{1}{4}$
Rabbit Point.....	374 $\frac{3}{4}$
The Narrows.....	388 $\frac{3}{4}$
Demie Charge Rapids.....	395
Cross Lake.....	395 $\frac{1}{2}$
Cross Lake Rapids.....	403
Roche Rouge Rapids.....	404 $\frac{1}{2}$
West End Tramway.....	408 $\frac{3}{8}$
Grand Rapids (head).....	409 $\frac{1}{2}$
Grand Rapids (foot).....	412 $\frac{3}{4}$
H. B. Co.'s Post, Grand Rapids.....	413 $\frac{3}{4}$
Lake Winnipeg.....	415 $\frac{1}{2}$

PART II.—NELSON RIVER.

An extent of country of over 400,000 square miles is drained by the Nelson River. It discharges Lake Winnipeg into Hudson's Bay,—the watersheds adjoining this vast area being that of the Athabasca and Churchill Rivers to the north, that of the southern part of Hudson's Bay and Lake Superior to the east, that of the Mississippi and Missouri Rivers to the south, and the Rocky Mountains to the west. Of the principal rivers within this area may be mentioned the Bow, Belly (both branches of the Saskatchewan) the Qu'Appelle, Assiniboine, Red, Winnipeg and Burntwood Rivers.

The waters of the Nelson go under various names, as it does not retain its river characteristics throughout; in fact, about the half of it is lakes and wide channels full of islands, and these expanses have each their name. Where it discharges Lake Winnipeg at Warren's Landing, it is three-quarters of a mile wide, and has a strong current; it immediately thereafter expands into Great Playgreen Lake, which is full of rocky islands. Near the outlet of Lake Winnipeg is the dividing line between the sedimentary rocks to the west and the azoic rocks to the east and north. The latter follow down the Nelson for about 330 miles, where they dip and are superimposed by limestone.

Ross Island, a very large island, divides the water into the west and east branches. The survey line followed the latter, full of islands, so much so, that without a guide (Indian) one would undoubtedly get into wrong channels, and thereby delay the work. Norway House, an old Hudson's Bay Company post, is distant twenty-three and a-half miles from Warren's Landing. It is situate at the northern extremity of a rocky island, overlooking Little Playgreen Lake and Rossville, on the

east mainland, where there is a Methodist Mission and settlement of half-breeds and Indians. It is the largest inland post of the company; the buildings are of logs, with clapboards, all whip-sawed, and well built, and most of them within a stockade. The powder magazine is of stone and has a tin roof, and stands isolated. There is a gaol within the stockade, which did service in days gone by, when regular courts were held by an itinerant judge, when the Hudson's Bay Company exercised complete control over this vast territory. Its days of glory are gone since railroads enter the country, and all goods for the various posts are no longer sent from England *via* York Factory, and thence by York boats to Norway House, the distributing point. Some cattle are kept here, but their provender is obtained under difficulties. The country being rocky and wooded, hay can only be obtained in small quantities in little bays along the river—here an armful, there another—which are collected with boats, or left cut, and hauled with dogs in the winter. About twenty-five miles down stream, and up to Lake Winnipeg do they go in search of hay. Potatoes and the various vegetables mature, and do very well at Norway. The company, as well as the Indians, catch a great many fish, and for winter use large numbers are caught in the fall and dried, although fishing is also done in the winter under the ice, with nets. A portion of the supply caught is necessary for the "husky" (corrupted from Esquimaux) dogs, which are indispensable at that season, being the only means of conveyance, four dogs constituting a train. Two frozen fish a day, and fed only at night, is each dog's ration-allowance when at work. Here we found relics of Arctic explorers, in the form of broken instruments; also, old Hector Morrison and Indian Councillor Thomas. The former has been in the Company's service over fifty-six years, and accompanied Sir John Richardson and Dr. Rae on their Polar expeditions, in search of Sir John Franklin, and for his services received a silver medal from England. So did the Indian Thomas, and a reward of £450 sterling.

While at Norway, a brigade of York boats set out with winter supplies for Nelson House, on the Churchill, going down the Nelson as far as Split Lake, and then up the Burntwood River, from which a portage has to be made to gain the waters of the Churchill.

Since entering the Nelson and leaving the sedimentary rocks and coming to those of igneous origin, the magnetic needle shows signs of great fluctuation in declination, and instead of the declination decreasing as we passed eastward, it increased in twenty-one miles $2^{\circ} 33'$. A full record of magnetic observations for declination, inclination and total force is appended.

The country adjoining the river is low and rocky; no hills or prominences are visible, and of soil there is not much. The woods consist of spruce and poplar, and some scattered birch and pitch-pine, besides willow bushes. A good stick of timber would be about 9 inches at the butt.

Norway House is left on the 25th of July, and the downward course pursued; the current is not very strong until we pass Sea River Falls, a drop of about 6 feet. Islands are in profusion. Fire has destroyed considerable of the woods and is burning at present, it being also a very dry season here, as found along the Saskatchewan. The water at present is about 3 feet lower than as shown by marks of previous years on the rocks. The boat route winds through narrow channels, with rapids and portages, amongst the islands, until Pipestone Lake is reached, distant seventy-one miles from Lake Winnipeg. Here we meet schistose rocks, which continue across Cross Lake, where they are replaced by gneissoid. At the entrance of the lake there is an outcrop of talcose schist—the pipestone of the Indians—followed by trap. A closer examination of this area will undoubtedly reveal mineral deposits, for the indications are favourable. The shores around Pipestone Lake are low and marshy, and continue so to Cross Lake, at the head of which the Hudson's Bay Company has a small trading post. At the time of passing the Indians were gathering from far and wide to receive their annual treaty money from the Government. Both Pipestone Lake and Cross Lake are full of islands; the latter one extends eastward, two days' journey with dogs—according to the Indians—equivalent, probably, to eighty miles. Soon after leaving this lake the first large

rapid is encountered—the Ebb and Flow Rapids. There are two chutes of 3 and 6 feet, followed by a rapid. A portage of about a quarter of a mile is here made.

A few miles beyond are the White Mud Falls, a drop of about 20 feet in a narrow channel. We have here again the waters we left to the west shortly after leaving Lake Winnipeg, and flowing through Great Playgreen Lake. The adjoining vertical granite walls are about 40 feet high; and a short distance below the falls and rapids are found white boulder clay banks between the rock walls, whence the name of the falls. The eddies here are bad and dangerous, the water being turbulent and frothy. The portage necessary is 30 chains long. The woods in this vicinity are good, affording 12 inch spruce sticks. There is considerable balsam also. The country is all wooded, but not a forest country. After a rapid the channel always expands until another rapid is met.

A few miles farther and Bladder Rapids are encountered, where a portage of 20 chains is made; the descent is about 10 feet. After leaving this a part of the water branches off to Duck Lake; and a short distance below the forks another portage has to be made, to overcome the Over the Hill or Paskitotouwiniga Rapids. Scarcely is this one left behind when we cross another one, which is immediately followed by the Red Rock Rapids, where two portages are made. The name was suggested by the red appearance of the granite exposed here, where also is found a diversity of rocks—granite, diorite, amygdaloid trap and ferruginous gneiss. A few miles below this one, is the picturesque chain of Rocks Rapids. Five rocky islands lie obliquely across the river, and between them is the chute of about 3 feet. The basalt formation at this point is peculiar, the cleavage being vertical and horizontal, presenting the appearance of a stone wall and pavement built by an artisan. From these rapids to Lake Sepewisk, a distance of three miles, there are sandy clay banks, about 35 feet high, adjoining the river—the first encountered; also a sandy beach. From Cross Lake to Lake Sepewisk one is always within ear-shot of a rapid. To the north of the head of the lake, distant 123 miles from Warren's Landing, the first undulating country is seen, but of very limited extent; otherwise it has been low, and level, and rocky. Lake Sepewisk, meaning "a river of many channels," is a very picturesque and narrow lake. It is over thirty miles long, and full of rocky islands, clothed with evergreen. The rock is granite and gneiss, more disintegrated than heretofore met.

After leaving this lake, for the first time since leaving Lake Winnipeg, we have all the waters collected in one channel—the Nelson River—which continues therein for the next seventy-five miles. It is about 20 chains in width, deep, and has a strong current. From the outlet of Lake Sepewisk the country on each side rises. Land there is practically none; it is primeval rock; yet the whole surface is wooded, principally with spruce, some tamarac, pitch pine, birch and poplar, the last fast decreasing in quantity and size as we proceed northward. Spruce sticks there are, of 10 inches, yet the exception rather than the rule. Devil's Creek, thirteen miles down stream, discharges through a small canon, with vertical walls 60 feet high, into the river. Presumably its dismal appearance prevents the Indians entering it, as they believe it to be one of the haunts of the evil spirit. Water tumbling in spray over the rugged precipices, adds to the beauty of the river. Such is seen at White Water Falls of Otter River, as it discharges into the Nelson, about two miles below Devil's Creek. For a long distance the east shore is comparatively low, with clay banks and sandy beach; while the west side is rocky. This peculiarity is very striking. There is considerable *brulé* on each side of the river. On the east side, Clearwater River, a stream 10 chains in width, discharges the lake of the same name into the Nelson. This lake is a favorite hunting ground of the Indians. The general course of the river is pretty straight, and northward; its width varying, averaging about 18 chains, with numerous bays, and these generally opposite each other. The banks are somewhat undulating, from 20 to 40 feet; yet in several places rise to 75 and 100 feet. Nearly forty miles from Lake Sepewisk, on the west side, do we pass the mouth of Broken Mouth Lake River (or if preferable, the Cree name, Pekatonasagahigan), which discharges the water of the lake of the same name. The stream is 5 chains wide

and fifteen miles long. Sturgeon are very plentiful at its confluence. Sixteen miles beyond this we run the Devil's Rapids. Here the river contracts to about 6 chains and, in consequence, has a tremendous current with bad and dangerous eddies. In the latter it was all that three of us could do to paddle down stream. Near these rapids are a number of large trap dikes in the gneissoid granite; and beyond an outcrop of fine variegated serpentine, containing traces of olivine. Shortly before reaching Grand Rapids a magnificent stretch of water greets one's view. Here a large river, fully 10 chains wide (name unknown), discharges its water from the east. A short distance above this one empties Goose Hunting River, with part of the water of Stinking Lake. At Grand Rapids, which are 226 miles from Warren's Landing, being a little over half way to Hudson's Bay, the river turns abruptly and flows around a point. There are two chutes together, of about 25 feet. At the lower one the width is only about 4 chains. Foaming and seething, the water rushes madly along, and incredible it seems that the waters of the Winnipeg, Red, North and South Saskatchewan Rivers, each one far wider than this, besides many others, could be forced through such a narrow gorge; but what is lacking in width must be replaced by depth and velocity. The rock around the point is mostly basaltic. A good wide portage, 200 yards long, leads over the hill 40 feet high, and across the point. Skids are placed along the road and over them the large clumsy York boats are hauled by hand. The boats (Hudson's Bay Company) are built to carry eighty pieces, or four tons, and a complete crew has nine men—eight for the eight oars and a steersman. It is provided with a mast and square sail for utilizing in fair wind, when crossing lakes or going up streams; otherwise, for the latter a line is attached to the boat and four men walking along shore pull it—called tracking. It is very hard work. At portages each man carries two pieces, *i. e.*, 200 pounds.

After rounding the point the Hay or Grass River, 5 chains wide, discharges from Stinking Lake on the west side into a deep bay. A few miles beyond is the chain of Islands Rapids, where another portage is made; an intermediate one is run. The last name was suggested because several large projections of rock are found across the river. A short distance beyond another rapid is run, and we are in Split Lake—having portaged fifteen rapids and run many more since leaving Norway House, a distance of 210 miles.

The spruce has been rather small latterly, about 4 inches in diameter. The lower limbs soon die from the growth of moss thereon, leaving only a green top. Tamarac, which otherwise generally grows in swamps, is found here on the bare rock. In places on the hillside the moss is knee deep, and specially pretty is the dry white Caribou moss.

Split Lake is about thirty miles long and six wide. It is full of islands and deep bays. Its name is derived from the fact that a string of islands "split" it. The Hudson's Bay Company has a small post on a peninsula on the north shore, where the canoe route for Fort Churchill turns off. The principal river, besides the Nelson, flowing into this lake, is the Burntwood, a large stream up which Nelson House, another trading post, situate on the waters of the Churchill, is reached from Norway House. The islands in the lake as well as the shores are wooded, chiefly spruce, some tamarac, poplar and birch; the wood is somewhat better than on the Nelson, averaging probably seven inches in diameter. The shores are rocky, the fixed rock being igneous, granite, diorite, gneiss and trap. We found raspberries ripe, so also currants, but gooseberries not quite—August 16th.

For a short distance after leaving Split Lake the Nelson has a uniform width of nearly half of a mile, but it soon expands and has deep bays. At each narrows are rapids, some large, some small; the banks are now not so continuously rocky, being interspersed with boulders and clay banks. The wood again becomes smaller, much thereof being *brulé*. Gull Lake is another expanse of the river; it is about ten miles long and one wide. In this region are bears especially plentiful; quite unmindful of us they would walk along the shore looking for dead fish.

We are now at the extreme limit from the west of the Indians' knowledge of the Nelson, the danger and difficulty of navigating it further deterring them from attempting it. Their knowledge thereof beyond is only from tradition, for since last

Below the last rapids we have a swift and strong current, in a channel about three-quarters of a mile wide, with numerous limestone reefs. For some distance the current is tremendous, at ordinary paddling we would go at the rate of ten miles an hour. Rock exposure is seen very little, the banks being a whitish clay, with less sand than farther up stream. They resemble the banks of the South Saskatchewan on the plains, and rise to 125 feet in height. Alternating, there are grassy patches on each side of the river, made from the action of the ice; they are from 10 to 20 feet above the present level of the water. Such a difference in the height of the water was not noticed above the Limestone Rapids; from which is inferred that at the lower one of these rapids an ice jam annually flows, damming up the water, and when the dam breaks, mows down projecting points. Numerous islands are found in the stream, many of which were apparently a part of the main land, while others have been formed by deposits made by ice. There is little or no beach along the banks. The wood (spruce) is small, although some trees measure 7 to 10 inches, and back from the river it is smaller still. The little poplar that is found is scrubby.

A short distance below the Limestone Rapids may be considered the extreme head of navigation from Hudson's Bay, distant seventy-five miles; but in navigating the river piloting will be necessary to keep aloof from reefs. About sixteen miles farther down, the reefs disappear, and there are islands in the river, and it has a strong current. Soundings in mid-channel showed from 50 to 60 feet of water. In the next thirty-five miles, that is, up to Seal River, the woods get perceptibly poorer, the spruce being mere mossy hop poles. When Seal Island is reached, which is twenty-five miles from the sea, the river becomes very shallow, reefs and stones being strewn across the channel between island and south mainland, there being only 11 feet of water on the reef in mid-channel.

About the eastern end of Seal Island is the limit of the tide from Hudson's Bay. Seal River, which empties on the south shore opposite this island, is a rapid stream, 1 chain in width. It has some historic interest, for here some of the Earl of Selkirk's settlers spent a winter before reaching their destination. Flamborough Head is an imposing point on the north shore, several miles below Seal Island. The deep water channel runs from the south shore, opposite the end of Seal Island, to Flamborough Head, continuing along the north shore to the next point, and then strikes out for mid-channel to the bay. The high clay banks which have been found on each side of the river, since leaving the Limestone Rapids, continue on the north shore to about nine miles beyond Seal Island, but on the south shore disappear two miles below Seal River, where we find low, wet ground, just several feet above high tide mark, well wooded with spruce, some 12 inches in diameter, and extending about sixteen miles eastward. Besides spruce, there is some tamarac, also alder and willow bushes. It was found that in the woods on the high banks the ground was frozen to the surface, *i.e.*, immediately beneath the moss, so that the tent pegs could not be driven. This is perpetual frost. In the river the ice attains a thickness of nearly 9 feet; along shore, where shallow, it freezes to the ground. It is not till Christmas that the ice takes at Seal Island, and thereafter freezes down to within nine miles in mid-channel from the Bay, there being open water throughout the winter beyond that point. Of course, along the river banks, the ice extends to the bay.

We are now on Beacon Point, as the tongue of land is called, lying between the Nelson and Hayes Rivers, and projecting into Hudson's Bay. A gravel ridge on the west side of the point extends a short distance. A beacon 91 feet 6 inches high has been erected by the Hudson's Bay Company on the point, which is very swampy. The beacon is more ornamental than useful, being difficult of access in the swamp, and five miles from York Factory. No lantern is ever lighted therein. It is 430 miles from Lake Winnipeg to Hudson's Bay, by the Nelson River.

After rounding the point and entering the Hayes River, the land begins to rise from the level of high tide to about 30 feet, when York Factory is reached. It is situate on the west shore, five and a-half miles from the mouth of the river. At

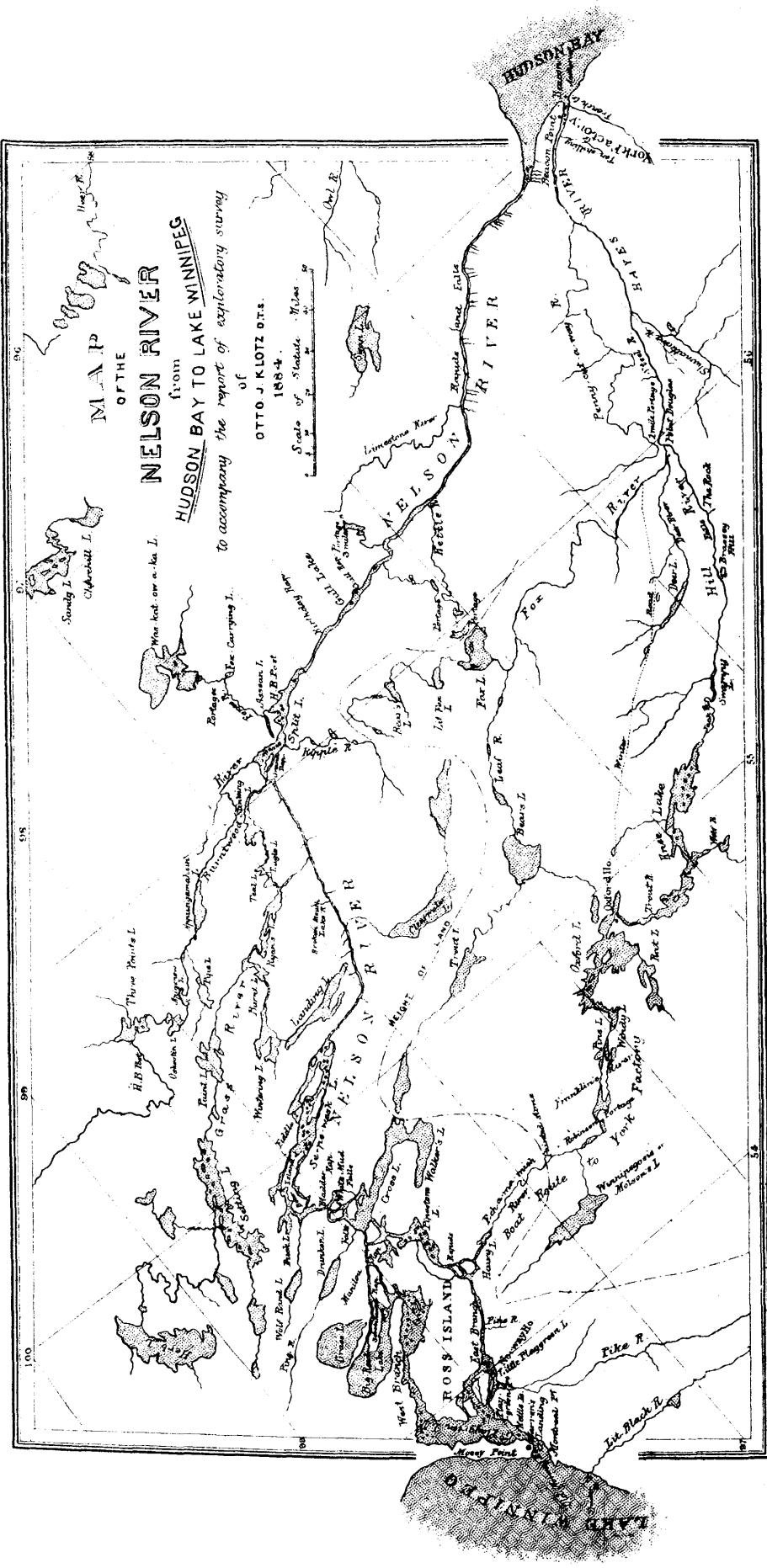
York Factory there are but very few buildings outside of the stockade of the fort, which comprises about thirty well-built frame buildings, in which all the necessary trades for the work of the fort are represented by artisans. This place was, at one time, the scene of much activity and business, but now half empty and falling into decay, since the advent of railroads towards and into the North-West; the goods and supplies of the company for the interior posts, as far as Mackenzie River, now coming the latter route instead of *viâ* York.

It was towards the close of the seventeenth century that this fort was established by the Hudson's Bay Company. Its present site is about half a mile farther up stream than the old one, which was captured by the French in 1782, but afterwards restored. The old site is still visible by the wearing away of the clay banks exposing coffins and logs. Although the ground around the fort is high, but a short distance outside of the stockade there is wet marshy ground, overgrown with small wood and willow. It could easily be drained. While here the officers of the Government steamer "Neptune" of the Hudson's Bay Expedition paid a short visit to the fort, on the 12th September, the vessel being anchored about eighteen miles out at sea. On the opposite or east side of Hayes River the land is low, also on the islands in the vicinity, on which the hay for the fort is obtained; the grass is very coarse. They were engaged in haying 13th September. The few cattle here were brought from England. Potatoes (small) are grown at York, but do not mature. In general, snow falls in every month of the year. The firewood has to be hauled five to six miles, in winter, on account of the boggy ground, or rafted many miles down the river. To obtain timber they have to send over a hundred miles, and up the Fox River. Knees for boat building are obtained on the southernmost part of Beacon Point, but the supply here is limited. Rainy, disagreeable weather is very prevalent at York.

Although almost surrounded by water—the Nelson to the left, the Hayes to the right, and Hudson's Bay in front—yet these waters do not furnish the fish necessary for the supply of the fort; and fishermen are sent (we met them) up the Nelson about ninety miles, thence up the Limestone River to a lake for whitefish, which are transported in winter by dogs to York. Similarly, fish are brought the long distance from Fox Lake. The fish caught at York are almost exclusively the herring-whitefish, small, but very palatable. In the winter some trout, pike and methy are obtained. In the summer, whales (white porpoise) are caught by shooting or harpooning. For this purpose high stands are erected within the tide lines, from which the Indians watch them coming in with the tide, for an opportunity to shoot. Once, with a long ($\frac{1}{4}$ mile) net, fifty-three were secured. They were shot within the net, but this plan failed ever after. The number obtained is not always sufficient to supply even the dogs for the year, so that seldom any oil is secured. Similarly it is with the seal catch in the fall. The skin of the latter is used for sleds. The wood therefor is generally brought as elm planks from England. The hunt here is also of limited extent, furnishing beaver, otter, marten, mink, fox, bear and musquash, besides deer. Moose there are none.

About five hundred souls all told (with aborigines) belong to York. Churchill, Severn and Trout Lake are the sub-posts thereof. At York the spring tides rise about 12 feet, the neaps 7 feet; each, of course, increased by the wind, especially as the water is shallow. The large extent of shoals and reefs and shallow water exclude York from becoming a sea port. Ice jams annually form opposite the fort, on account of islands and shoals, and at one time piled up 26 feet above the bank in front of the fort; *i. e.* 56 feet above the present level of the water. Standing at the extreme of Beacon Point on Hudson's Bay, and looking towards sea at low tide, the surf, covered with boulders, extends as far as the eye can reach.

The Nelson, in the last thirty miles of its course, expands like a funnel, from half a mile to many miles in width at its mouth; so that it offers no natural advantages or facilities for a harbour, but rather the reverse. From the north shore, about twenty miles up stream, a breakwater might be constructed, but the large expense attendant thereto would weigh heavily against the Nelson ever having a harbour,



MAP
OF THE
NELSON RIVER
FROM
HUDSON BAY TO LAKE WINNIPEG
To accompany the report of exploratory survey
of
OTTO J. KLOTZ DTS.
1884.

Scale of Statute Miles
0 1 2 3 4 5

although in its favour would be that it is less distant from the western terminus of any prospective railroad than Churchill, and its temperature less severe.

As for the building of a railroad to Hudson's Bay, it is practicable. The east side of the Nelson, from Lake Winnipeg, is more favourable than the west side, because there are far fewer lakes and rivers adjoining to the east than to the west. In this railroad, whatever course it may pursue, the engineering difficulties presented will not be so much those of grade, excavations, embankments or tunneling, as of avoiding water. The general character of the country lying between Lake Winnipeg and Hudson's Bay is, comparatively speaking, level, mostly rocky, but abounding in lakes and water courses, and the more it is explored the more water will be found. These latter circumstances will undoubtedly cause considerable deviation in the route, and increase the distance between the extreme points. On the lower part of the Nelson, beyond Split Lake, are favourable places for bridging the same.

Along the whole line the adjoining woods would not furnish the necessary ties, far less bridge timber; although ties and small bridge timber can be obtained on the islands in the lakes and in detached places on the mainland. The wood on the islands is generally better than on the mainland, not being subject so easily to the annual or periodic fires. None of the country along the line would ever furnish any cereals for export, the climate on the one hand, and scarcity of soil on the other, preventing such.

DISTANCES FROM WARREN'S LANDING, LAKE WINNIPEG.

	Miles.
To Playgreen Point.....	11 $\frac{1}{4}$
Norway House	23 $\frac{1}{2}$
Sea Falls.....	43 $\frac{5}{8}$
Pipestone Lake	71 $\frac{1}{4}$
Cross Lake, Hudson's Bay Co.'s Post.....	83 $\frac{1}{2}$
Ebb and Flow Rapids.....	92 $\frac{1}{8}$
White Mud Falls.....	96 $\frac{1}{2}$
Bladder Rapids	104 $\frac{5}{8}$
Forks to Duck Lake.....	106 $\frac{1}{2}$
Over-the-Hill Rapids	111
Red Rock Rapids	114 $\frac{1}{2}$
Chain of Rocks Rapids.....	119 $\frac{1}{2}$
Lake Sepewisk	122 $\frac{1}{4}$
" outlet.....	155
Devil's Creek.....	163
White Water Falls.....	170 $\frac{1}{2}$
Clearwater River.....	183 $\frac{1}{4}$
Devil's Rapids	210
Grand Rapids	226 $\frac{1}{8}$
Chain of Islands Rapids.....	230 $\frac{1}{2}$
Split Lake.....	232 $\frac{1}{2}$
" Hudson Bay Co.'s Post	246 $\frac{3}{4}$
Gull Lake.....	275 $\frac{5}{8}$
Gull Rapids	285 $\frac{5}{8}$
Kettle Rapids	319 $\frac{1}{2}$
Long Spruce Rapids.....	326 $\frac{1}{2}$
Limestone Rapids.....	344 $\frac{1}{2}$
Extreme Head of Navigation.....	355 $\frac{1}{2}$
Seal Island.....	404 $\frac{1}{4}$
Hudson's Bay.....	429 $\frac{1}{4}$
York Factory.....	435 $\frac{5}{8}$

Having completed the survey, and fortunately before the ice on the river set in, I determined to return to Norway House by the regular boat route—that is, by the Hayes River and Oxford House. I left York on the 13th of September, and five days later is the outside date at which the officers of the Hudson Bay Company consider it safe to start with a canoe, for fear of the smaller waters being frozen. It would have been rather serious had the season been much farther advanced, as dogs are seldom used from here to Norway House about 400 miles distant, the traveling being bad; and when the winter packet is sent, two Indians start off with a sled, hauling it themselves. Such a mode of conveyance would have obliged me leaving instruments and much camp equipage behind. This route being long known, I shall only make some cursory remarks on the journey.

We take advantage of the incoming tide, which extends up the Hayes River, about ten miles above York. The river is full of large islands and reefs. It was immediately noticed that there were more and larger poplar (about 5 to 7 inches) here than on the Nelson opposite. As soon as the limit of the tides was passed it was necessary to attach lines to the canoes and pull them—one man on shore, another in the canoe steering. This is called “tracking,” and very hard work it is, especially along the very steep wet clay banks. The Hayes River is really the Shamattawan (contracted from Keche-Mattawan, the big branch), but the latter loses its name at its confluence with the Steel River. The country is comparatively level and wooded. At an abrupt turn we enter the Steel River, which is about 5 chains wide; and again at a sharp turn leave this one, or the Fox River as it is called, beyond and enter the Hill River, one of about 4 chains in width. A high cut bank at the confluence of the Hill and Fox Rivers, from its shape, is called the “Crane’s Breast.” It is very marked that the woods on this route are far better than on the Nelson, and there is a greater proportion of tamarac—probably one-third; its leaves were yellow and falling, 15th September. Many trees (spruce) would measure 12 inches in diameter. Many bands of “travelling deer” were encountered, swimming across the river on their westward or inland journey. They come from the coast and go inland, as far as Cross Lake, for the winter, and return in the spring. They are large, but not so large as the moose, are of a dark grey blackish colour, and the bucks have a white collar and breast. They are very inquisitive and approach one for closer inspection, yet are easily startled. The first band seen was mistaken for some trees floating down the river, the medley of antlers resembling the dry limbs of trees.

Sandy clay banks follow the course up stream, gradually rising in height for about 125 miles, when the first rock formation (azoic) and rapid, with portage, are met. In this vicinity the banks attain their maximum height, whence onward they recede and decrease in height; with them the woods deteriorate also, and materially. Much brûlé is seen. Hence on, rapids and portages are numerous. The shores are rocky and the river full of islands and channels. It is surprising that the large York boats can navigate this river. It is a mere creek compared with the Nelson. When Swampy Lake is reached, seventeen portages had been made, and besides up many rapids we had poled and pulled and lifted. Ten miles and we enter Jack River, full of islands and rapids; but soon thereafter are in Knee Lake. On its south shore there is some fair sized wood—spruce, balsam, tamarac and birch—the birch especially increasing in size as we proceed westward, yet not uninterruptedly. The plicated magnetic iron ore found in the “knee” just above the water level resembles some of the magnetic ore from the northern peninsula of Michigan. The narrowed part of the “knee” which connects the two parts of the lake is about eight chains wide. The lake is full of islands and deep bays. There is comparatively little rock exposure on the north side of the lake, while the south shore is very rocky. Numbers of Indians, with their families, were met, being out on their fall and winter hunt. No outcrop of limestone is met on this route. It was found that the leaves of the alder are the last to change colour in the fall. We next ascend the Trout River with several portages into Back Lake, a small one, and from it into Oxford Lake. At the extreme north-east end of this lake is a post of the Hudson’s Bay Company, situate on high cleared ground. The buildings are not extensive.

There are about 600 souls (Indians) belonging to this post. For timber they must now go about thirty miles, and get it from the islands, where, as previously remarked, it is always better. Firewood is close at hand. The York Indians get their birch bark and birch for snowshoes from this vicinity. In this lake the clearest water of any between Lake Winnipeg and Hudson's Bay was found, resembling that of Lake Superior. Excellent fish are caught in it, principally whitefish and trout. The lake is about thirty miles long, and its shores are from twenty-five to thirty feet high, mostly rocky; but on the north shore some clay banks were seen, and there are many deep bays also. Leaving it we enter a nameless marshy river, and after two portages cross Windy Lake, three to four miles wide, and into a marshy river again, and into Pine or Spruce Lake, from which we take a new route to avoid Hell Gate on the Franklin River, beyond Pine Lake. An Indian met here acts as guide until the old route is again met. We thus pass through Lake Max, about fifteen miles long, not heretofore shown on the maps, and by making a portage of twenty-seven chains over a height of land between the two lakes gain the waters from which the Franklin River flows. Soon thereafter we cross Robinson Portage, the best met with. It is about thirty feet wide, clean and somewhat graded, and three-quarters of a mile long. A half day's paddling brings us to the height of land, the watershed between the Nelson and Hayes River system. The watershed here, called "The Painted Stone" from the red moss and lichens on the rock, is but a chain in width and several feet above the level of the water. We then enter the Echemamish, a stream so small that two dams have been built to store water, to enable the York boats to float therein, and this they not always do, but have to be dragged through mud and mire. The water channel in the marshy valley is sometimes but twenty links wide and very crooked. The country in general is low and rocky, and poorly wooded. After crossing Hairy Lake, so called from the abundance of reeds in it, being several miles wide, we again enter a channel for a short distance, and then enter the Nelson, completing the circuit of the two water systems. The entrance is very marked on account of the change of colour of the water, the latter looking a milky green, the former black; yet both waters are clear, one lake water, the other swamp water. The Nelson was found to have risen 9 inches since our departure in July. Another day's paddling and we reach Norway House on the 29th day of September, having made altogether during the season eighty-two portages.

Of all atmospheric phenomena none is more difficult of representation, either by words or illustration, than the aurora borealis. In these northern latitudes, where we witness them almost daily, being brightest and most vivid about midnight, the above difficulty is only too well illustrated and felt. The beauty of the aurora is not only its appearance as an arch or bow or grand drapery, or its display of colours, but its life, its activity, its fleetness; now shooting up columns and building, now fading and disappearing—ever restless. Dense as heavy clouds as it sometimes appears, yet the stars twinkle through it with their wonted lustre.

A few days previous to and after the 21st of September a peculiar tint in the atmosphere surrounding the sun was noticed. It was also observed at moonlight. It is probably caused by matter extraneous to the earth.

At Norway a full set of magnetic observations were again taken. It was considered advisable, at this season of the year especially, both for safety and economy, to engage a York boat for going down Lake Winnipeg about 300 miles, instead of with our small canoes. A few days delay there was here, but advantageously employed, while waiting for a York boat and Indian crew, as they were busy hauling hay with the boats from nooks and corners on the river to the fort.

Following any travelled water course in the North-West Territories one sees, occasionally, tall evergreens, with only a green top, looking like a Christmas tree stuck on to a telegraph pole. It is a "lobstick." It was the custom in former days, when liquor was an article of trade, to make lobsticks along the route of the "trippers," extending from Hudson's Bay to the Mackenzie River. The trippers, as these voyageurs were called, conveyed by York boats the goods of the Hudson's Bay Company from York Factory, the metropolis then, where they were landed by the

company's ship annually from England, to the posts of the interior. To the most distant posts two years were required for transport. At rapids where portages were necessary, or at turning points on the lakes, or other prominent places where they generally camped, these lobsticks were made. For the purpose, a tall spruce tree was selected, its branches lopped, leaving a green top. This was done in honour of some one either in the party or some one at one of the trading posts, and he upon whom the honour had been conferred was expected in return to present the trippers with a gallon or so of rum. These lobsticks served afterwards, up to the present time, as guides along the water route.

Being here on a Sunday, it was interesting to see the Indians and their families, in their canoes, dressed in their best, bright colored ribbons being predominant, going to church, which is situate several miles beyond on the east mainland, the girls using the paddles as well as the sterner sex.

We leave Norway on the 7th of October. Especially the northern part of Lake Winnipeg, some miles from the shore, is shallow, full of rocks, and treacherous. At the northern end are peat beds more than 4 feet in thickness, for which the future will undoubtedly find application. The whole of the country along the east shore is low and rocky (granite), and wooded, the bulk of the wood being only fit for fuel. A solitary Icelandic family was found on a small island in the lake, content and happy. The Icelander has a few cattle, grows his necessary potatoes, fishes, and in winter hauls them with oxen 100 miles to Winnipeg.

When within the bounds of Manitoba, the genial climate experienced was in strong contrast with the disagreeable, drizzling and sleety weather of the past two months. On the 16th of October we arrived at Lower Fort Garry, or the Stone Fort, on Red River, whence the Indian crew and boat returned, my party and self reaching Winnipeg the next day by train; having completed about 2,100 miles by water and 1,700 thereof in our small, but good, Peterborough canoes.

I cannot close my report without speaking in the highest terms of all the officers of the Hudson's Bay Company with whom I came in contact along my route, for their kindness, assistance and proverbial hospitality.

APPENDIX.

During the whole season thermometric observations were taken; of the barometer also, until the instrument, an aneroid, met with an accident; but as two factors enter into the latter, and the one (elevation above the sea) thereof changes daily by occupying new stations, these barometric observations are not considered of great value.

In the following table of temperature, expressed in degrees of the Fahrenheit scale, those of the air were taken at six o'clock in the morning, two in the afternoon and eight in the evening; those of the water generally near mid-day, and always in the current when in a river. Of course the temperature of the water is not so easily affected as that of the air, and subject to less change, yet large differences were observed, as will be seen in the table, between successive temperatures of the water. This was generally caused by passing from very shallow water in a wide expanse, as amongst the sandbars, into deep water, or *vice versa*; or, again, it may be lowered by an affluent from some icy swamp. Especially on the Saskatchewan are these large variations found. Although on a large number of days rain fell, yet the fore part of the season was very dry, and the latter part disagreeable drizzling; yet the total rainfall was small, and not one heavy rain or thundershower occurred.

RISE AND FALL OF THE SASKATCHEWAN RIVER

AT VARIOUS STATIONS BETWEEN THE FORKS AND
CEDAR LAKE

To accompany the Report of Exploratory
Survey of O. J. Klotz
1884

SCALE
INCHES
TEN FEET TO ONE INCH

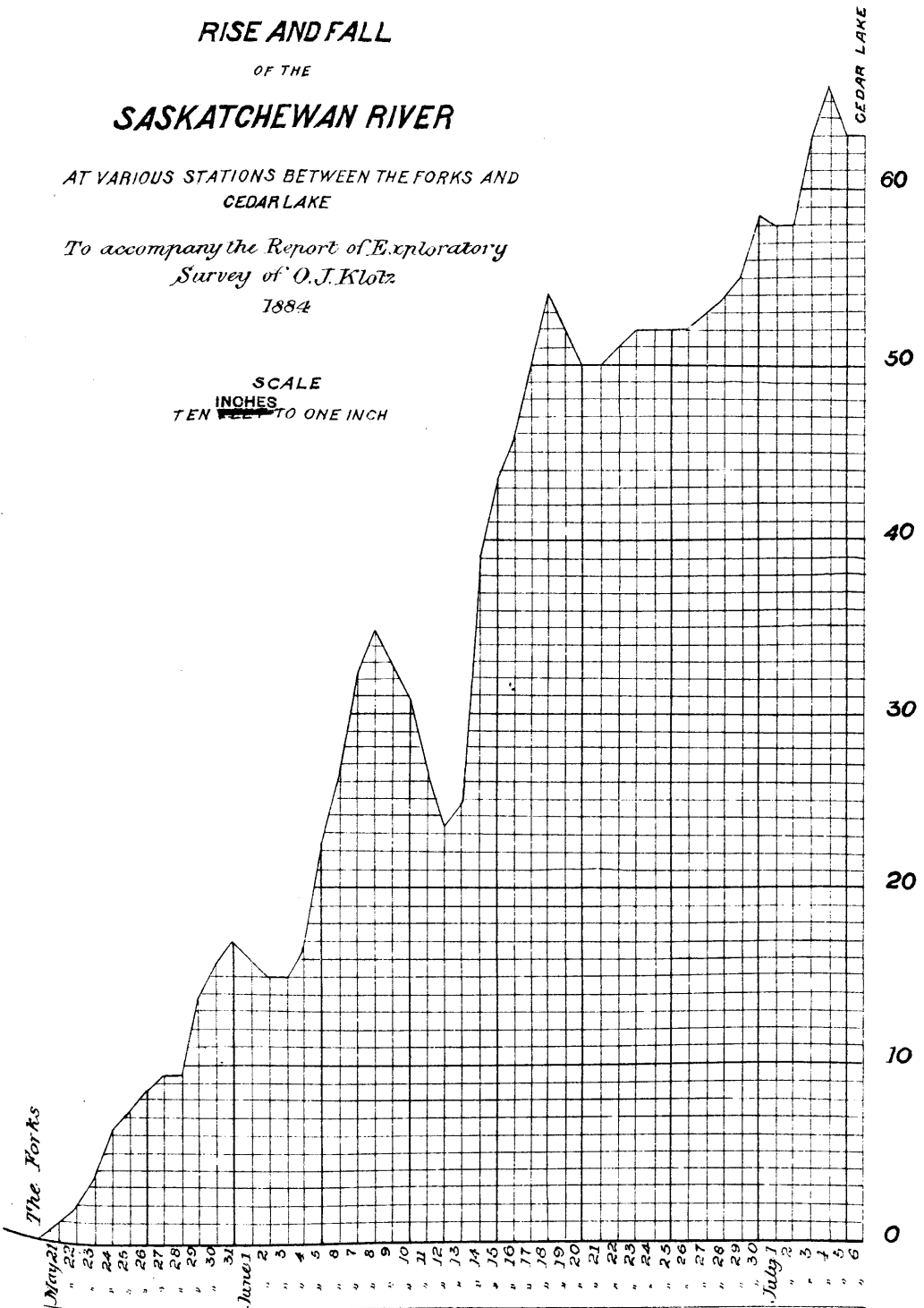


TABLE OF TEMPERATURE.

Date.	Air.			Water.	Remarks.
	6 A.M.	2 P.M.	8 P.M.		
May 8.....	48°	70°	52°	50°	South Saskatchewan.
do 9.....	48	63	52	55	
do 10.....	32	67	52	44	Shallow, sand bars.
do 11.....	48	58	50	57	do
do 12.....	35	60	42	52	do
do 13.....	51	70	52	52	do
do 14.....	50	66	62	55	
do 15.....	52	76	65	57	Deep.
do 16.....	48	81	70	60	
do 17.....	58	71	54	61	
do 18.....	55	77	61	61	
do 19.....	58	56	49	55	
do 20.....	48	65	45	55	
do 21.....	43	71	48	55	The Forks.
do 22.....	48	73	58	56	
do 23.....	48	82	68	56	
do 24.....	50	80	72	62	
do 25.....	68	70	58	60	
do 26.....	54	68	55	61	
do 27.....	46	74	60	61	Fort à la Corne.
do 28.....	58	78	68	60	
do 29.....	52	72	57	61	
do 30.....	50	77	65	62	
do 31.....	52	77	.....	63	Saskatchewan.
June 1.....	75	83	80	64	
do 2.....	63	85	74	65	
do 3.....	52	69	48	66	
do 4.....	42	42	46	54	
do 5.....	40	48	55	56	
do 6.....	46	56	54	55	
do 7.....	49	60	59	56	Shallow, sand bars.
do 8.....	58	64	62	58	do
do 9.....	56	80	66	60	do
do 10.....	62	63	51	61	
do 11.....	48	68	52	60	
do 12.....	47	62	50	60	
do 13.....	54	58	56	58	
do 14.....	59	72	.....	60	
do 15.....	76	86	80	67	Cumberland Lake.
do 16.....	68	80	73	.....
do 17.....	68	83	75	.....
do 18.....	60	88	76	69	Saskatchewan.
do 19.....	70	90	72	69	
do 20.....	72	88	79	70	
do 21.....	77	79	66	72	
do 22.....	74	80	76	72	
do 23.....	73	76	61	72	
do 24.....	53	74	65	72	
do 25.....	53	72	60	72	
do 26.....	62	78	74	70	The Pas.
do 27.....	65	82	69	66	
do 28.....	56	62	58	65	
do 29.....	54	63	58	64	
do 30.....	52	66	54	60	
July 1.....	44	60	53	60	
do 2.....	43	52	54	60	
do 3.....	46	59	54	58	
do 4.....	49	56	55	58	
do 5.....	49	66	60	58	
do 6.....	54	72	56	58	Chemahawin.
do 7.....	50	73	64	58	
do 8.....	59	70	62	60	Cedar Lake.
do 9.....	50	69	66	63	do

TABLE OF TEMPERATURE—Continued.

Date.	Air.			Water.	Remarks.
	6 A.M.	2 P.M.	8 P.M.		
July 10.....	58°	70°	64°	62°	Cedar Lake.
do 11.....	54	64	62	60	do
do 12.....	50	58	60	59	do
do 13.....	50	62	58	59	do
do 14.....	53	67	60	59	Channel.
do 15.....	50	64	50	60	Cross Lake.
do 16.....	55	75	50	60	Saskatchewan.
do 17.....	55	70	60	61	do
do 18.....	60	70	56	61	do
do 19.....	61	80	70	62	do
do 20.....	65	76	65	60	Lake Winnipeg.
do 21.....	60	82	68	61	Great Playgreen Lake.
do 22.....	62	75	64	64	Nelson River.
do 23.....	62	78	65	65	do Norway House.
do 24.....	65	77	66	65	do do
do 25.....	56	78	66	66	Little Playgreen Lake.
do 26.....	54	75	64	67	Nelson River.
do 27.....	62	68	64	67	do
do 28.....	46	74	72	66	do
do 29.....	48	75	69	65	do
do 30.....	46	62	57	66	Pipestone Lake.
do 31.....	55	68	60	66	Cross Lake.
Aug. 1.....	48	81	64	64	Nelson River.
do 2.....	53	78	67	65	do
do 3.....	65	82	60	65	do
do 4.....	60	85	68	66	do
do 5.....	54	70	54	65	Lake Sepewisk.
do 6.....	52	69	63	66	do
do 7.....	55	74	71	66	do
do 8.....	62	85	80	66	Nelson River.
do 9.....	61	75	62	65	do
do 10.....	71	68	61	66	do
do 11.....	60	74	68	66	do
do 12.....	56	67	68	66	do
do 13.....	51	55	54	66	do
do 14.....	52	62	61	64	do
do 15.....	50	52	50	61	Split Lake.
do 16.....	51	60	50	61	do
do 17.....	64	68	56	61	do
do 18.....	57	61	50	60	Nelson River.
do 19.....	45	53	50	60	do
do 20.....	32	51	48	60	Gull Lake.
do 21.....	40	52	47	59	Nelson, Gull Rapids.
do 22.....	31	60	50	58	Nelson Rapids.
do 23.....	42	60	45	56	do
do 24.....	50	52	48	56	do
do 25.....	49	52	45	56	do
do 26.....	42	66	60	56	do
do 27.....	50	67	65	56	do
do 28.....	48	80	48	56	do
do 29.....	51	60	45	55	do
do 30.....	45	62	40	55	Nelson.
do 31.....	55	57	50	55	do
Sept. 1.....	47	60	45	54	Nelson River.
do 2.....	40	44	40	54	do
do 3.....	44	52	45	54	do
do 4.....	44	42	40	54	do
do 5.....	44	48	43	54	do
do 6.....	34	45	40	50	do within the tide.
do 7.....	38	56	50	46	do do
do 8.....	40	61	45	44	do do
do 9.....	40	49	41	44	Hudson's Bay.

TABLE OF TEMPERATURE—Continued.

Date.	Air.			Water.	Remarks.
	6 A. M.	2 P. M.	8 P. M.		
Sept. 10.....	38 ^o	45 ^o	41 ^o	44 ^o	Hayes River (tide).
do 11.....	39	47	49	44	do
do 12.....	38	51	43	44	do
do 13.....	39	57	42	44	do
do 14.....	43	47	46	44	Hayes River.
do 15.....	43	48	48	44	do
do 16.....	40	45	40	44	Steel River.
do 17.....	38	49	45	44	Hill River.
do 18.....	43	55	42	44	do
do 19.....	36	53	42	45	do
do 20.....	33	53	43	45	do
do 21.....	37	45	33	45	Jack River.
do 22.....	39	49	40	46	Knee River.
do 23.....	44	62	38	46	do
do 24.....	34	45	34	46	Oxford Lake.
do 25.....	34	45	45	46	Windy Lake.
do 26.....	40	50	44	48	Robinson Portage.
do 27.....	39	54	44	46	Echemamish.
do 28.....	43	52	40	48	Nelson River.
do 29.....	38	57	39	48	do
do 30.....	36	52	31	48	do Norway.
Oct. 1.....	30	45	40	48	do
do 2.....	38	37	39	46	do
do 3.....	37	46	38	46	do
do 4.....	45	53	46	46	do
do 5.....	46	50	44	46	do
do 6.....	38	46	34	46	do
do 7.....	32	34	30	46	do
do 8.....	27	48	38	46	Great Playgreen Lake.
do 9.....	33	41	40	44	Lake Winnipeg.
do 10.....	34	46	42	44	do
do 11.....	31	43	40	46	do
do 12.....	31	47	45	48	do
do 13.....	30	55	48	48	do
do 14.....	40	60	55	49	do
do 15.....	43	62	45	50	do
do 16.....	42	60	46	50	do
.....	.....	.....	.....	52	Red River.

Number of days on which rain or snow fell in the following months, between the 1st of May and 16th of October, inclusive :—

MAY.		JUNE.	JULY.	AUGUST.	SEPTEMBER.		OCTOBER.	
Rain.	Snow.	Rain.	Rain.	Rain.	Rain.	Snow.	Rain.	Snow.
2	1	13	9	18	22	1	3	2

EXTRACT from the Report of Mr. Ogilvie on the Survey of Block and Township Outlines in the winter and summer of 1883.

Starting at the intersection of the 14th Base and 5th Initial Meridian, the first four sections of the latter line, in Township 53, are covered with bush, interspersed with small patches of prairie. The soil is generally good. The last two sections are entirely wood—poplar and spruce—with tamarac swamp and moss marsh interspersed in small patches. These conditions continue the same to the 15th Base Line, with the exception of a few small patches of prairie in the vicinity of Dead Man's Lake, to which the western edge of the prairie reaches. Northward along the 5th Initial Meridian from this lake, until the Pembina River is reached at the 16th Base Line, the country is all heavily timbered with large poplar and spruce; but, unfortunately, a great deal of it has been burned over and is now dry, and much of it is fallen, which rendered it very difficult to get our supplies through. After crossing the Pembina River the country changes for the worse, being generally moss marsh or muskeg, with ridges of small poplar between. This line crosses the Pembina River six times in a distance of sixteen miles, and finally leaves the valley in Township 63; after which the country improves for a short distance, muskeg being less frequent. In many places extensive tracts of fine poplar woods occur, the soil appearing to be of excellent quality. In Townships 65 and 66 the surface is much broken with sandy ridges and knolls, which are covered with pine (Banksian) fit for nothing except small building logs or fencing. The valleys between these knolls contain spruce and tamarac swamps, the timber of which is small and unfit for any use, except fencing or fuel.

In Townships 67, 68, 69, 70 and 71, and as far as the Athabasca River, the surface is rolling and comparatively free from swamp. The timber generally is poplar, and some good spruce, with occasional knolls of pine (Banksian).

The Athabasca River was crossed in Township 81, Sections 24 and 25. It is here 12 chains and 19 links wide from brink to brink, and was, when we crossed it (1st May) brim full of water. The mean depth then was about 10 feet, and the current about four miles an hour. I shall speak more fully of this river further on.

At this point, the plains on the south side are 300 feet above the water, while on the north side the top of the bank is 370 feet above water, but immediately after falls away to the north into an extensive moss marsh, which is thinly timbered with small tamarac and spruce. I did not prosecute the survey of this line any further than the marsh above mentioned.

I commenced the ascent of the Lesser Slave River, on my way to Peace River, on the 18th day of June, after having gone down the Athabasca River to the Athabasca Landing and getting a York boat put into sailing order, and waiting some twelve days for my carts to arrive from Edmonton. I arrived at Slave Lake post on 1st July and, after considerable delay, I reached Little Burned River on the 16th. In the vicinity of this river I expected to meet Mr. Thompson on the 6th Initial Meridian, but could find no trace of him until the 19th. On the 20th I learned from him that he had not, owing to very unfavourable weather, determined the latitude of his starting point on the Meridian. I then saw him personally and arranged that if the weather would permit during the next few days, we would, at different points on the Meridian, determine the latitude by prime vertical transits; and, if necessary, correct the place of the provisional posts which he had planted on it, by a latitude deduced, as he told me, from his traverse survey from the mouth of Lesser Slave River. The weather for some time proving unfavourable for observing, I had to accept the place of the 21st Base, established by him as described, and produce it westward from the Meridian and found the general character of the several ranges along it to be as follows:—

Range 1.—Is about three-fourths timbered with poplar, some of which would make fair building timber. There is also some good sized spruce scattered over it, which could be utilized either for building or timber. The other fourth is prairie, with a luxuriant growth of grass and flowers on it. The soil in this range, as far as

seen, on both sides of the line, is generally first-class and deep, being never less than 1 foot deep, with hard clay subsoil.

Range 2.—Across this range the timber thins out, so that there is fully one-half prairie; and the soil is in some places shallower and lighter, with a sandy subsoil. On the west side of Section 36 in this range the line crosses Little Burned River, which is here, on an average, about 45 feet wide, with a mean depth of about 1 foot, and a rapid all the way to Peace River. There is enough water in it to drive a respectable mill, and as the season of 1883 was remarkable in this region for dryness and coldness, I presume there is no question about its efficiency at all times. The valley here is about 300 feet deep, and increases rapidly in depth as we approach Peace River, which, at the trail crossing about ten miles further up, has simply a bank about 15 feet high.

Range 3.—This range is fine level prairie, with many small bluffs of poplar on it. The soil is generally good black loamy clay, with a subsoil of hard clay.

Range 4.—This range is much the same as the last described, but the bush is more plentiful. Township 80 in this range is nearly all wood, while Township 81 is nearly all prairie. The valley of Muddy Creek was crossed in the westerly tier of sections in this range. Its sides at this point are very steep—so much so, that a valley about 700 feet deep is spanned by 50 chains. In a great many places its sides are scarped, and the loose clay on those places is continually rolling into the water of the creek making it extremely muddy—hence its name.

The Meridian between Ranges 4 and 5 runs down the side of this valley, and strikes Peace River on the south side of Section 18, in Township 80. As it would serve no useful purpose to produce this Meridian (for the present at least) further south than the river—the country south of it being generally heavy wooded—I stopped it here, after triangulating over the river, and making an approximate measurement of a cross-section of it, the details of which I shall give hereafter. I then produced the 21st Base Line across Range 5. The east half of this range is about half prairie and half wood, and the soil is very good. There are a few meadows through it. The west half is wood entirely, poplar and some spruce. The soil is light, but of fair quality.

I returned to the Meridian between Ranges 4 and 5, and produced it north through Townships 81 and 82. This line follows up the valley of Muddy Creek, which it crosses and leaves in Sections 24 and 25, the creek from this point trending north-westerly. The remainder of the township is prairie and poplar wood mixed. The soil everywhere in it is good; but that part occupied by the creek valley can never be utilized for anything except pasture, as it is much broken by land slides. Moreover, anything grown in the valley, could only be got out of it with great difficulty.

Township 82 is, on the south side, burned slash and prairie opening. The north half is moss marsh, with a few sandy knolls in it, covered with small pitch pine. This marsh extends much farther north than Township 82, and appears to bear westward to the valley of Muddy Creek. I intended to produce the 21st Correction Line westward from this Meridian, but finding the swamp impassable for carts, could not do so. I then outlined some townships in the prairie region, to give settlers who are in it now, and those who may come previous to sub-division surveys here, a chance to locate themselves with something like a certainty. I outlined Townships 81 in Ranges 3 and 4; and Township 82 in Range 4, with the exception of the northern boundary. I then went to the Initial Meridian, to run the 21st Correction Line eastward from it; and in order to avoid taking my carts through a large swamp, I started from the Meridian on the section line between Sections 9 and 16, planting the post between Sections 9 and 10 and 15 and 16, at 18·305 chains from the Meridian. I produced this line eastward to Range 25, thence northward between Ranges 25 and 26, west of the 5th Initial Meridian, to the 21st Correction Line, which I ran eastward across Range 25. Here I found the country so dry that it was difficult to obtain water for our use; in fact, all the work east of the Meridian was performed while camped at Old Wives Lakes, and, those excepted, we could find no water in the vicinity.

This inconvenience, coupled with the fact that my provisions were getting short (it being very difficult to obtain a supply here, as the only traders in the district, the Hudson's Bay Company, did not anticipate a demand from our quarter, and consequently did not lay in any over and above that required for their usual trade), induced me to suspend operations for the season, after running the Meridian between Ranges 24 and 25, one section south from the correction line.

That portion of the Peace River country which has been so much spoken of (and with good reason) by those who have passed over it, is bounded on the west by Muddy Creek, on the south by Peace River, on the east by Peace River, (after it turns northward below the mouth of Smoky River,) and on the north by the forest which now lies almost parallel with, and about twenty miles back from the river. This piece of country is truly a lovely place, being level and well enough wooded for all farm purposes. The soil generally excellent, and dry to a fault; while the views from many parts of it are magnificent, and not excelled by any others I have seen in the territories, except those along the base of the Rocky Mountains, and one or two at the Red Deer River, on the Calgary and Edmonton trail. The meteorological conditions are, so far as I could learn from those who have lived in the district for years, as favourable to the successful raising of grain, as in any other part of the territory. Mr. McDougall, the Hudson's Bay Company's Factor, at Dunvegan, kept a meteorological record at that place, in the Peace River valley, from which I will quote in my meteorological notes hereto appended. I also obtained evidence from some parties who lived on the plains, out of the river valley, during the summer and fall of 1882. It is not scientific, but is, however, valuable.

Mr. Laurence, who has lived at Fort Vermillion for some years, assured me that the climate there is as suitable for agricultural purposes, as that of the eastern part of the Province of Quebec, where he was born and lived until he moved to Fort Vermillion, where he now teaches school in connection with the Church Mission Society. He says that barley is always a success, and potatoes and vegetables are as good, generally, as he ever saw. The Rev. Father Husson, Roman Catholic Missionary at Dunvegan, who lived at Vermillion for years, corroborates Mr. Laurence's statement with reference to potatoes and vegetables. Wheat was never much grown, for the simple reason that it could not be very well utilized as an article of food, except when boiled whole.

During the last year or two, however, small hand-mills have been introduced, and a fair article of flour can be made by them. This has encouraged the growing of wheat in larger quantities, and last year not much less than 100 bushels were raised at Fort Dunvegan, nearly all of which, though grown under unfavourable circumstances, would compare favourably with any I have seen in other parts of Canada, whether standing unharvested or in the bag.

Through the kindness of the Rev. Mr. Brick, the Church Mission Society's Missionary, and the Roman Catholic Missionary here, I have been enabled to present the Department with samples of wheat and barley grown at this place; also, a sample of Egyptian barley grown at Vermillion, in the summer of 1882, by Mr. Laurence, already mentioned. I need hardly add that those samples were not selected, but taken at haphazard, as they came, so as to represent, as nearly as possible, the average quality of the grain.

I inquired of all I met and knew to be in a position to give information respecting the country up and down the Peace River, more especially that portion of it where prairie is to be found.

Grand Prairie.—This lies to the south of Peace River, and is generally supposed to be about forty miles south of Dunvegan. The estimates of its size, as given to me by the various parties I consulted, differed greatly; but taking a mean of all the estimates together, it is probably about twenty miles wide by about forty long. All concur in describing it as a most beautiful piece of country, having a rolling surface, with many clumps of poplar, streams of fine water and first-class soil. At the Hudson's Bay Company's post summer frosts are said to be prevalent. This, however, is said by some to be purely local, as it is near a lake or pond and on low ground.

The estimates of size given me by some old Indians and half-breeds who saw it forty or fifty years ago, compared with the estimates of those who have seen it recently, lead me to believe that the forest is gradually encroaching on it, as I know it is on the prairie here, which has come under my own notice, for there is truly a great difference between the country as I saw it, and the same part as Sir Alexander Mackenzie appears to have seen it nearly 100 years ago, and later still, as Archibald McDonald, Chief Factor of the Hudson's Bay Company, saw it in 1828, when he accompanied Sir George Simpson in his celebrated canoe voyage from Hudson's Bay to the Pacific Ocean. Between Grand Prairie and the Peace River there are several small pieces of prairie which can be plainly seen from Township 82, Range 3, west of the 6th Initial Meridian. One of those prairies lies to the north of a ridge of hills called The White Mountains, which are plainly seen in a south-westerly direction from the above township. Its area can scarcely be less than three or four square miles; and is said, by those who have seen it, to be good soil and well watered. Northwards from Dunvegan, on the Battle River trail, after leaving the large prairie already described, bordering on Peace River, there are said to be many small prairies scattered through the forest, and the same is said of the trail leading to Fort St. John.

Down the Peace River there are said to be many pieces of prairie on both banks, of which the accounts I got are very conflicting. There appears to be a comparatively large prairie district around Vermillion. Mr. McDougall, Chief Factor in the Hudson's Bay Company, who has travelled a great deal through the Peace River district, and seems to have given more than usual attention to the country he passed over, told me that he had several times ridden on horse-back from Fort Vermillion to Hayes River—a distance he called about fifty miles—and all the way, except about three miles, was prairie, with clumps of poplar on it. The soil he considered very good for agricultural purposes. He never noticed any very bad frosts during the summer months when he was there. Mr. Laurence, who lives here, calls it the "Garden of the Peace River country," and declares that part to be freer from summer frosts than that around Dunvegan (of which he has not much personal knowledge however.)

He explains this by the fact that around Dunvegan the plains are about 800 feet above the river, while at Vermillion they are scarcely 100 feet, thus making a difference of between 700 and 800 feet between the altitudes of the two places.

There is also said to be some good prairie on the south-east side of the river here, and at the mouth of Little Red River, further down the Peace.

The Rev. Mr. Brick told me that when coming up Peace River in September, 1882, he saw on the 13th of that month, in a small garden, green growing cucumber vines, with cucumbers growing on them. This fact speaks well for the absence of summer frosts in latitude about 59°.

It appears there is also quite an extensive tract of prairie country at the head of Salt River, a tributary of Great Slave River; but whether the climate would permit the maturing of wheat there, or not, is a question on which I could obtain no definite information.

One would hardly think so, considering the height of latitude, but there are many climatic anomalies in those territories; and perhaps many more to be experienced. Mr. McLean, a trader in the Hudson's Bay Company's service, told me that he lived for seven years at Fort Liard, on the Liard River, latitude about 60°, and that in every one of those years he raised all the potatoes and vegetables required for use at the post. He said that barley and oats, whenever sown there, always matured well and were of good quality. Wheat he never saw tried there, but thought it would succeed. Were he not a reliable man one could hardly credit the figures he gave of summer temperatures observed there by himself. He relates one instance in which he saw the thermometer over 100 Fahrenheit in the shade.

I made many inquiries concerning the country that lies between the Peace and Athabasca Rivers, but could learn nothing definite, as I met no one who had gone any distance from either rivers into it. It is generally supposed to be a region of swamps and lakes, and all heavily timbered. From the north bank of the Athabasca,

where the the 5th Initial Meridian crosses, I could see northward over the valley of Moose River to a ridge of hills at least thirty miles distant, and all that distance was apparently heavily timbered. When going to and coming from Peace River, I had to send my horses from the junction of Moose and Lesser Slave Rivers northwards to the foot of a ridge of hills some eight or nine miles back from Slave River and Slave Lake, called Raspberry Mountains; thence around by the foot of those hills and down to the lake about five miles above the head of Lesser, Slave River. This had to be done to avoid the impassable swamps which surround the head of Slave River. Both parties who went (different men in each one) report some spots of fine prairie land along the foot of the hills, though to look at the country from the lake, no one would suspect their existence. They also report that a cart or pack road could readily be made this way.

The country between Lesser Slave and Peace Rivers is nearly all wooded with small poplar and some spruce. There are many spruce and tamarac swamps scattered through it.

Near Peace River the trees are small, and the land has every appearance of having been a prairie some years ago.

On Heart River there are many patches of good prairie, which would, as far as soil is concerned, make excellent farms. Also, at the west end of Lesser Slave Lake, there are some extensive pieces of prairie, having very good soil.

The forest is gradually encroaching on those prairies; and, should no fires occur, they will, in the course of a generation or two, be all poplar woods.

When coming down the Athabasca in the fall, our horses could sometimes keep along the shore of the river, but more frequently, owing to land slides, they had to go up on to the plains, and far enough back from the river to avoid the ravines running into it. I accompanied the men who brought the horses and chose the path for them. The country we came over was all woods, which extended as far as could be seen to the north; but many places I passed over were, some years ago, prairie. I was assured by an old half-breed I met on the river, who has been up and down it since his boyhood, and can recollect as far back as fifty years ago, that there used to be many pieces of prairie along the river and to the north of it—notably, a fine large piece at the confluence of the Lesser Slave and Athabasca Rivers, which he described to me on the spot as it existed upwards of fifty years ago. Now there is only about an acre of it left, and that will soon be grown over with poplar and willow. Whenever required, it will not be difficult to find a fair pack trail, and, in dry seasons, a passable cart trail, from opposite the Athabasca Landing to the confluence of the Moose and Lesser Slave Rivers. From this point it would have to go northward, as already described, to the shore of the lake; thence along the lake a good pack trail could be made with very little trouble, to Slave Lake Post, where there is a cart trail cut by the Hudson's Bay Company to Peace River, through just as bad country as any I saw on the track described.

The country around Athabasca Landing is—on the south side of the river—partly open, a fire some years ago having devastated the bush for miles around, both up and down the river. Nearly all the original timber is now lying, and there is a second growth springing up. Should a fire again occur, in the course of a year or two, quite a large tract of country will be converted into prairie.

I travelled up a creek (which flows into the Athabasca, about half a mile above the Landing) a distance of about eight miles, and found that the fire had reached that far, but apparently not much further. On the road between the Landing and Edmonton, the *brulé* extends southward along Tou-ti-nou Creek, over thirty miles from the Athabasca. The soil in this *brulé* is generally light and gravelly—in some places very stony, with granite boulders. This quality of soil remains the same to the Bridge Lakes, when it improves. The surface is rolling, sometimes knolly.

From the Bridge Lakes to Edmonton the soil is generally good, the surface rolling, and about half of it timbered with poplar and a few spruce.

During the whole of my work I kept a daily record of the meteorological conditions. A summary, for the months of July, August and September, I presented in

my report for 1882. I now present a summary of it for the remaining months of the period I was in the field.

It will be seen from it that the summer of 1883 was very cold in the Peace River country, and, I believe, all over the Territories. To show that the state of the weather was exceptional, I have added the temperature observed by Mr. McDougall, at Dunvegan, for the two previous years. No record was kept there during the summer of 1883, but that they had injurious frosts no one denies. That such were common during the summer months of other years no one will admit.

My record for the month of June was taken in the Lesser Slave Lake district, and so is not a fair basis for comparison in the Peace River country, but it is the nearest record I could find, and I am anxious to use it. The mean temperature for the months, as I have given it, is the mean of the maximum and minimum. I also give the mean temperature for 9 p.m.

I could not conveniently procure the record for 1882, but know that it was much the same as that for 1880 and 1881.

TABLE showing some of the Meteorological conditions on Peace River for part of the Years

	1883.				1881.				1880.			
	June.	July.	August.	Sept.	June.	July.	August.	Sept.	June.	July.	August.	Sept.
Mean temperature for month.....	55·00	56·89	57·03	47·02	55·65	58·05	55·00	46·45	55·45	61·35	55·05	53·25
Mean maximum.....	70·03	70·72	72·05	62·07	69·80	72·80	66·90	57·50	68·60	75·00	67·40	61·90
Mean minimum.....	39·98	43·07	42·02	31·98	41·50	43·30	43·10	35·40	42·30	47·70	42·70	44·60
Highest temperature.....	94·00	88·50	85·00	76·00	79·00	87·00	86·00	74·00	80·00	86·00	76·00	78·00
Lowest temperature.....	16·50	28·30	22·00	10·50	32·40	35·40	31·40	25·30	30·40	34·40	33·40	23·30
Number of days below freezing.....	8	4	5	15	0	0	2	4	2	0	0	10
Number of days 80° and above.....	6	4	5	0	0	4	2	0	0	10	0	0
Number of days 40° and below.....	14	8	13	23	10	8	9	25	14	3	7	24
Rainfall in inches.....	1·25	·76	·68	·68	6·74	1·72	5·22	2·50	3·76	1·85	1·21	1·32
Number of days it rained.....	14	9	6	4	7	5	13	11	15	9	6	7

TABULAR STATEMENT showing some of the Meteorological conditions for part of 1882 and part of 1883.

	1882.						1883.					
	Oct.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.
Mean temperature for the month.....	32.86	19.17	15.95	— 9.10	5.87	22.38	38.26	48.04	56.00	56.89	57.03	47.02
Mean maximum temperature.....	39.95	29.40	— 5.95	2.50	20.20	36.32	50.78	65.35	72.03	70.72	72.05	62.07
Mean minimum do	25.77	8.95	5.00	— 20.71	— 8.46	9.45	25.75	30.73	39.98	43.07	42.02	31.98
Mean range.....	14.18	20.45	21.90	23.21	28.66	25.87	25.03	34.62	32.05	27.66	30.03	30.09
Mean temperature at 9 p.m., for month....	31.53	17.50	3.42	— 9.58	3.34	20.70	36.33	44.52	52.17	56.76	54.16	43.37
Highest temperature	51.00	44.00	42.50	32.00	56.00	57.00	72.50	83.00	94.00	88.50	85.00	76.00
Lowest do	9.00	— 13.00	— 41.00	— 51.50	— 43.50	— 12.00	— 0.50	18.00	16.50	28.30	22.00	10.50
Greatest range on any day	31.00	41.00	38.00	42.50	65.00	45.00	43.50	58.50	67.00	46.00	47.00	49.50
Lowest do	1.90	0.00	0.00	8.00	4.00	4.00	5.50	8.00	8.00	4.00	6.00	2.50
Rainfall in inches for the month.....	2.39	0.00	.10	0.00	0.00	.20	.65	.24	1.25	.76	.68	.68
Snowfall do	8.75	3.60	9.12	10.60	5.20	6.30	1.40	9.00	0.00	0.00	0.00	0.00
Depth in inches of snow in water.	1.17	.48	1.22	1.41	.69	.86	.19	1.20	0.00	0.00	0.00	0.00
Number of days on which it rained.....	4	0	1	0	0	1	5	3	14	9	6	4
Number of days on which it snowed.....	6	4	7	6	7	5	2	1 on 3rd	0	0	0	0

On the 3rd of May, there was a heavy snow storm. On the 5th, the snow was gone. About the 20th, most of the trees were in leaf. The Pembina and Athabasca Rivers broke up about the 15th April, and were clear of ice on the 25th.

During the course of my work I observed for magnetic declination and inclination at several points through the country. The results are given below.

TABLE showing the magnetic declination, inclination and total force observed by Wm. Ogilvie, D.L.S., in the North-West Territories, during the seasons of 1882 and 1883:—

DECLINATIONS.

Declination.	1882.	Latitude.	Longitude.
22°-618 E.....	August 5th.....	50° 58'	110° 40'5
23°-318 E.....	August 19th.....	51° 03'	112° 14'
26°-614 E.....	November 29th.....	54° 02'	114° 00'
	1883.		
27°-757 E.....	May 9th.....	55° 10'	114° 03'5
30°-173 E.....	September 21st.....	56° 09'6	117° 47'3

INCLINATION AND TOTAL FORCE.

Inclination.	Total Force.	Date.	Latitude.	Longitude.
		1882.		
79° 50'25*	Not observed.	May 24th.	C.P.R. Station	Winnipeg.
76° 14'1	"	July 15th.	51° 05'	110° 15'
76° 13'2	"	August 6th.	51° 00'6	111° 40'5
		1883.		
77° 58'1	"	January 1st.	54° 21'3	114° 00'
78° 29'1	13-734	May 10th.	55° 10'	114° 03'5
78° 17'25	13-614	September 22nd.	56° 08'	117° 50'6
78° 15'1	13-572	October 3rd.	55° 32'20''	116° 08'34''

* This one is of doubtful accuracy, on account of its proximity to the C.P.R. Station.

APPROXIMATE Position of Hudson's Bay Company's Post at Lesser Slave Lake, deduced from plan of Traverse, by W. T. Thompson.

Latitude 55° 32' 30".

Longitude 116° 8' 34".

To close with, it may be well to state that many of the Indians in the Lesser Slave Lake and Peace River districts were anxious to learn the nature of my mission to their country, they not yet having made any treaty with the Government. I explained to them the nature of my work, and tried to make them understand that my operations in no way interfered with any right they had in the country.

I think it will be found, whenever a treaty is made for that part of the country, that the original Indians will be very few compared with those who have immigrated into it from the south and east—many of them quite recently.

The original tribe of the country—the Beaver Indians—are fast dying out, through starvation and disease. At the rate of decrease of the past few years a very short time will elapse until the Beavers will be a tribe of the past. They seem to

have lost all that energy and valour which appears to have once characterized them, and which yet distinguishes a branch of their tribe—the Sarcees—which moved to the south some generations ago. The Peace River country, some fifteen or sixteen years ago, was literally alive with all sorts of game; but now the reverse is the case. At that time to kill a moose was a trifling incident; now it is a rare occurrence and accomplished by few. At that time beavers were to be seen at any time on any water; now they are almost extinct.

Around Lesser Slave Lake many of the half-breeds are betaking themselves to farming, and last fall many of them there had stored a goodly quantity of potatoes, of very good quality. With those, and the fish they will catch in the lake, they will manage to live comparatively comfortably.

In the Peace River country none of the Indians have thought of turning to agriculture yet. One half breed had a small patch of potatoes near the mouth of Smoky River, which yielded very well and were of good quality. This fact will encourage others to embark in the same business, provided they can get seed, which is the great drawback in the country at present.

All who have seen the country think very highly of part of it as a farming country, and [were there better facilities for getting into it, it would soon be pretty well settled. The Beaver Indians have no objection to people settling in the prairie part of the country, but do not wish the forest part interfered with. I do not think, however, that they have spirit enough to try to prevent it, if it was attempted.

REPORT OF MILNER HART, ON THE SURVEY OF MAIN HIGHWAYS IN PRINCE ALBERT DISTRICT.

I have the honour to acknowledge the receipt of your letter S 9,643.

During the past season I surveyed 155 miles.

I located roads between the following places, viz.:—

1st. On Saskatchewan Forks and Carlton Trail (*via* Prince Albert town). From east line of Range 24 west of 2nd Principal Meridian. W. 46 to north line of W. 47, Range 1, west 3 Principal Meridian.

2nd. From Prince Albert to South Branch of the Saskatchewan.

Trail to Halero Settlement, easterly of Red Deer Hill.

Trail to Tait and Gordon Settlement, *via* Island Lake.

Trail to Indian Reserve, from a point west of Prince Albert, from Saskatchewan Forks and Carlton Road.

Trail to lots 44 and 45, from a point on trail from Prince Albert, *via* Island Lake.

3rd. Trail along South Branch, from Halero Settlement to northerly limit of Indian Reserve.

4th. Trail from Carlton Forks, Section 24, W. 46, Range 1 west 3rd Principal Meridian to Fisher's (late Batoche) and Gabriel's Crossings of the South Branch of the Saskatchewan River.

5th. Trail from near St. Laurent Mission to Duck Lake.

6th. Trail from near Fisher's Crossing to Duck Lake and south limit of Indian Reserve.

7th. Trail from Duck Lake to Gabriel's Crossing of the South Saskatchewan River.

I am of opinion that all the trails located by me should be established as main highways, saving and except that part of the Saskatchewan Forks and Carlton Trail through the town of Prince Albert, from the east line of river lot 82 to the line between river lots 63 and 64.

This portion of Prince Albert has been sub-divided into town lots; the owners are, from time to time, amending their surveys; and Prince Albert, ere long, will become an incorporated town. For these reasons, I think it would be better not to

establish, as a main highway, the trail I surveyed between the points above mentioned, but let the residents settle it among themselves.

Parts of some of the trails I located are very crooked. It could not be obviated, on account of the numerous lakes and ponds.

REPORT BY WILLIAM OGILVIE, D.L.S., 1884.

To the Deputy of the Minister of the Interior, Ottawa.

SIR,—I have the honour to submit the following report on my operations, and the country explored by me in my survey of the Athabasca and Peace River valleys.

I left for Edmonton on the 22nd of May, arriving at that place on the 31st. There I made the final arrangements for my season's supplies, and left for the Athabasca Landing, where I arrived on the 9th of June. Here one of my men became very sick, and I had to send him back to Edmonton. I had to accept in his place a boy who happened to be there while on his way to Peace River, who knew nothing of canoeing. Cloudy, rainy weather detained me at the landing until the evening of the 14th of June.

The progress of the survey was much hindered by bad weather, the summer being unusually wet.

Much delay was caused, also, by the loss of one of my party, and the canoe in which he was, as I was deprived of his services; and it cast a gloom over the spirits of the party for a long time. I may state here that the accident was entirely due to the choice and actions of the men themselves. They started without my orders or knowledge, and chose a place for descending the rapids, which was not that pointed out to me, by a man whom I sent to examine them, as the best place to run, and which I ran the next day with a canoe the same build and as heavily laden as the one which was lost, and with no approach to an accident except touching a stone.

Fort McMurray was reached on the 12th of July.

Here I remained until the 15th, collecting information about the surrounding country and getting my boats in order, as they were somewhat battered in the descent of the rough part of the river. I also had to buy another canoe and engage another man to take the place of the one lost.

From this point to Athabasca Lake the descent of the river is easy and safe, there being nothing worse than an acceleration of the current in a few places. The lake was reached on the morning of the 26th, but a strong head wind prevented my crossing to Fort Chipewyan until the 28th. Here I remained until the evening of the 31st.

The ascent of the Peace was made without mishap or adventure of any kind. On this as on the Athabasca the bad weather was the cause of much delay and hardship as well as danger, a strong wind blowing up the river, making it dangerous for canoes as heavily laden as ours were.

At all the points along the river where missionaries or traders resided I gathered all the information possible about the surrounding country. I reached Dunvegan on the 26th of September, having abandoned the upward traverse of the river a little above Smoky River. This part I finished on my return, thus completing the traverse of the Peace River from the meridian between Ranges 4 and 5 west of the 6th Initial Meridian (connecting with the 6th meridian at its crossing) to Fort Chipewyan. I reached Little Slave Lake Post on the 11th of October, and owing to contrary high winds was detained at that place until the afternoon of the 17th. The trip down the lake occupied us until the morning of the 22nd, the weather being, almost continuously, cold and stormy, so that we could not proceed on the lake with our canoes.

On the 24th of October I began to traverse the Athabasca River from the crossing of the 5th Initial Meridian to my starting point at the Landing, fondly hoping that I should be able to complete the circuit from the 5th Initial Meridian on the Athabasca to the 6th on the Peace. I had made only half a day's traverse, when a

heavy snow storm set in, which lasted two days. I waited until it was over, still hoping that the weather would allow me to finish, but when the storm ceased such a sharp frost set in that the snow laden water became in a few hours an almost solid mass of moving ice, which rendered our position in the canoes oftentimes somewhat perilous. This compelled me to abandon the traverse of the Athabasca and make the best time I could to the Landing. Fortunately the river did not close on us, and after much trouble and labor we reached the Landing on the 30th. There I found the man I had engaged in the spring to meet me at the Landing and take care of my horses and outfit during the summer.

Owing to there being a foot of snow on the ground our progress to Edmonton was slow. We arrived at that place on the evening of the 6th of November. I remained at Edmonton until the 10th., finishing my business and recruiting my horses.

I had to go down to Fort Saskatchewan in order to cross the river, the crossing at Edmonton being blocked by ice, which was not sufficiently strong to carry.

I reached Calgary on the evening of the 18th.

It will not be out of place to make a few remarks here on the instrument used to determine the distances (a Sigeol micrometer). This was the first occasion, I believe, on which such an instrument had been used on a Canadian survey. The defining power of the telescope on the one I had, was equal to that of any glass of the same size that I have ever seen; and, although, in my opinion, the apparatus for measuring the angles might be modified so as to make it more convenient to handle, without sacrificing its accuracy, it is still quick and accurate to a degree that I did not expect, and, as far as my experience goes, much more so than any other form of micrometer that I have seen. Without giving any figures or measurements as examples, I will say that the probable error of an angular measurement taken with it, under ordinary conditions (taking the mean of, say, five readings) was never more than a few seconds. The base used in connection with the micrometer was made of an inch plank in the form of a T (to make it rigid), with two detachable glass squares, painted white, with a red disc in the centre. Each of the glasses was a foot square, and the disc 6 inches in diameter. The glasses were each enclosed in a frame $15\frac{1}{2}$ inches square, painted white, and of sufficient buoyancy to float the glass should they ever be set adrift. These frames were attached and detached from the base rod at every station; and between stations, were carried in a box, which prevented injury to the glass. The work of attaching and detaching only occupied a few seconds; and, as the fittings were all of iron, the distance between the centres of the discs remained practically the same during the season, and would have remained so, if necessary, much longer. Only one pair of glasses was used on the survey. I found the above mentioned form of base much more accurate and convenient than any I have seen, and the distance between the discs (20 links) gave a good angle at ordinary distances. The glasses showed clearly and distinctly, by either reflected or transmitted light, and permitted distinct, sharp readings to be taken when the outline of the shore and bank of the river could not be seen. More especially was this the case when looking towards the sun when it was low, the white glass then showing, by transmitted light, much more clearly and distinctly than in any other way.

The Athabasca River.

Descending the river from the landing, only two rapids worth mentioning are met with between that point and Grand Rapids. The first of these is situated 120 miles below the landing, and is caused by a bar of gravel reaching across the river, which in this part is somewhat wider than the average, and correspondingly shallow. This rapid presents no obstacle to the passage of York boats not drawing more than 2 feet of water, nor do I think it would, with the water at its ordinary height, to steamboats such as navigate the Saskatchewan; and even should such be the case, it would be no very difficult matter to construct a channel, as the bar is not more than 100 to 120 yards in length.

The second rapid is met with 143 miles from the Landing, and though rougher than the first, yet is not such an obstacle to navigation, as here the river is not so wide and is consequently deeper. Judging from appearances, I should say that there was never less than from 3 to 4 feet of water in the centre or deepest portion of the rapid.

Grand Rapids are situated 166 miles below the Landing, are about two miles long, and I should estimate, at this season of the year, have a fall of about 65 feet, most of which occurs in about 30 chains. The river here has, through past ages, worn for itself a bed in the soft sandstone, about 300 feet deep. Thickly scattered over the face of the rapid may be seen spheroidal concretionary masses of sandstone, varying in size from a foot or two to 10 or 12 feet in diameter. These, harder than the surrounding mass, have offered greater resistance to the action of the water, and have remained standing on the slope of the rapid in numberless quantities, adding greatly to the roughness of the same. Midway in the rapid is a large timbered island around which the waters sweep, and, converging below, rush through a channel not more than 100 yards wide, while above the island the river is from 500 to 600 yards in width. The rush of water through this channel is tremendous, and reminds one forcibly of the rapids below Niagara Falls. Standing on the east bank of the river, just at the narrowest part of the channel, and looking up at the wildly tumbling white waters dashing from rock to rock as they sweep around the fir clad island, while on either hand stand the towering and almost perpendicular sandstone cliffs with their fringe of dark green fir apparently brushing the clouds, one sees a spectacle that inspires with awe and wonder, and one that an artist would love to look upon and feel to be worthy of the best touches of his brush. For a couple of miles below the rapids the waters are somewhat turbulent, but as far as I could see, deep and not dangerous.

Rapids de Roches are reached 194 miles below the Landing. These are short, the principal portion not being more than 250 yards in length; in this distance there is a fall of about 8 feet. The passage is rough and stony, and is impassable for canoes. York boats descending these rapids have to be lowered by means of ropes fastened on shore, several men being stationed in the boats with poles to guide. I may state here that this plan is followed in the passage of all difficult rapids on this river. Should it ever be necessary, a single lock will overcome the difficulties here met with.

Long Rapids are 214 miles from the Landing. They are about eight miles in length, and are composed of three distinct rapids, with a fall in the first of about 26 feet; in the second of about 8 feet; and in the third of about 12 feet, or of about 46 feet in all. There is a space of about half a mile between the first and second, and of about a mile between the second and third. The first is the largest, while the last is the most difficult of descent, as numerous fragments of sandstone are scattered through it. It was in the second of these three rapids that the accident occurred by which I lost one of my men.

At 226½ miles the Crooked Rapids are to be met with. These are three miles in length, and the chief portion in shape resembles a horse shoe magnet. The fall is about 25 feet, and is dangerous on account of the water rushing to the outside of the curve, making it very rough there, while the inside is comparatively smooth. Boats descending keep to the inside, and are lowered by the aid of ropes as before mentioned. In these rapids may be found two ledges of rock, one at the head and the other at the foot, reaching almost across the river, and over which the water drops almost perpendicularly a distance of 2½ or 3 feet. These would, I believe, prevent any large boat passing, unless the water was very high.

The head of the Cascade Rapids is reached at 235 miles below the Landing. These rapids are two and a quarter miles long, and are composed of four ledges of rock which run across the river at intervals and form four cascades of from 3 to 4 feet fall each, the total fall being about 20 feet.

The rapid known as La Roche commences at a distance of 244 miles, and is about a mile and a quarter long. At the head of this rapid are two cascades similar to those in the Cascade Rapids, each with a fall of about 3 feet. The total fall is about 12 feet.

The last rapid is situated at a distance of 251 miles below the Landing. It is short and not very difficult of descent. With ordinary care canoes can make the passage.

Between the above mentioned rapids may be found many others, some of which require care in descending with canoes, but none present the same difficulties as those already mentioned. I might also say that from Rapids De Roches to Fort McMurray it is almost one rapid.

From the last rapid to Lake Athabasca, a distance of about 170 miles (from ten to fifteen miles more by the steamboat channel), the river is navigable for river, if not for lake steamers; and during the last summer several trips were made by the Hudson's Bay Company's boats from Fort Chipewyan to Fort McMurray without any difficulty; also, one or two trips were made about forty miles up the Clear Water River.

The width of the river from the mouth of the Pembina, about 100 miles above the Landing, to the confluence of the Clearwater at Fort McMurray, a distance of 252 miles below the Landing, varies from 300 to 500 yards; while from Fort McMurray to where the river commences the formation of its delta, near the lake, a distance of 150 miles, the width varies from 400 to 800 yards. From the last mentioned point, namely, where the river commences the formation of its delta, to the lake, the width in many places exceeds a mile, while sand bars and islands are so numerous as to make it difficult in many places to tell which are the main shores.

Numerous streams flow into the Athabasca, but with the exception of the Little Slave, the Clearwater and the Red Rivers, none exceed 50 yards in width, and are for the most part rushing torrents for miles above their mouths. The Little Slave and Red Rivers are about 100 yards wide, while the width of the Clearwater is from 150 to 200 yards.

Between the Landing and Fort McMurray, the banks of the river are never less than 300 feet in height, and in many places rise 400 or 500 feet, and are often precipitous. Below Fort McMurray the banks seldom rise to the height of 100 feet, and gradually get lower and lower, until the lake is reached, where they do not exceed a few feet in height.

The banks here are almost continually being washed away, the trees which grow along them being deposited in the stream to such an extent that, in many of the bends, it is almost impossible to force a passage for canoes. In this way the lower part of the river is slowly and continually changing its bed, and carrying what was formerly the bottom of the lake down to form a bottom for it as it now exists. Here one can easily trace in the banks the layers of sand, gravel, clay, leaves, limbs, &c., that were deposited in this flat when the lake was much larger than at present.

With the exception of the channel worn by the flow of the river, the lake, for miles-out, does not exceed 3 feet in depth, and is constantly getting more and more shallow by the depositing of sediment from the dirty waters of the river, which, during the summer months, are thick with sand, clay and other matter. By placing the ear close to the edge of a boat when floating quietly in the stream, one can distinctly hear the noise made by these particles rubbing against one another. The average rate of current of the Athabasca, when the water is at the ordinary height, is four miles an hour.

Leaving Chipewyan I passed into the Peace River by the channel in the delta called the Quatre Fourches, so named from the fact that a short distance from the lake two of these channels cross each other. From Chipewyan to the entrance is four miles, and from the lake to the Peace River is thirty miles. The river, at this point, is from 100 to 150 yards wide and with a deep channel. I tried often, but did not find bottom in it with a 5½ foot paddle. The current in the channel at this point (during high water in the lake and river) being so slow, renders it difficult at times to determine which way the current flows. At the point where the Quatre Fourches joins the Peace River the latter has a width of fully a mile, but divided into channels by numerous islands and sand bars which, at times, occur to the number of two, three and four abreast, making the river in parts two miles wide from the last men-

tioned point to Peace Point, eighty-six and a-half miles from Chipewyan. From Peace Point to the head of the Little Rapids, one hundred and a-half miles from Chipewyan, the river passes through rock with narrower channel and not so many islands and bars. The Little Rapids are about three and a-fourth miles long, and are merely a swift current, as the frailest canoe might descend without danger, except from stones. Owing to the state of the weather I could not see to determine the fall, but I do not think it is more than 8 feet. Here the river is very wide, not less than a mile and a quarter. Passing on the north side the water was very shallow, and was apparently so all the way across. My guide and others informed me there is a pretty deep channel near the middle, but it is crooked and fringed with large rocks, which at present render it dangerous for large boats descending. In high water, however, there would be no danger. The north bank is low, and no great difficulty would be experienced in making a channel along it to accommodate such boats as would navigate the deeper part of the river. From the Little Rapids to the falls, 231 miles from Chipewyan, the river is much the same as it is below Peace Point. In very few places is the channel without islands or bars. Where there are no obstructions it is nearly half a mile wide and deep water. In places where the islands are numerous and large, the river is upwards of two miles wide, rendering it difficult to form an estimate. In ascending, however, there was the appearance of shallow water. I tried the depth with my paddle, which was $5\frac{1}{2}$ feet long, and conducted these tests all the way up to Dunvegan, and only in two places did I find bottom in that part of the river which might be called the channel; these I will specify hereafter. The falls are a perpendicular drop of $9\frac{1}{2}$ feet, and have a width of a mile at present state of water. Above them is a rapid about a third of a mile in length, and a fall of about 8 feet. These falls are not a very impressive sight, as the banks are low, and timber scrubby, and on account of the width the water is smooth. About a mile and a half above the falls is another rapid which, in time past, has been a cascade; but the water has worn channels through the rock, over which it fell, leaving large masses of rock standing in the bed of the river. The fall in this rapid is about 8 feet, and is not more than 300 yards long. This makes a total fall from the foot of the falls to the head of this rapid of about 25 feet. Mr. McKenzie, at Red River post, near the falls, told me there is a natural channel on the north side of the river, from a point a little below the falls to a point above the upper rapid, which could easily be converted into a canal. Through it the waters of the extensive swamp enter the river, and the only rock cutting on it would be at the upper end to connect with the river. This opinion is only given from ordinary observation, and might be modified by actual survey. I did not see the place referred to, but think Mr. McKenzie's judgment can be relied on. The falls and rapids do not cause much trouble to the passage of empty York boats or scows, for on the south side of the falls the waters have worn the rock away, so that instead of one perpendicular drop there are three or four of a foot or two each, forming a channel some 60 or 80 feet wide, down which the boats run quite easily, their impetus being restrained with ropes from the shore. A natural wharf is found at the foot of the falls for loading and unloading boats. From this place to Battle River, 430 miles from Chipewyan, the bed of the river is much as before described, except that many of the islands and bars are gravel instead of sand. From Battle River upwards, the channel becomes narrower, and the bars and islands are nearly altogether of gravel. The current is generally much swifter than in the lower river, but in no place is there anything serious to prevent a steamer ascending.

From Battle River to Dunvegan, the river is from a quarter to half a mile in width, the latter distance being where widened by islands. One of the points I referred to, as being shallow, is at the mouth of Smoky River, 541 miles from Chipewyan, where the water was not more than 4 feet deep. The current being swift, I estimate it all much the same at this point. The other place is eleven miles above this or 552 miles above Chipewyan, where the river spreads out into four or more channels between Gravel Islands. I came down what I thought was the best channel, and for quite a distance found only $4\frac{1}{2}$ feet of water, and at the bottom, for about 50-

yards, only $3\frac{1}{2}$ feet. By deepening one of the channels, and obstructing the others, it could be made passable in low water for boats drawing 5 or 6 feet. As far as my knowledge of the river extends, the Little Rapids, the falls and rapids, and the places last described, are the only obstacles to the navigation of boats drawing 6 or 7 feet of water between Chipewyan and Dunvegan, 604 miles. Below its junction with the Athabasca, where it is called the Great Slave River, it is navigable for 100 miles down to the rapids, at Salt River, where there is about sixteen miles of rapids; thence into Great Slave Lake and down the Mackenzie to the Arctic Ocean, about 1,400 miles of uninterrupted navigation, from about the 1st of June, until about the 1st of November; and were it not that the ice does not leave the lake until the time mentioned, it would be open from 1st of May, as the ice generally leaves the Athabasca and Peace Rivers between the middle of April and the end of the month. The banks of the Peace from the lake up, for about 30 miles, are low and flat, never rising more than 20 or 25 feet above the river, and in many places the same erosion of the banks may be seen that is going on in the Athabasca, but not to the same extent, the current being less. To Vermillion (273 miles from Chipewyan) the banks nowhere exceed 100 feet in height. At Vermillion, they begin to gain in elevation, and at Battle River they are 500 to 700 feet high, and in many places a sharp straight descent to the water. One notable point a little below Cadots River rises from the water as steep as hardened sand and clay will lie, without a break, 523 feet. Again at a place known as "the ramparts" a few miles below the White Mud River, the river flows between sandstone cliffs which rise perpendicularly 200 to 300 feet almost from the water, and behind these cliffs the wooded banks rise in broken masses to a height of fully 700 feet above the river. There is fine scenery here; and to one admiring such, a trip on this river from Vermillion to the Rocky Mountains in the autumn months would be interesting. Between Battle River and Dunvegan the banks are from 600 to 800 feet on both sides, and would prove a serious obstacle to a railroad traversing the country. The only streams of any size flowing into the Peace River below Dunvegan are the Smoky River about 200 yards wide, the Battle River about 120 yards wide, and the Loon River about 150 yards wide. All the others are small, none exceeding 40 to 50 yards at the mouth.

Timber.

The timber on the Athabasca, from Little Slave River down to McMurray, is generally small, and consists principally of "poplar, cottonwood, spruce, tamarac, pitch pine, small white birch, and occasionally a few balsams." There is also abundance of "underbrush, alder, willow and hazel." Alders and willows grow to a size which surprises people from the eastern part of the country. I have seen alders more than 8 inches in diameter, and 30 feet high, while willows are often seen 1 foot in diameter. I have met with one 16 inches in diameter.

The white birch is the only hardwood in the country of any use; but it is small and crooked, seldom more than 6 or 7 inches in diameter.

The pitch pine is generally small and scrubby. I saw little or none that would be of any value. It is only found on high sandy or gravelly knolls or ridges.

The tamarac is scarce and generally small. It is only found in marshes, and a great deal of it is hollow and unsound at the heart.

The spruce is plentiful, it and poplar being found in about equal quantities, and both greatly outnumbering all the others taken together.

It is generally found in groves by itself and, as a rule, it seldom exceeds 12 to 14 inches in diameter, and from 100 to 120 feet high.

There are many large groves of it that would make good useful timber, for any purpose for which this kind of timber is used, the trees being large, long, and clean.

The poplar and cottonwood are generally small, but on many of the flats they are of a good size, sometimes large.

From McMurray down to the flats adjoining the lake, the timber is nearly all spruce and poplar. There are a few ridges of pitch pine, which possess no value.

Occasionally a few white birch are seen.

On the flats, around the lake, the timber is principally spruce, with a good deal of poplar and cottonwood, and a very few white birch.

The spruce are generally much larger here than on the upper portion of the river, and much more free from limbs and knots, and well suited for use. I have seen nothing to compare with it in any part of the Territories (adjoining the prairies) through which I have been.

For three or four miles back of the lake, on the south side, there is nothing but willow and small poplar, which gradually merges into the large timber as we get back from the lake.

Around Fort Chippewayan, on the north side, the timber is generally small, and nearly all spruce and pitch pine; a small percentage of it only would be fit for use as lumber.

I learned from those who had been north of this point that the same features are to be seen through to Great Slave Lake.

On the Quatre Fourches River there is some very fine spruce, with groves of poplar, and a few pitch pine mixed through it.

On the Peace, up to Vermilion River, there is a great deal of first-class spruce, much of it being the best I have seen in the country.

The sandy and gravelly ridges here, as elsewhere, are covered with pitch pine. There is also much poplar and cottonwood, but it is generally small; mixed with this is a little white birch. I saw very little tamarac.

Above Vermilion River, as the banks get higher, the timber along the river becomes thinner and smaller, until, near Battle River, many of the hillsides are bare, or covered only with scrub. Wherever a flat or a moderate slope occurs, the timber is generally of a fair size; therefore, I have reason to believe it is the same on the prairies back from the steep banks.

The timber from Battle River up to Dunvegan is thin and poor. In very few places could there be found much that would prove of any value.

Here, as on the Athabasca, the timber on the upper part is not to be compared with that found on the lower.

Agricultural Capabilities.

All the way down the Athabasca to the lake, the country is (with the exception of a few meadows) thickly wooded, and a great deal of it swamp and marsh, interspersed with lakes and ponds.

A great deal of the soil along the bank was of very fair quality. At Fort Murray, where there is a couple of small prairies or meadows; the soil is good, and the root crops and garden produce raised there are generally very good.

To convert this into an agricultural country, the forest would first have to be cleared, and considerable drainage would be required for a large portion of it, which would render the question of its settlement a problem for the future to determine.

From Lac la Biche to McMurray is a pack trail, which is occasionally used. It runs along the course of the Athabasca River, at a distance of from two to twenty miles. Those who have passed over it inform me the country is much the same as that seen along the river—woods and swamps, with a large percentage of marsh or bog; also quite a number of lakes.

The country on the west side of the river, as far as I could learn from Indians and the few white men with whom I came in contact who had been over it, was much the same, at least for fifteen or twenty miles back. I could learn nothing definite about anything much further back than that. The only approach to prairie along the Athabasca is where the House River flows into it (a few miles above Grand Rapids), where an extensive fire has almost cleared away the forest for a mile or two around this point. It is now covered with a good growth of grass and shrubbery. The soil appears to be very fair—a loamy clay—and were there any inducement to settlers, a few fine farms might be established. A meadow near McMurray is about

sixty acres in extent, from which the Hudson's Bay Company procure their hay. The soil is said to be good.

At a place called "Point Brulé," about ninety-six miles below McMurray, fire has partially cleared off the forest for some little distance from the river. A couple of families of Chippewyan Indians have taken possession of a small portion of it, and done a little cultivation in the way of planting potatoes. Their efforts were necessarily very crude, and the appearance of the crop bore witness to it.

It is a pity such attempts do not succeed, as one failure does more to dishearten the natives with agriculture than ten successes would do to encourage them.

The soil at this point was a gravelly clay, and with ordinary cultivation should yield pretty fair crops.

On the flats near the lake the soil is wholly alluvial; it is rich, but too low and damp for agricultural purposes.

On the north side of the lake, around Chippewyan, there is little or no soil of any description, the country being all bare Laurentian rock.

The Hudson's Bay Company have a garden at the fort of upwards of an acre in extent, and the Episcopal Mission one of smaller area, but the soil is very sandy. The Roman Catholic Mission have a garden also, most of which they obtained by draining a bog into the lake.

In the season of 1883 (which was a pretty favourable one in that district, being free from summer frosts) the Hudson's Bay Company raised about 400 bushels of potatoes, the Episcopal Mission 30 bushels on a small patch, and the Roman Catholic Mission about 500 bushels.

Many of the retired Hudson's Bay Company's servants also have small patches which they cultivate, potatoes and fish being the principal articles of food used during the winter.

I am sorry to say that owing to the prevalence of summer frosts nothing like the above returns were expected by any of the parties above named last summer.

I believe one or two of the patches owned by Hudson's Bay Company's retired servants escaped the frost, but the general effects were ruinous.

Ascending the Peace River until Peace Point is reached, the country is mostly low and flat, and the soil is lacustrine, like that on the Athabasca. Occasionally a sandy or gravelly ridge is seen, which must have formed a bar in the shallow waters of the great lake which once covered this district. The soil in the flats is good, but, like that in the flats on the Athabasca, it is too low and damp for agricultural purposes. On the north side of the river, at Peace Point, the country is prairie, with poplar bluffs; and the same extends, I was informed by Indians, through to Salt River, in the Great Slave River district. The soil along the Peace River at this point is a black gravelly clay, with a coarse gravel subsoil; and, as nearly as could be learned from Indians, it is pretty much the same all the way through to Salt River, where there is quite an extensive prairie. This prairie was described to me by those who have seen it as one of the prettiest and best pieces of country in all the northern district. The country along the north side of the river, from Peace Point up to Vermillion, is generally heavily timbered, with occasional parts of open scrubby woods and small patches of prairie. On the south side the open woods and prairie are less frequent, until we reach a piece of scrubby prairie, which begins seven or eight miles below Red River and reaches to it, and runs back about two and a half or three miles, where it merges into the forest. The soil in it is good black loamy clay, about 1 foot deep, with a subsoil of fine sandy clay. The Hudson's Bay Company here cultivate two or three acres, and when the summer frosts are not too severe the returns are splendid. This year the crop consisted of potatoes, turnips and garden stuff, which, notwithstanding the successive and severe frosts of the season, looked very well when I was there (the 22nd August), but Mr. McKenzie feared the yield of potatoes would be small, compared with that of last year, which was enormous. Usually a little barley and wheat has been grown there; this year none was sowed.

At Vermillion, along the river on the south side, there is about twelve to fourteen miles of prairie, with small poplar and scrub, which runs back from the river about three miles. The soil is a good black loamy clay, loose and deep, with a gravelly clay subsoil. The Episcopal Mission school at Vermillion, for the teaching of the young in the district, has a farm attached, with about twenty acres under cultivation, under the management of Mr. E. J. Laurence. Last year his crops of potatoes, barley and wheat were splendid; this year the frosts almost destroyed everything.

Mr. Garrioch, in charge of the Mission, also cultivates quite a large piece (from twenty-five to thirty acres) in connection with the Mission. The Hudson's Bay Company has an extensive field growing both roots and grain (wheat and barley); and the Roman Catholic Mission also cultivates some ground. Besides the above farms, several others were located last summer by private parties, all of whom seemed hopeful for the future. Many of them had been in the country for several years. Here, as at other places mentioned, no one expected to harvest much more than the seed sown, owing to the very unusual season, which was in the early part dry and warm, so that grain sown in April did not germinate until June, for want of moisture. In June the weather became very wet, and continued so all the summer, with frosts at frequent intervals. That this summer was unusually severe all were agreed, but all admitted that there was an uncertainty every year. Mr. Moberly, in charge of the New Brunswick Company's post here, who has lived in the country for several years, told me his experience for seven years stood as follows: Two years an unqualified success, two years failure such as the present, and three years a fair return.

Opposite Vermillion, on the north of the river, there is an extensive tract of prairie and poplar bluff country, which extends from the Peace to the watershed between the Peace and Mackenzie Rivers, south-westward along the Peace for about forty miles or more, and north-eastward along the river a few miles, until it merges into the country already described. This is said to be a first-class country in every way, well wooded and watered, with a rich, deep, black, loamy clay soil; and if the life of flowers and berries be any indication of freedom from frost, this district is favoured in this respect, as the berries ripen here when they are killed in the surrounding parts.

The country south-westward from the end of this tract to Battle River is described as woods and swamps, alternating with patches of prairie and open woods, and from the Battle River to the prairie near Dunvegan generally drier and with more prairie.

It appears, therefore, that from Dunvegan, on the north side of Peace River, down the river to Peace Point, and thence to Salt River, on the Great Slave, there is a tract of country about 600 miles in length and forty miles wide, of which a large percentage is fit for immediate settlement, and a great deal more could be very easily cleared.

Of the country south-east of the Peace, between it and the Athabasca, very little is known. It was described by all whom I met, who had seen any portion of it, as a rolling surface, the ridges heavily wooded with fair timber, and many of the basins containing swamps and lakes of considerable size. Out of one of the latter, Lake Wapisca, the Loon River flows into the Peace, and another stream called by the same name into the Athabasca, at Grand Rapids. Some of the ridges rise into high hills, and in some of these rock exposures are said to be visible. Whenever the needs of the country make it worth the trouble, timber can be easily floated into the Athabasca and Peace Rivers by the numerous streams which enter them from this tract.

A little north-east of Vermillion, and between twenty and thirty miles from the river, is the west end of the Cariboo Mountains. They extend from this point eastward about sixty or seventy miles, and then appear to turn to the north. From a station a little below Vermillion, I took the angle of elevation of the highest point I could see in them, and found it to be $0^{\circ} 55'$, so that they must rise between 1,500 and 2,000 feet above the river. I saw no white man who had been in these mountains, except on a flying visit in the winter for trading, and then, of course, the most

rugged parts would be avoided, and consequently very little observed of the rocks composing them. The Indians speak of beautiful many-colored stones seen in them. Judging from what they say, I think the rocks are Laurentian, and the "beautiful stones" may be crystals. I was told they also speak of places on the north side of the mountains which smoke in the winter; but I have noticed that the Indians call all sorts of vapours "smoke," and what they call smoke may only be the vapour rising from springs.

At Dunvegan, notwithstanding the severity of the frosts, the crops were very good, both in quality and quantity. When I was there, the Roman Catholic Missionaries had threshed their grain, samples of which I brought back. The yield was as follows:—50 pounds of wheat were sown on the 16th April and reaped on the 20th August, and 27 bushels threshed of good clean grain; 15 pounds of Egyptian barley sown on the 18th April and reaped 20th August, and 15 bushels threshed, weighing fully 60 pounds to the bushel. The Hudson's Bay Company and Episcopal Mission had not threshed, and could not give their returns; but they were well satisfied with their crops of all kinds. The Rev. Mr. Brick, of the Episcopal Mission, was already using bread, when I was there, made from wheat of the present year's growth.

The only settler in all the Peace River country who lives beyond the immediate valley of the river (Mr. Milton, who lives about eleven miles from Dunvegan), lost all his crop by the frosts; fortunately for him, his operations were not very extensive. A company was formed last season, by people interested in that part of the country, to erect a small grist mill, in order to encourage settlement there; but the unusual severity of the season caused them to recall the order they had already sent out for the mill. It is much to be hoped that next season will prove more favourable; should it not, it will divert a good deal of attention that is now directed to that part of the country, and of which (aside from the climatic conditions) it is in every way worthy.

I was informed that in the season of 1883, on Great Slave Lake, the Hudson's Bay Company caught and used 75,000 whitefish. There are also many other varieties of fish in those lakes. Trout are often caught weighing upwards of 40 pounds and on the MacKenzie, a very large species of salmon is plentiful, which is said to weigh as much as 100 pounds.

The 75,000 whitefish mentioned, would average about 2½ pounds each, and represent about 200,000 pounds of good palatable food.

With proper care, the fish of those lakes could be made a source of wealth to that part of the country, and food for the more agricultural portions in the south. Add to this the future value of the vast forests, and the probability that the immense deposits of Bitumen (or whatever it may prove to be) will be converted to a useful purpose, and the prospect of mineral wealth being discovered in the vast Laurentian district north of Lake Athabasca, and the future of this part of the country may not be so dull and valueless as many think it doomed to be.

At frequent intervals I observed for magnetic declination, with a 6-inch reversible needle attached to my transit.

During the summer I kept a record of the minimum temperatures of each day, as shown by a "self-registering thermometer." I will give the dates and temperatures below freezing point only, and the mean minimum temperature for each month.

The mean minimum temperatures were, during the last sixteen days of June, 42°·8, during which period the thermometer did not go below freezing point; during July 46°·9; August, 44°·1; September 34°·9.

The lowest temperatures observed were—

2nd July, 30°·3; 4th July, 28°·7; 19th August, 28°; 5th September, 28°; 7th September, 27°·5; 8th September, 28°; 18th September, 31°; 19th September, 26°·5; 21st September, 22°; 25th September, 25°; 28th September, 28°·5; 29th September, 23°.

These temperatures were observed in the river valley, close to the river, where the frost is never so severe as on the plains above.

Although the Indians inhabiting the country through which I passed are non-treaty Indians, they were everywhere kind and civil to me.

I have also to acknowledge much kindness and attention from the Missionaries and Hudson's Bay Company's officers with whom I came in contact. They everywhere showed a readiness to give me all the information they could, and also to oblige me in any way, which was very gratifying, as well as convenient to me personally, and contributed much to the success of the survey.

I have the honour to be, Sir,

Your obedient servant,

WILLIAM OGILVIE,

Dominion Land Surveyor.

PART III.

—

GEOLOGICAL SURVEY.

PART III.

DEPARTMENT OF THE INTERIOR,
GEOLOGICAL AND NATURAL HISTORY SURVEY AND MUSEUM BRANCH,
OTTAWA, 31st December, 1884.

SIR,—In compliance with the terms of the Act 40 V., chap. 9, clause 4, I have the honor to submit, for your information, a summary report and observations on the work accomplished during the past year—from the 1st of January to the 31st of December, 1884—by the Geological and Natural History Survey and Museum Branch of your Department.

The early part of the year, prior to the commencement of field observations, and part of November and December, was occupied in the preparation of the annual volume of reports, with accompanying maps and illustrations, which will be ready for distribution early in January. These form a volume of about 600 pages royal 8vo, with views and illustrative diagrams. The volume is dated 1882-83-84, as it, and the accompanying maps, embrace a part of the work done in each of those years. The maps and sections which accompany the volume are as follows:—

British Columbia.—One sheet of sections, geologically colored. Report B.

North-West Territory.—One map; scale, 8 miles to 1 inch, geologically colored with section, covering about 26,000 square miles—Bow and Belly Rivers, Districts of Alberta and Assiniboia. Report C. One map (scale, 8 miles to 1 inch) of part of the basin of the Athabasca River, District of Athabasca. Report C C.

Quebec, Prince Edward Island and New Brunswick.—Nine sheets (scale, 4 miles to 1 inch), geologically colored, covering 19,044 square miles, Nos. 1, N.W.; 3, N.E.; 3, N.W.; 5, S.W.; 5, N.W.; 7, S.W.; 15, S.E.; 15, S.W. Reports E, F, H.

Nova Scotia.—Inverness, Victoria and Richmond counties. Twenty-four sheets (scale, 1 mile to 1 inch), geologically colored, covering 4,000 square miles. Report F.

In the volume there are fifteen separate reports, containing much valuable and interesting information relating to the geology, mines, minerals and other natural resources of all sections of the country where explorations have been in progress, from Cape Breton to British Columbia. I may specially call attention to Report H., by Mr. Hoffmann, as giving complete analysis of thirty-seven samples of coal from the North-West. These show portions of ash and water varying, the former from 2.12 per cent. to 21.67 per cent., and the latter from 0.71 per cent. to 21.87 per cent.

Most of the specimens analyzed were necessarily taken from or near the surface; better results might therefore be expected from samples taken from where the seams have not been subjected to the deteriorating influence of lengthened exposure to the atmosphere. The average percentage of water and of ash in the whole thirty-seven specimens is 9.007 water and 9.073 ash. The ordinary coals used for fuel contain from 8 to 15 per cent. of ash. Of these North-West coals only six contained over 15 per cent. of ash, while twenty contained less than 8 per cent. In this important particular, therefore, they may be said to compare favorably with the ordinary Carboniferous coal; and there can no longer be any doubt whatever, that there is a practically inexhaustible supply of excellent fuel in the North-West, distributed, at intervals, over very extensive areas, and easily accessible, from the international boundary northward to the Peace and Athabasca Rivers, and from the Pacific coast westward to Roche Percée, or through ten degrees of latitude and twenty degrees of longitude.

In the further working out of the structural details of this vast coal, or lignite-coal, bearing region, many important and interesting facts will, I have no doubt, be brought out by Dr. Dawson's investigations in relation to the influence that geological age and proximity to axes of disturbance may have had in determining the

quality and character of the different seams, in which respects, as shown by Mr. Hoffmann's analyses, great differences occur within comparatively limited areas.

Besides the publications already referred to, a sketch geological map of the whole of the Dominion, on a scale of 40 miles to 1 inch, has been prepared, and was published for the meeting of the British Association, together with an explanatory descriptive sketch of the physical geography and geology of the Dominion, in a pamphlet of 55 pages, royal 8vo., by the writer and Dr. G. M. Dawson. This map and pamphlet was distributed gratuitously to the members of the Association.

A complete catalogue of the publications of the Survey, from its commencement in 1843, to 1882, was prepared and published in March last. (28 pages, royal 8vo.)

Other publications in the biological section have also been prepared and issued during the year. These are referred to on a subsequent page.

The greater part of my own time during the year has been occupied in matters of administrative detail, which, with duties in connection with the meeting of the British Association in Montreal, have left me but little time for personal investigations in the field. From the 11th to 23rd of July I made an excursion along the line of the Canadian Pacific railway, from Ottawa west to Pogamasing, carefully examining the many interesting and instructive cuttings that have been made through the Laurentian and Huronian rocks. A large number of specimens were collected both along the main line by myself, and along the branch from Sudbury to Algoma by Mr. H.P. Brumell, who accompanied and assisted me. In the whole distance, 36½ miles, only one metalliferous vein of any importance has been exposed. This is in a small cutting, about four miles west of Sudbury. The ore-bearing rock or vein has a width of 40 yards in the cutting. It apparently consists of iron and copper pyrites. A rather coarse diabase or diorite forming the walls. Specimens were collected for analysis, and will be reported on by Mr. Hoffmann. I am informed that the vein has been traced for a considerable distance on both sides of the track on a bearing of 335°. The great thickness of this pyritous vein and its proximity to the railway may render it of considerable importance. In August, before the meeting of the British Association, I accompanied Professor Bonney, who has been for some time engaged in a study of the Archæan rocks of Britain, over the same ground.

Since his return to England he writes me as follows, respecting this excursion and the visit to Canada: "People are now turning up rapidly in London all very much pleased with their visit to Canada. My boxes of rocks have arrived safe in London, but I have not yet unpacked them, as I have ordered a new cabinet to hold them. I am thirsting to get to work on them. That journey to Sudbury will not be soon forgotten. Except Niagara, it was the greatest treat I had in Canada."

The kindness and courtesy of Mr. Archer Baker, General Superintendent Eastern Division Canadian Pacific railway, and also of Mr. Abbott, Chief Engineer at Sudbury, in placing hand cars at our disposal, greatly facilitated our examination. Indeed it would have been otherwise impossible to have effected it in the short time which Professor Bonney could devote to this excursion.

After the close of the meeting of the Association in Montreal on the 5th of September, I proceeded with the excursion party to the Rocky Mountains, and after our return was engaged in examinations at Rat Portage and along the line of the Pacific railway eastward to Nipegon. I left Port Arthur on the 26th of October and reached Ottawa on the 30th. Cost of season's exploration, \$407.45.

The preparation of reports, maps and sections for publication and the examination, study and arrangement of the collections will fully occupy the time and attention of the staff during the winter months. Eighteen separate geological explorations have been carried out during the summer, relating to which the following summary reports are now submitted.

EXPLORATIONS AND SURVEY.

BRITISH COLUMBIA AND NORTH-WEST TERRITORIES.

On the 9th of May Mr. Amos Bowman left Ottawa for British Columbia to continue the geological exploration and survey in that Province. The first part of the

summer was devoted to the lower portion of the Fraser River, its tributary valleys and the adjacent mountain region. The scene of operations was then changed and the remainder of the season devoted to the continuation of the work for the map of the southern interior of British Columbia, referred to in my report for last year. This map covers an area of about 30,000 square miles. Mr. Bowman has not yet returned, but it is hoped that he will have collected the necessary data for the completion of the map.

Dr. G. M. Dawson has been engaged during the past summer in continuing and extending the reconnaissance work in the Rocky Mountains, south of the Red Deer River.

Dr. Dawson, with Mr. James White as assistant, left Ottawa on the 21st of May and returned on the 20th October.

Field work was begun from Morley, and the valley of the Kananaskis first examined. Finding a practicable pass from the head waters of this river to those of the Elk, a track-survey was made down the valley of the latter stream, and thence across the watershed eastward to the sources of the Old Man River, and down to the "Gap" of the North Fork. The almost impenetrable character of some parts of this country, together with the very heavy rains of the early summer, rendered progress so slow that it was necessary to make a detour from this point to Pincher Creek to obtain a new supply of provisions. The head waters of the Highwood River, Sheep Creek and the Elbow River were then explored on the way north to Morley. A traverse was next carried through by the Vermilion Pass to the Kootenay and Beaverfoot Rivers, and thence by the Kicking Horse and Columbia Valleys and back to the Bow Valley by the White Man's Pass.

Dr. Dawson having been requested to meet the party of members of the British Association which visited the West, was then obliged to leave for a few days for that purpose, while Mr. White occupied himself in making a topographical survey of the vicinity of the anthracite coal deposits in the Bow Valley.

Later in the season a traverse was made up the Cascade River to the Red Deer and thence westward to the sources of the Bow; and in descending the Bow valley various points of geological interest were examined.

In October, snow storms became so frequent at the high elevations at which it was necessary to carry on the work, that the operations of the season were brought to a close.

The work of the past season, with that of 1883, and surveys of other isolated tracts previously made, furnish data for a reconnaissance map—geological and topographical—of that portion of the Rocky Mountains between the Red Deer and the 49th parallel, embracing an area of about 10,000 square miles. As this portion of the mountains is at present attracting much attention, in consequence of the proximity of the railway, and the maps now existing are quite unservicable, it is proposed to publish, as soon as possible, the information now in hand, in the form of a preliminary map. This will serve as a guide to prospectors and others, and may eventually form the basis for a more complete map as the surveys progress.

The explorations of the past summer have still further increased the known area of coal bearing Cretaceous rocks in the mountains, and resulted in their pretty complete definition. The anthracite bearing rocks in particular, while forming a narrow trough, have now been traced a long way north and south of the originally discovered locality. Deposits of copper ore have lately been found at a number of new localities in this district and efforts are now being made to develop some of the more accessible of these. Fossils were collected in several localities from the Lower Cambrian rocks which underlie the great limestone series of the mountains, and the existence of extensive masses of intrusive (dioritic?) rocks, which in some places contain sodalite and other interesting minerals, determined. About sixty photographs illustrating the magnificent scenery of this part of the mountains and their geological features, were obtained, together with a small collection of such plants as appeared to be new or interesting. Cost about \$1,900.

Mr. R. G. McConnell reports that the work done during the season of 1884 consisted in completing the geological examination and topography of the country lying between the International boundary and the 51st parallel, and extending eastward from the eastern boundary of Dr. Dawson's map to the third principal meridian. The work in this area also occupied the summer of 1883. All the geological formations occurring in it, ranging from the middle Cretaceous to the Miocene Tertiary, have been carefully examined and their boundaries, except where masked completely by the drift, determined and mapped with a tolerable degree of accuracy.

Great attention was also given to the topography of the region, and more especially to the hills, ridges and plateaus occurring in it, many of these being but very imperfectly represented on existing maps, but of great importance in connection with geological outlines. Most of the topographical work, during the past summer, was done by his assistant, Mr. D. B. Dowling.

Notes were made on the various soils observed in different parts of the area, and also on the character and quantity of the woods contained in it.

A full report on all the observations made during the two seasons is now being prepared, and together with a map showing the geological and topographical features of the whole area, embracing 39,500 square miles, will be ready for publication in the spring. Cost of exploration, \$2,200.

Mr. J. B. Tyrrell reports that, in accordance with instructions, he was engaged during the summer in making a geological and topographical examination and survey of the country lying between the 110th and 115th degree W. longitude, and stretching north from the 51st parallel to the North Saskatchewan River, including portions of the drainage areas of the Red Deer and Battle Rivers.

Men and supplies were obtained at Calgary, and field work was commenced on 30th May. From that time till 26th October, the party were travelling on the open plains in the southern portion of the district, or in the wooded country further north, coming into Calgary three times during the season for supplies.

In the early part of the summer a canoe survey was made of the Red Deer River from the crossing of the Edmonton trail to the mouth of the Rosebud, and during the rest of the season, track surveys, with odometer measurements where possible, were made of the country passed over. Notes were taken of its general character, and the southern edge of the woods can now be denoted with some degree of accuracy.

Several compact seams of lignite were met with, which will furnish an abundant supply of fuel, and in some places, in the vicinity of the Red Deer River, a large amount of ironstone was also seen.

The conglomerates discovered last year by Mr. McConnell in the Cypress Hills were found to occur also in the Hand Hills, covering a considerable area.

Collections were made of the different rocks seen in the district, as well as of any fossils that could be obtained without too great delays.

The measurements, and traverses made with estimated distances during the year were:—

1745	miles by odometer.
180	„ river traverse (estimated).
700	„ on horseback (do).
<u>2625</u>	„

The cost of the season's exploration amounted to \$1,982.92, including the price of four horses, harness, wagon, saddles, &c. These however will, for the most part, be available for another season's work.

ONTARIO.

Mr. A. C. Lawson's work in the Lake of the Woods region was in continuation and completion of that undertaken by him during the previous season as Dr. Bell's

assistant, viz.—the prosecution of a detailed topographical and geological survey of the northern half of the Lake of the Woods, or that portion of it embraced within the limits of the Huronian belt of rocks, which are here of such interest, not only from an economic point of view as comprising the gold-mining area, but also as exhibiting, by the great extent of their exposure and ease of access, the leading lithological and structural features of this metalliferous series, as well as its relations—here clearly shown—to the underlying Laurentian rocks, thus affording us a key to the elucidation of similar belts in less exposed regions.

Mr. Lawson, accompanied by Mr. J. W. Tyrrell, C.E., and Mr. W. F. Ferrier, left Toronto for the scene of operations on 27th May, and engaging canoe-men at Sault Ste Marie commenced work at Rat Portage 31st May, returning from the field October 29th.

In the course of the season the whole of the shores of the portion of the lake under survey, together with Shoal Lake and the numerous islands which occupy to so large an extent both lakes, were carefully examined and surveyed, and specimens of all the typical rocks of the Huronian belt collected, so that material is now on hand for the construction of a good topographical and lithological map of that section of the country. Particular attention was paid to the character and structure of the rocks in the neighborhood of the chief auriferous veins, with the object of ascertaining, if possible, the general law governing their occurrence; and in this some measure of success has been attained, since it seems to be generally true that the largest and richest lodes are in proximity to intrusive masses of igneous rocks. The general confines of the Huronian belt were defined with greater certainty and our knowledge of its distribution extended to the south east.

In the country adjacent to the Lake of the Woods, log surveys and geological examinations, were made of the lakes stretching eastward from the Lake of the Woods towards Vermilion Bay, and of Crow Lake to the southeast. An examination was also made of the country crossed by the canoe route between Sabaskong Bay and Rainy Lake. While in the vicinity of Fort Francis, Mr. Lawson took the opportunity of opening two of the mounds on the Rainy River, situated on Mr. McKinstry's farm, and succeeded in obtaining a number of ancient Indian relics of great archaeological interest.

Cost of season's operations, \$1,729.70.

Mr. E. D. Ingall proceeded, on 1st July, to Lake Superior, to report on the mining developments of that region. He first coasted down the north shore of the lake, from Port Arthur to Sault Ste. Marie, examining all the chief mining locations: Then, after visiting the mines in the Sault Ste. Marie district, he returned to Port Arthur, from whence he made trips to the recently opened mining district at Kaministiquia, on the C. P. R., and the mineral discoveries in the vicinity of the Rabbit Mountain Mine, and Whitefish Lake. After remaining there some short time, to collect information from persons interested in and conversant with the mines of the district, he returned to Ottawa on the 18th November.

The cost of the expedition amounted to \$834.29, part of which sum consisted of expenditure on account of outfit (tents, &c.), available for ensuing seasons.

Mr. E. Coste has been engaged in investigations in the gold and iron ore-bearing region in the counties of Hastings and Peterboro', on which he reports as follows:—

From the 1st of May to the 10th June, the iron ore deposits in the townships of Madoc, Marmora and Belmont were examined, and the iron mines being developed in the townships of Tudor and Wollaston were inspected. This preliminary work demonstrates that there is a very good, but small, auriferous district around Deloro, in Marmora, and also that the iron ore deposits are numerous and important, both of hematite and magnetite.

On the 10th June a systematic survey of this region was commenced and steadily pursued until the 25th October, when bad weather and snow terminated field operations. During these four months the northern boundary of the limestone formation (*Cambro-silurian*) has been traced and mapped in detail from Stocco Lake, in Hungerford, to Burleigh Falls, in the township of Smith, as well as the numerous detached.

patches which were found to be far more in number than are shown on any existing map. It is of practical importance to define exactly the limits of these limestone deposits. As sources of limestone and perhaps also for lithographic stone they are themselves valuable. They rest horizontally on the crystalline rocks, and their margins thus limit the areas in which the gold veins and iron ores may be looked for. These, in North Hastings, and probably elsewhere in this region, are associated with certain granitic masses, around which they all occur. To trace out and map these eruptive masses is, therefore, also important. Three such masses, the Huckleberry Rocks, the mass forming Coe Hills in Wollaston, and the one called Red Mountains, in the township of Lake, were mapped, and steps were being taken to map the two masses, on the borders of which are the Emily and Baker mines, when field operations were suspended.

During all these excursions close attention was given to the crystalline Archean rocks and the conclusion was arrived at that the true Huronian series is represented in North Hastings, but conformably following the inferior crystalline limestones, schists and gneisses of the Laurentian, and thus agreeing with the result of observations in the Lake of the Woods region, where auriferous veins and iron ores also occur under corresponding conditions in the Huronian rocks.

In November Mr. Coste visited West Portland township to examine and report on some phosphate mines.

From the 14th to the 21st of November he was engaged inspecting some of the mines in the Eastern Townships, including the Capelton copper mines, an iron ore deposit at Sherbrooke, two asbestos mines at Black Lake, in Coleraine, and the lime works at Marbleton, in Dudswell township. Two of the copper mines of Capelton are in active operation; the Crown mine, Orford Copper and Sulphur Company, and the Albert mine, G. H. Nicholls & Co. The former has a shaft 1,150 feet deep. The ore averages 3 per cent. to 4 per cent. of copper and 40 per cent. sulphur. The vein or bed is a long one, and in places as much as 35 feet wide. A third company, the Canadian Copper and Sulphur Company, whose works are on the same vein, and on another parallel one, about 800 feet to the south-east, suspended operations in May last, because they were losing the sulphur, and the low prices obtainable for copper did not pay. This company now proposes to amalgamate with the Huntington mine in Bolton, and to erect sulphuric acid works for the complete utilization of the ore.

A number of specimens were collected, and full reports of the season's work, with observations on the laws, and customs, and regulations affecting mining development in Canada, will be prepared by Mr. Coste during the winter.

Mr. A. Cochrane was entrusted with the topographical measurements and surveys required in connection with Mr. Coste's exploration. This work embraced micrometer surveys of lakes and rivers, and many of the travelled roads over an area of about 350 square miles in the townships of Rawdon, Huntington, Madoc, Marmora, Wollaston and Belmont; also, accurate instrumental surveys of various gold and iron mines. The instruments used in making these surveys were a 4-inch transit, a 2½-inch prismatic compass, an 18-inch micrometer, with 12-inch discs and a 100-foot chain and tape.

QUEBEC AND NORTH-EAST TERRITORY.

Surveys and explorations have been carried on during the year in several parts of Quebec and the North-East Territory. Mr. R. Ellis made a micrometer survey of the Causupscull River, a tributary of the Metapedia, for 45 miles, to its head waters, with a view to making the topography of the quarter sheet map, now being engraved, more perfect, and at the same time to determine with greater accuracy the limits on this river of the great inland Devonian area described last year* in the Gaspé Peninsula.

*Geological Survey of Canada Report for 1880-81-82.

Early in the year steps were taken to organize an expedition for the purpose of extending the exploration and survey—commenced in 1870 and continued in 1871—of the, as yet, but little known region to the north of Lake St. John, including the completion of the survey of Lake Mistassini, and an examination of the country between it and the shores of James' Bay. The co-operation of the Provincial Government in carrying out the expedition was solicited, and after considerable negotiation, a sum of \$1,500 was granted by it. After consultation with the Honorable Mr. Lynch and with E. E. Taché, the Assistant Commissioner of Crown Lands, Mr. John Bignell, P.L.S., was selected to take charge of the party, and Mr. A. P. Low, of this branch, was appointed as geologist and second officer in charge.

On the 13th of May a credit was issued by me to Mr. Bignell for \$3,000, and he was instructed to engage men and make all necessary arrangements to start as soon as possible, with the understanding that the expedition would pass the winter at Mistassini. He was furnished with tracings of the plans of the surveys of 1870 and 1871, and for his further guidance a memorandum was given him, stating generally the objects of the expedition, and also instructions drawn up by the Assistant Commissioner of Crown Lands at Quebec, and approved by myself.

Memorandum, Mistassini Exploration.

The expedition should start as early in July as possible. The objects of the expedition are :—

1st. A thorough survey, hydrographical and topographical, of Lake Mistassini, especially of the northern and eastern portions not examined or surveyed by the Geological Survey parties under Messrs. Richardson and McQuat, in 1870-71.

2nd. A geological examination of the lake shore and of as much of the adjacent country as may be practicable.

3rd. The collection of specimens, vegetable, mineral and animal, illustrating the resources of the region.

It is also important that a survey should be made of the Rupert River, through which the waters of Lake Mistassini discharge into James' Bay. This will probably require another season's work, unless the party can conveniently separate, and while one was engaged surveying the lake, the other could descend the Rupert River and perhaps return by the East Main River or by any of the other large rivers which discharge into the east side of James' Bay. This plan would afford a larger amount of information relating to those portions of the north-eastern territories of the Dominion and adjacent portions of the province of Quebec south of the height of land, which lie between the 72nd and 79th degrees of longitude and the 50th and 52nd degrees of latitude, an area of about 42,000 square miles, of which at present very little is known, but which, there is reason to believe, may contain valuable minerals and areas of land fit for settlement. Two routes from Lake St. John to Mistassini have already been explored and surveyed by the Geological Survey, as well as a large extent of the shores of the lake northward to the outlet on the west side. The reports of these expeditions are published in the Progress Report Geological Survey for 1870-71 and 1871-72, and the plans of them on a scale of 4 miles to 1 inch are in the office of the Survey.

Surveys could be carried on at intervals this winter around the lake, and in the spring these could be extended by the Rupert or East Main River to James' Bay; and while the expenditure for the second season would be very considerably less than will be required this season, the result might be expected to be infinitely greater. The precise route to be followed after starting must be left to the discretion of the leaders, who will in this be guided by circumstances.

The following are the instructions given, as stated, to Mr. Bignell by the Department of Crown Lands, Quebec.

Letter of Instructions.

SIR,—The Legislative Assembly of this province having voted a sum of \$1,500 in favor of an exploration to Grand Lake Mistassini, which is about to be undertaken

by the Federal Government, I am directed by the Honorable the Commissioner of Crown Lands, to inform you that you have been nominated to take charge of one of the exploring parties under the general control of Dr. Selwyn, Director of the Geological Survey of Canada.

The route you are requested to adopt is the following :—

Starting from Grand Lake Pipmuakan, you will go up the river Betsiamites as far as Lake Manouanis, near the source of that river, and the position of which has been determined by you some years ago. From Lake Manouanis to Grand Lake Mistassini, you will travel in a westerly direction, following the streams and lakes forming the heads or sources of rivers flowing south into Lake St. John, or in the opposite direction, and you will also pass by Grand Lake Manouan, of which mention was made to you by the Indians at the time of your last survey in that region.

On your whole way to Mistassini, as above indicated, you will make a regular survey or scaling of the different rivers, lakes, portages, &c., you will follow as your route, estimating the distances with the "micrometre rochon," and measuring the angles with the theodolite.

During the course of your survey you will make astronomical observations as often as circumstances will allow you to do so, in order to determine the meridian and latitude of different points of your route.

You are also requested to give the usual information respecting soil, timber, &c., in the same manner as you have done for your survey of the Outardes, performed some years ago. You will also furnish this office with a complete copy of your plan of survey and of all similar work performed by any of your party.

Signed

E. E. TAGHÉ,

Assistant Commissioner.

I fully expected he would start not later than July, and was much surprised to learn from Mr. Low that Mr. Bignell did not leave Bersimis—the route by the Bersimis River having been determined on—till the 20th March. I have received no communication from Mr. Bignell since the 18th of August. I have, however, received letters from Mr. Low, dated Lake Pipmuakan, August 25th and September 1st, and Lake Manouan the 9th of October. The following are extracts from these letters:—

"Pipmuakan Lake, 1st September.—At a distance of 65 miles up the river Bersimis a yellow gneiss occurs. This rock is highly charged with magnetite, and its action, combined with that of the weather, upon the felspar, may account for the decomposition of the latter, for beyond this place these rocks were found to be quite friable, and made up of grains of yellow quartz and magnetite; and from this I believe the great beds of yellow sand and black magnetic sand are formed, which are found everywhere along the river and coast. In some cases the rock consists almost entirely of magnetite, in beds from 1 to 20 feet thick, as seen along the river and on the portages for a distance of 40 miles, and these must contain a vast amount of valuable ore.

"At 105 miles from the coast a pink crystalline limestone occurs, containing crystals of mica, sphene and Labrador felspar; a short distance beyond this exposure a dark bluish; fine grained labradorite was found. From this point, 135 miles from the coast, I have seen only a succession of coarse and fine grained labradorite rock. I have collected specimens of the different rocks, and send them with this letter to Bersimis, whence Mr. Burgess has promised to forward them to Ottawa.*

"The river, for 45 miles from its mouth, is quite navigable; and its banks and the neighboring mountains are clothed with a good growth of timber, consisting chiefly of spruce, red pine, birch, tamarac, poplar and balsam. At the distance named there is a fall of about 100 feet, and above this, for 40 miles, the river is a succession of falls and rapids. It then becomes quite navigable to the lake, there

*The specimens referred to have not yet been received.

being only one rapid past which a portage is requisite. The timber extends only about eight miles above the first fall. Above this there is only a second growth seldom exceeding eight inches in diameter, and principally spruce, birch and poplar, with a few tamarack, pine and balsam. The whole country has been burnt over not many years ago.

"The mountains along the river, for 100 miles from the sea, vary from 800 to 1,200 feet in height; beyond this, they diminish gradually in altitude till, around this lake, they are not more than 300 or 400 feet high.

"The river above the falls abounds with fish, and we have taken large pike, suckers and brook trout in the nets. Below the falls there are a few sea trout and salmon.

* * * * *

"Since my last letter from Lake Pipmuakan, 1st September, I returned down the line 45 miles to meet Mr. Bignell, who did not leave Bersimis until 20th August, and we did not leave Lake Pipmuakan until the 10th of September. Then, I again left Mr. Bignell for Lake Manouan *via* the Manouan River; Mr. Bignell continued up the Bersimis River. I have now completed my work and am waiting Mr. Bignell on the west side of Lake Manouan. The distance passed over I estimated at nearly 100 miles. Much time was lost on account of being unable to cross the large lakes in a high wind, as our canoes are too small to stand the sea.

"The weather has also been very unfavorable. From this point, Lake Manouan, there is a portage route to Lake Onouistagan on the Peribonka River, which takes three days; thence we go up the Peribonka for three days, and then proceed by a western branch to a chain of lakes on the height of land, and from there by several lakes to Lake Mistassini. We will be unable to get further than the height of land in canoes, as all the small lakes will be frozen over. The labradorite rocks I found to extend only about two miles west along the shores of Lake Pipmuakan, and from that point to here I have found only red and grey gneiss, with no economic minerals, except in a band of crystalline limestone, on two small lakes east of Lake Manouan, which contained large crystals of mica some of them 8 to 10 inches across. The country between Lakes Pipmuakan and Manouan is flat and covered with many lakes, only one range of hills, of about 800 feet high being passed on the Manouan River. The country has all been traversed by fires and the timber is all burnt. Game is very scarce here, and but few fish are caught in the nets.

"We expect to reach Mistassini between the 15th and 30th of November. We had the first snow storm yesterday, 8th of October, and the ground is covered with about 3 inches of snow. Since the 10th of September the thermometer has fallen below 32° every night."

A supply of provisions, as under, for the uses of the party during the winter and spring, was forwarded to the post on Lake Mistassini. Mr. F. H. Bignell who had charge of this expedition, left Lake St. John with the provisions on the 16th of July, in six canoes with nineteen men. Ten of these were discharged on the 6th of August, 35 miles up Chief River, and the post was reached with all the provisions on the 10th of September. There seven more of the men were discharged and were allowed seven days provisions and twelve days pay to return direct to Lake St. John. Mr. F. H. Bignell, with two men, then proceeded towards where it was supposed the main expedition would enter Little Lake Mistassini.

His report of this trip is as follows:—

"I then travelled towards Themiscomie Lake to meet the main expedition, as that was the only practicable route for the latter to first strike Little Mistassini. In so doing I navigated Great Mistassini for 120 miles from Foam Bay, also retracing my journey some 60 miles, as there was another route which the main expedition might possibly follow. I then effected the crossing to Little Mistassini, a distance of some 6 miles, by portages and four small lakes, and travelled 80 miles towards its head. The general trend of the smaller lake seems the same as that of the great lake—S.W. to N.E.

"About 35 miles from the head of Little Mistassini, the Rupert enters and flows out of it again, the inlet and outlet being almost opposite each other, and both bearing the same name. The outlet from Little into Great Mistassini is not more than $1\frac{1}{4}$ miles long, but it is exceedingly broken by rapids. Little Mistassini is supposed to be 100 miles in length, but, if I saw its greatest width, it is not more than 6 miles broad at its broadest point. I found Little Mistassini very beautiful. I did not visit its southern shores, except where I struck them near the head, to portage to the Rupert, and there I remarked that they are sandy; but the southern shores look very beautiful from the north, the land coming down to the water's edge in a gradual slope, and being clothed with spruce—which seemed of a fair size—bouleau, &c., but no pine.

"Along the north shore, which I coasted, islands are numerous; the banks are generally low, and in most parts composed of solid limestone, forming a natural wharf, with numerous fissures, varying in width from $1\frac{1}{2}$ to 10 inches.

"I did not run up the Rupert River from Little Mistassini, but struck it from towards the head of the lake by a portage of about $2\frac{1}{2}$ miles. The part of the Rupert that I travelled, some twenty-five miles, comes from an east direction, and the river is a large and noble one.

"Leaving the Rupert, we reached Themisconic Lake on the 23rd September, and found there an old abandoned Hudson's Bay post, built of square spruce logs. Although the building looked old, it seemed still good. We discovered no traces of the main expedition, but we did not yet relinquish hope of meeting it, and though the region was a wild one, and perfectly unknown to us, we managed to extricate ourselves very creditably, by pushing on through the portages and lakes till we crossed the height of land and struck the waters flowing into the Shipshaw River, into the Manouan, and by the Manouan into the large Peribonka, finally arriving back at Lake St. John on the 8th of October, without having the satisfaction of meeting the main expedition, which appears to have reached the Shipshaw River after we had passed that place. I should mention that the guide of my party, who was to have remained to guide the main expedition around Great Mistassini and down the Rupert River to James Bay and return, objected so to do and returned to Lake St. John. I wrote a letter to the main expedition, warning them of all this, but I am not aware whether it will be easy for them to replace him. The delay in sending in my report is due to the fact that I expected and have since received a letter from the main expedition, which I thought would be of more importance and call for insertion in my report. However, I may be permitted to extract from it the intelligence that on the 12th October they were at Lake Manouan, some 285 miles from Bersimis River, by canoe route; that they were then all well and fully expected to reach Mistassini in canoes. I should not omit to mention that I was greatly indebted to Mr. John H. Commins, officer in charge of the Hudson's Bay Company's post, at Lake St. John, and Mr. Miller, officer in charge at Mistassini post, for kind assistance in every way within their power."

The above does not correspond with Mr. Low's expectations, which, indeed, seem far more probable, unless the party is favored by exceptionally mild weather.

PROVISIONS AND STORES LEFT AT LAKE MISTASSINI BY F. H. BIGNELL.

Flour, 16 barrels; pork, 10 half barrels; lard, $4\frac{1}{2}$ half barrels; bacon, 1,093 lbs.; oatmeal, 180 lbs.; tea, 69 lbs.; sugar, 75 lbs.; molasses, 7 gallons; beans, 75 lbs.; evaporated apples, 50 lbs.; lime juice, 5 gallons; raisins, 28 lbs.; barley and rice, 43 lbs.; tobacco, 100 lbs.; candles, 75 lbs.; soap, 25 lbs.; soda, quantity not given; handsaws, 2; augers, 2; gimlets, number not given; axes, number not given; iron traps, number not given; wire for snares; Sheet-iron stoves 4; rabbit, 1; colliers, 5; tent, 1; tow lines, 2; large bark canoes, 2.

The Rev. Professor Laflamme, of Laval, was requested to continue and extend the investigations which he commenced in 1883, and the report on which appears in the volume of Geological Reports for 1882-83-84, to be published in January.

Respecting his work of the present season, the following short notes have been received, and translated from the original manuscript, by the writer:—

"I regret that serious illness, arising chiefly from the bad weather experienced, obliged me to discontinue the researches which you asked me to undertake in the Saguenay region, during the past summer. Notwithstanding this, I have been able to determine, with sufficient precision, the limit of the Cambro-Silurian strata, which occur on the south-east side of Lake St. John, and also to note the patches of the Utica and Hudson River formations, which, in various places, cover the Trenton limestone.

"Nothing of special interest was observed relating to the Trenton formation, except that in several localities it affords an excellent building stone. The banks of the River Quiatchouan, from the lake to the great fall, which marks the commencement of the Laurentian gneiss, may be specially mentioned. The beds are horizontal and thick, and the stone is easily dressed. It is, however, in some respects inferior to that obtained elsewhere. The Deschambault stone, especially, is very superior.

"In my report for 1883,* the probability of the existence of another basin of Cambro-Silurian age, besides those of Lake St. John and Ste. Anne, was stated. This conviction is confirmed by observations, and it is now proved that the Trenton limestone occurs over a large area in the parishes of St. Alphonse and St. Alexis, though it is often concealed by a considerable thickness of the overlying glacial clay deposits.

"A marked character of the Utica schists which I have examined, is the large quantity of bitumen they hold. One of the large islands in Lake St. John, Ile Traverse, is largely covered with *débris* of these schists. These were, some time since, accidentally ignited by a fire made on the shore, and burned for eighteen months, neither rain or snow being sufficient to extinguish them, and it required nothing less than an extraordinary rise of the lake to completely drown this strange furnace.† The "*glairers*" which have been thus burned have changed color, and through a thickness of 5 or 6 feet they now constitute a compact conglomerate.

Some have supposed that these Utica shales (schists) could be used for roofing slate, but they have neither the consistence nor strength sufficient for that purpose.

"On a long excursion made up the Ashuapmouchouan River, I convinced myself of the immense extent of arable soil in this part of the country. These quaternary marine clays are all extraordinarily fertile, and colonization can find an important outlet in this direction. There are areas, bordering on the large rivers, in which the clay is covered by a thick layer of sand. Though I was not able to find a single fossil, I am induced to regard these sands as being more recent than the Saxicava sand of Dawson. They appear to resemble the sands now being formed by the rivers.‡

The distinct traces of shore lines which were observed at about 250 feet above the actual level of the lake, afford some idea of the depth of the quaternary ocean which invaded this region after the retreat (*passage*) of the glacier.

The foregoing are the principal facts observed during this brief examination. I regret not having been able to complete my investigations, especially in reference to the Cambro-Silurian basin of Ste. Anne."

In last year's report it was mentioned that Mr. Adams had spent about two and a-half months in field work about Lakes St. John and Kenogami and the discharges of the Saguenay. This work was continued and extended during the past summer, and his report on it is as follows:—

In accordance with instructions I spent four months during the past summer in the Saguenay district. The area explored, containing about 3,500 square miles, lies to the north of Lake St. John and the discharge of the Saguenay River, and is traversed by the Rivers Peribonka, Little Peribonka, Aulnais and Shipshaw, all of

* Geological Survey Report for 1882-83-84, Report D.

† This bituminous character of the Utica shales has long been known, and is fully described in the Geology of Canada, Chapters X. XVII. and XXI. A.R.C.S.

‡ They are probably similar in character and origin to those described in Chapter XXII., Geology of Canada, 1863, as the Saugeen clays and sands, in which also no shells have been found.—A.R.C.S.

which were examined. It was ascertained that the anorthosite rocks found by Mr. Richardson in 1857 about Lake St. John extend much further to the north and east than has been hitherto supposed. They were found exposed along the Peribonka for over one hundred miles from Lake St. John, and on the Shipshaw to a point four miles north of Lake Pamouscachiou, which was as far north as these rivers were examined, and in neither case was the limit of the anorthosite rocks reached. As similar rocks are largely developed on the River Moisie, it seems not improbable that the anorthosite rocks in these two areas are really continuous. To ascertain whether this is really the case, it will be necessary to examine the upper portions of the rivers Bustard and Manicouagan, and they should also be found on the Bersimis River.*

Numerous deposits of iron ore, some of them very extensive, were observed about the Discharge of the Saguenay. The specimens of these ores which were collected have not yet been examined, but judging from the iron ores occurring in similar rocks elsewhere, they will probably be found to be titaniferous.

The expenses of the season amounted to \$612.55.

It having been decided in the spring to send an expedition to Hudson's Bay to make investigations in reference to the navigation of the bay and straits, and to establish stations for observation during the winter, it was thought desirable that Dr. R. Bell, who had already made several explorations around Hudson's Bay, should accompany this expedition, to act as medical officer, and to make observations on the natural resources of the region—mineral, vegetable and animal—and such collections as time and opportunity permitted.

Lieutenant Gordon, R.N., commanded the expedition. It left Halifax on the 22nd July, in the Newfoundland sealing steamer "Neptune," and returned to St. Johns on the 11th October. Dr. Bell states as follows respecting this expedition:—

"The Labrador coast was reached at Blanc Sablon, thence followed round to Ford's Harbor and Nain, where one day was spent. Nachvack was the next place touched at, and thence the vessel proceeded to Cape Chidleigh, near which the first observing station was built. Crossing to the north side of Hudson Strait, Resolution and the Lower Savage Islands were sighted, but the stormy weather prevented landing. The Upper Savage Island was then reached, and here, a short distance east of North Bluff, the second station was established. Thence we crossed to Cape Prince of Wales, the site chosen for the third station; and the fourth was built on Nottingham Island. Recrossing the straits and entering Hudson's Bay, a suitable site for a station was unsuccessfully sought for on Mansfield Island. Thence, passing close along the south-east side of Southampton Island, the entrance of Chesterfield Inlet was made. We landed on Marble Island, and then made for Cape Churchill, and anchored in Churchill Harbor, from the 6th to the 9th of September. York Factory was next visited, and left on the 12th September. From there we made Digges Island, on the south side of the western entrance to Hudson's Strait, on the 15th. Here the fifth station was established. On the return voyage through the Straits, all the stations were visited, and a second unsuccessful attempt was made to land on Resolution Island. We then proceeded down the Labrador coast to Nachvack, where the sixth observatory was established, and on 6th October we left there for St. Johns."

The collections made are now being examined, and Dr. Bell is preparing a detailed report of his observations. It will, however, be readily understood that the few places touched at and the short time spent on shore at each, precluded the possibility of any large amount of geological or other scientific observation being effected. The conclusions arrived at in relation to climate and navigation will doubtless be fully reported on by Lieutenant Gordon. About sixty interesting photographs were taken by Dr. Bell.

Cost of season's work, \$ †.

* See page —. Mr. Low's report.

† Statement not received.

NEW BRUNSWICK AND NOVA SCOTIA.

In New Brunswick some time was spent by Mr. Ells in examining the copper deposits of eastern Westmoreland, which, in consideration of the large amount of capital now being expended here, must be regarded as of economic importance; and in this connection it may be remarked that the peculiar copper deposits which have been so largely developed at Dorchester, are of considerable extent, traces being found at many points on Cape Maringouin peninsula, as well as in the southern parts of Albert county, and at various places in the counties of Cumberland and Colchester, in Nova Scotia. At none of these localities, however, are the deposits, apparently, so extensive as at the Colonial Copper Mining Company's area, and that adjoining to the south. On this property a large amount of work has been done, and at the time of Mr. Ells' last visit, in October, about forty-five men were employed. This copper deposit has already been described in former reports as occurring near the contact of the millstone grit with the lower Carboniferous red marly shales. The ore occurs in small pockets or bunches, where it has been precipitated by the deoxidising action of the organic matter of the plant stems upon copper in solution, and is often associated with small layers of coaly matter. A band of grey sandstone, about 8 to 10 feet thick, is now being mined, which carries grey copper ore in a fine state of division, disseminated through the bed, to the extent of from 4 to 6 per cent., according to the manager's assay. Experiments are now being made with a view to concentrate this ore on the spot, the result of which has not yet been made known. The band of sandstone containing this copper ore extends for several miles. The ore was seen in beds of both Upper and Lower Carboniferous age.

The coal seams reported to occur to the north of Sackville were found on examination to be ranging from 2 to 6 inches, and, therefore, of no economic value. The productive coal measures are apparently wanting in this locality, the upper Carboniferous resting upon the millstone grit in which the coal seams referred to occur.

A sample of gold was seen in a piece of quartz, said to have been blasted in digging a well in New Annap. The ledges whence it was said to be taken could not be seen, but the rocks in that vicinity—talcose, micaceous schists of pre-Cambrian aspect—are intersected in places with irregular veins of quartz similar to those in the pre-Cambrian of New Brunswick, and may be gold bearing.

Professor Bailey has continued the surveys in New Brunswick. His work in the field extended over a period of two months and a-half, and in addition to the duties of general direction and supervision, embraced the special study of the contact lines of the different formations, the systems of movement to which these have been subjected, their various degrees of alteration and the collection of their contained fossils. A detailed report on those several points is being prepared. His assistants for the season were Mr. W. McInnes and Mr. J. W. Bailey. The former took the field on the 1st of June and continued work until about the third week in October; the latter beginning on the 1st of July, continued work to the same date. Mr. McInnes, in addition to affording Professor Bailey special assistance when required, undertook the entire charge of the topographical part of the work.

This included the measurement with the odometer of 252 miles of roads, and the making surveys by pacing of about 18 miles of other roads and streams that were too rough for the odometer.

In all these surveys notes were taken of the geology and surface features, sufficient for the compilation of an approximately correct topographical and geological map of the region examined, which embraces the larger portion of Carleton county and parts of the counties of Victoria, Northumberland and York, and is included in sheet 2, S.W. This sheet, uniform in size and character with those already published, will be prepared during the winter.

Mr. J. W. Bailey assisted both Mr. McInnes and Professor Bailey in the ordinary routine of camping, in the collection of fossils and in the exploration of

streams and comparatively inaccessible regions. Special attention was also paid by him to the surface features of the regions explored, including the determination of altitudes and the outlining of prominent ridges and valleys, the results of which observations will be incorporated in the map already referred to.

In addition to the fossils collected in different portions of Carleton and Victoria counties, which are mostly of Silurian age, others of the same age were also collected from certain localities in Charlotte county, together with still others from rocks of Cambrian age in St. John county. The former have been sent to the Survey office for determination; the latter have been entrusted to Mr. G. F. Matthew, by whom the Lower Cambrian fauna has been made a subject of special investigation.

Cost of season's exploration, including salaries, \$1,627 39.

The exploration relating to the surface geology of New Brunswick, carried on by Mr. Robert Chalmers during the past season, extended to all parts of the province, and a number of interesting observations were made. The work commenced on the 7th of May. During that month portions of Albert and Westmoreland counties were examined, and early in June Mr. Chalmers proceeded to the Bay of Chaleur district, spending ten days between Bathurst and the mouth of the Metapedia. He then went to Kent county for three or four days; thence proceeded to Northumberland, where he was occupied till the 21st of June. From the latter date to the 10th of July was spent in making further examinations around the Bay of Chaleur, from Caraquet to the mouth of the Upsalquitch, on the south side, and westward on the north side as far as Puspebiac, visiting all the back settlements between the Nipisiquit and the Restigouche, and ascending several small rivers short distances. On 15th July, he left St. John for the Tobique River, and hiring two Indians with canoes there, he started from Andover on the 19th, accompanied by Mr. George U. Hay, botanist, of St. John, as a volunteer. The trip occupied fifteen days, in the course of which the river was ascended to its source. Wicton Lake was crossed to Nipisiquit Lake, measuring their heights barometrically. Some of the highest peaks along the route were ascended, and many facts were obtained relating to the flora and agricultural character of the region traversed. On the return trip to St. John, a short time was spent re-examining the terraces below Grand Falls and in the Keswick valley, and the necessary data obtained for preparing drawings of the sections illustrating Mr. Chalmers' report (Geological Survey Report, 1882-83-84, Report G.G.) St. John was reached on 18th August, and a few days spent there preparing the drawings referred to, and making detailed examinations of Lily Lake and other places in that vicinity.

On the 26th of August Mr. Chalmers left for the northern part of the province, and having secured two canoe men at Bathurst, started on a canoe trip up the Nipisiquit, ascending that river to its source, thence returning to Portage Brook, and crossing over to Upsalquitch Lake he descended Upsalquitch River, reaching Campbellton on the 19th September. Between that date and the 26th the time was occupied in making some additional observations on the Restigouche and at other points on the Bay of Chaleur. He then started up the South-West Miramichi, following it from Newcastle to the head of settlement—10 to 12 miles above Boistown, and obtained some important facts. From Boiestown he proceeded across the country to Fredericton, and thence to St. John. In the early part of October a few days were occupied in correcting proof sheets of his report and in examining Lawlors, Douglas, Latimer and other lakes lying in the north-east part of St. John County. On the 13th October he left for Sackville and Amherst, and while there thought it advisable to go to Herbert River, N. S., which he did by way of Spring Hill, to see the "Boar's Back," a remarkable kame described in *Acadian Geology*. Returning he examined the brick clay at Moncton and remained a day at Petitcodiac, reaching St. John on the 18th.

On the 20th he went to St. Stephen and thence proceeded up the St. John to Edmundston. Examined the valley of the Madawaska north to the Quebec boundary, finding striæ and evidence of post-glacial lakes or lake expansions along the course. On the return trip he re-examined the St. John valley at the mouth of the Aroostook and at some points below that place.

The remainder of the season, with the exception of two days spent going to Fredericton to obtain barometric readings from Professor Harrison, was devoted to the study of the region around the mouth of the St. John, and westward to the head of the Long Reach, also along the Bay of Fundy coast to the Charlotte county boundary. Specimens of clays were collected at several of the principal brick yards, and quaternary fossils from the Bay of Chaleur district.

On the 12th November he left St. John for Belledune; on the 13th he went to Bathurst to get some meteorological data at the station kept there; and on the 14th started for Ottawa.

A detailed report will be prepared during the winter.

Cost of season's exploration, including salaries \$1,198.47.

The surveys and explorations made during the year by Mr. Ells, in the province of Nova Scotia, were confined principally to the counties of Cumberland and Colchester, with the view of completing the quarter-sheet map adjoining those already published of southern New Brunswick, and of getting the large amount of work already done by Messrs. Barlow and McOuat* ready for publication. The first half of the season was devoted to the examination of the structure of the Cobequid mountain range, including the relations and extent of the iron ore deposits along its south side, which were traced from the North River, to the northward of Truro, to the Harrington River, below Five Islands, a distance of over 40 miles. Surveys were made of most of the streams flowing from the mountains to the Basin of Minas. These afford excellent sections of the various formations in this area. The horizon of the iron ore is easily recognized, both by its lithological character and its associated minerals. Veins of iron ore of considerable size were found as far west as Five Islands, beyond which the formation was not traced.

The baryta which was formerly mined on the Bass River undoubtedly belongs to the same formation, and the mineral also occurs in connection with the iron ore at the Londonderry mines. The extension of the iron-bearing belt east of Truro has not yet been traced continuously, but from the character of the iron ores and their associated rocks, it seems very probable that the deposits lying to the north of the west river of Pictou are a part of the same band. It will therefore be seen to be a formation of great extent and economic importance.

In connection also with the iron ores an examination was made of the deposit found near Brookfield, about 8 miles south of Truro, where masses of iron ore, similar to much of that found at Londonderry, lie scattered over the surface. Explorations during the past season by Mr. R. E. Chambers have resulted in finding the vein of ore from which these loose masses were probably derived.

On the north side of the Cobequid Mountains the copper deposits of the French River, Malagash, and other points were examined, but these were not found to be sufficiently extensive to be of much economic value. The country to the north was carefully surveyed by Messrs. Giroux and Barlow, who ran extensive chained lines in order to complete the map of this area commenced by Mr. Scott Barlow some years ago. The structure of the Spring Hill coal area was studied with the object of determining the prospect of finding the thick seams of that locality further to the north and west.

The presence of infusorial earth of great purity and in large quantity was noted in Folly Lake, on the line of the Intercolonial Railway, near the summit of the Cobequids. The bed of the lake, over a great part of its extent appears to be composed of this substance. Its value for the manufacture of fine brick and non-conductive boiler covering is very great, and the deposit will doubtless be speedily utilized for these and other purposes.

Towards the close of the season a visit was made to Digby, to examine the iron ore deposits of the North Mountain, or Triassic trap range, near that town. The iron was found to be a magnetite of excellent quality, and to occur in considerable quantities, with the prospect of cheap and easy surface mining.

* Vide Report Geological Survey, 1873-74.

Deposits of magnetite occur in this range throughout the greater portion of its length, but in general they have been considered too small and uncertain to be developed to any extent. The deposit at Digby appears to be the most considerable of any heretofore seen in that formation.

During the season Mr. Ells was assisted by Messrs. N. J. Giroux, C.E., and A. E. Barlow, B.A., both of whom were with him during the preceding season; also, for a short time, by Mr. R. E. Chambers, B.A.

The field work extended from 13th May to 21st November.

In connection with the exploration, about 1,000 miles of roads and streams were measured, as follows:—

	Miles.
Chained roads.....	264½
Micrometer surveys.....	6½
Paced roads.....	275
Paced streams.....	100
Odometer surveys.....	300

The amount expended, including salaries of two assistants, was \$1,900.

Mr. W. Fletcher was occupied, during the past summer, in the counties of Guysboro' and Antigonish, N.S., east of the West River of Antigonish, and East River of St. Mary's, west of the district examined in 1879, about Havre au Bouche and the Strait of Canso, and north of that surveyed in 1883, along Guysboro' Harbor and the Salmon River.

The country to the westward of the St. Mary's River and south of the West Branch, including the Liscomb River and other streams near the Halifax county line, was surveyed by Mr. E. R. Faribault, C.E., of the geological staff, assisted by Mr. A. McLeod, Archibald Cameron and John Smith; while to Mr. John McMillan, assisted by J. A. Robert, B.A., sen., and W. T. McLeod, was entrusted the country south of the Melrose road, between St. Mary's River and Country Harbor. Both areas, embracing about 773 square miles, are occupied by the whin slate (Lower Cambrian) and accompanying granite of the auriferous series of Nova Scotia, the boundaries of which have been carefully traced and material collected for the preparation of a map of this interesting region, within which lie the important gold mines of Sherbrooke, Fifteen-Mile Stream, Wine Harbor and Cochin's Hill. The whole area is generally rocky, studded with lakes, and for the most part barren, the inhabitants obtaining their living chiefly from the sea or from the mines. The land of the Gulf shore, on the contrary, is productive, well cultivated and thickly settled, and much greater variety prevails in the rock formations, Carboniferous, Devonian and pre-Cambrian being represented, similar in most respects to the strata, the limits of which have also been traced and described in the report for 1879-80.

To the Carboniferous, which occupies the coast from Blue Cape to Antigonish, belong the large deposits of excellent gypsum about Antigonish, Powquet, Tracadie and elsewhere; the limestone largely used for railway bridges and buildings—as in St. Wiman's Cathedral, at Antigonish—and also for making lime; clays used in the manufacture of bricks; and the small unimportant coal seam of Powquet Harbor. A small quantity of copper ore has also been obtained, mixed with coal, in the bark of fossil trees, as at Powquet Forks; at other times, at the contact of a Carboniferous limestone with conglomerate, mixed with both, in the form of purple pyrites or copper glance, as described in previous reports on Cape Breton. Deposits of this nature have been mined at Brierley Brook, Addington Forks and St. Joseph. Many of the limestones of the Ohio River contain traces of galena in addition to copper, and have been mined, but without profit.

The Devonian rocks which underlie the Carboniferous to the southward, contain specular iron ores, similar to those of Salmon River, Boylston, Ragged Head and other places already described, which have been worked at Caledonia Mills, Springfield and elsewhere. The copper ores of Lochaber and Polson's Lake are also of Devonian age, and appear to be associated with dykes of basic intrusive rock, which

are numerous throughout the Devonian area. No work has been done at these mines lately.

Few economic minerals have been found in the pre-Cambrian rocks which occupy small bosses on the eastern shore of Antigonish Harbor, and a larger area in the Kippocho Mountain, which extends to the East River, in Pictou county. Below the Ohio Cross Roads is an irregular vein carrying a considerable quantity of yellow copper ore.

Field work was begun on the 13th of May and terminated on the 1st of December. The cost of the season's explorations was about \$1,850.00.

CHEMICAL, MINERAL AND LITHOLOGICAL SECTIONS.

Mr. Hoffmann's report on these sections is as follows:—

The work carried out in the laboratory during the past year has been almost exclusively of a practical character.

The investigation referred to in last year's report, in regard to the characters and economic values of the coals and lignites of the North-West has been completed and a full report prepared for publication. A number of stones have been examined and reported on with reference to their durability as building materials. Numerous gold and silver assays, including an extensive series of specimens from the Lake of the Woods gold mining district, has been made. Also analyses of copper, iron and other ores, as well as a variety of miscellaneous examinations. Two hundred and ninety-three mineral specimens have been received—brought or sent—either for identification or for information in regard to their economic value. Apart from the time devoted to personal interviews in this connection, it further entailed the writing of 103 letters, which, in a good many instances, partook of the value of reports.

During the past year Mr. F. L. Adams acted in the capacity of assistant chemist for seven months, and four months were devoted by him to examinations in the field*.

In the mineralogical section of the Museum very marked progress and improvement may be reported. Valuable additions have been made to the collection, and Mr. Broadbent has devoted himself continuously and most assiduously to the work of labelling the specimens, and with most satisfactory results. To complete the work a large amount of labor is, however, yet required.

Mr. C. Willimott, assisted by Mr. H. P. Brumell, has arranged, labelled, catalogued and dispatched thirty-one collections, comprising 2,813 specimens of minerals and rocks for which application had been made by various educational institutions. He has, during the winter, prepared a report of the examinations he made the previous season. This is published in the annual volume of Survey reports for 1882-83-84. During the past summer he again visited, with Mr. Brumell the township of Wakefield, Quebec, and also the townships of Kingston, Thurlow, East and West York, Caledon and Barton, in Ontario, for the purpose of collecting specimens and obtaining information in regard to certain mining industries. The result has been large and very desirable additions to the mineralogical section of the Museum, to which also presentations have been made as under during the year:

E. J. Chapman, Ph. D., LL.D., University College, Toronto:

Specimens of Red celestite, from the Forks of the Credit, Peel Co., Ont.

E. Mason, of East Templeton, Que.:

Apatite, from the Jackson Rae Mine, Templeton, Que.

D. Hunter, of Calabogie, Renfrew county, Ont.:

Molybdenite, from Bagot, Ont.

H. Heeny, of Danford Lake, Que.:

Molybdenite with molybdite, from Alleyn, Que.

B. J. Harrington, Ph. D., McGill College, Montreal:

Tennantite, from Ascot, Que.

Meneghinite, from Barrie, Ont.

* This work has already been referred to under the head of surveys.

† Report M, Geological Survey Reports, 1882-83-84.

- C. E. Beardman, of Milltown, N. B.:
Two samples of a siliceous deposit, from Pennfield, N. B.
- Oliver Dorney, of Port Arthur, Ont.:
Silver ore, from the Silver Mountain Mine, Whitefish Lake, Ont.
- K. H. G. Chapman, of Belleville, Ont.:
A very fine specimen of Molybdenite, from the county of Pontiac, Que.
- Isaac Waterman, of London, Ont.:
A large and interesting series of the various products obtained in the distillation of crude petroleum.
- D. Aikman, of Montreal:
Samarските and Beryl, from the township of Maisonneuve, Berthier county, Que.
- Thos. A. Keefer, of Prince Arthur's Landing, Ont.:
A very fine collection of silver ore, from the Rabbit Mountain Mine, District of Thunder Bay, Ont.
- J. Fraser Torrance, of Montreal:
Infusorial earth, from Folly Lake, Colchester county, N. S.
- Hon. W. McDonald, of Nova Scotia:
Specimen of clay, from River Denys, N. S.
- G. Page, of Sudbury, Algoma, Ont.:
Chalcopyrite and pyrrhotite, from 3 miles west of Sudbury Junction, Ont.
- E. B. Haycook, of Ottawa, Ont.:
Orthoclase, from the township of Buckingham, Que.
- E. Scharf, of March, Carleton county, Ont.:
Apatite, from March, Carleton, Ont.
- W. J. Morris, of Beveridge Bay, Lanark, Ont.:
Sandstone, from Otty Lake, North Elmsley; also sandstone from Portland, Leeds county, Ont., and geologically interesting specimens.
- A. Cowan, of Victoria, B. C.:
Native saltpetre.
- F. W. Smith, of Ottawa, Ont.:
Apatite, from Bowman, Ottawa county, Que.
- D. Smith, of Winnipeg, Manitoba:
Brick clays, from Winnipeg.

BIOLOGICAL SECTION.

In this section Mr. Whiteaves reports that the first part of the third volume of the "Paleozoic Fossils" of Canada was published in March. It contains forty-four pages of text, and is illustrated by eight octavo lithographic plates and four woodcuts. The third part of the first volume of Canadian "Mesozoic Fossils" was published in April. It consists of seventy-two pages of letterpress, with twelve octavo lithographic plates. A considerable portion of the MSS. of the second part of the third volume of "Paleozoic Fossils" has been written, and many of the drawings required to illustrate it have been made. The fourth and concluding part of the first volume of "Mesozoic Fossils" is also in course of preparation, and it is hoped that both of these two reports will be issued early in the spring of 1885.

At the meeting of the Royal Society of Canada, in May last, two papers were read before the Geological section, viz., one a "description of a new ammonite from the Cretaceous rocks of Fort St. John, on the Peace River," the other "on a decapod crustacean from the Cretaceous shales at Highwood River, Alberta." The MSS. of these two papers, with the drawings required to illustrate them, are both in the printer's hands.

On the occasion of the meeting of the British Association in Montreal, and at the request of the committee of the Geological section, a short verbal communication on the present state of our knowledge of the Cambro-Silurian rocks of Manitoba and Keewatin was made to the section, in connection with a paper by Mr. J. Hoyes

Panton. This communication was based exclusively upon explorations and collections made by various officers of the Survey, from 1870 to 1883 inclusive.

In anticipation of the visit or visits of members of the British Association and their friends to Ottawa, every effort was made to get this section of the museum into as perfect order as possible, and the fine collection of Canadian aboriginal antiquities, recently acquired from Mr. C. A. Hirschfelder, was temporarily arranged in the mapping room. As the museum work of the year, however, was done conjointly with Messrs. Weston and Ami, it will be described more in detail in connection with the work of the latter. An unusual number of specialists, from Europe and the United States, visited the museum during August and September, and some time was spent in endeavoring to explain the specimens in which these gentlemen were most interested. During the absence of the Director, on field work, in September and October, the duties of Acting Director have devolved upon Mr. Whiteaves.

Collections of fossils from the Hudson River formation at Oakville, Ont., from the Devonian and Cretaceous rocks of the Athabasca River, and from the Silurian and Cambro-Silurian of Back Bay and other localities in New Brunswick, have been examined and reported on, for Messrs. Lawson, Dr. R. Bell and Prof. L. W. Bailey. The recent invertebrates obtained by Dr. Bell this year at Hudson's Bay, have been examined, and most of the species identified. A list of the latter has been prepared for publication in Dr. Bell's report. In the zoological collection, twenty-five species of Canadian mammals and fifty of Canadian birds have been named and labelled.

The study, which was commenced last year, of the large series of Laramie and Cretaceous fossils, now in the museum, from the Bow and Belly River districts, has been continued, and the additional collections made this summer from the same region and rocks, by Messrs. R. G. McConnell, J. B. Tyrrell and T. C. Weston, have been examined, and most of the species determined. A portion of the MSS. of a report on the whole of these fossils has been written, and about half of the necessary drawings have been made.

The extensive collections of Cambro-Silurian fossils made this season by Messrs. T. C. Weston and J. M. Macoun, at various localities in the valley of the Red River, Manitoba, on the west coast of Lake Winnipeg, and in the islands adjacent thereto, consisting of nearly 1,000 specimens, have also been subjected to a preliminary examination.

From the 1st of January to the 20th of May, Mr. Weston's time was employed in re-arranging and labelling specimens, in general museum work, and in the preparation of a number of microscopic sections of rocks collected by various members of the staff. From the 21st of May to the 10th of September he was occupied in the field. The localities first visited were Swift Current Creek, Irvine Coulee and the Saskatchewan coal mines. The rock exposures along the west shore of Lake Winnipeg were afterwards carefully examined, from Cat Head to the mouth of the Red River, and on Punk, Deer and other islands in the lake, as were also the Cambro-Silurian limestone of East Selkirk and Lower Fort Garry. Large collections were made at most of the localities visited, not only of fossils, but also of hand specimens of rocks, clays, silts, concretions, &c. After his return to Ottawa, on the 10th of September, Mr. Weston went to Quebec and made a collection of fossils from the Cambro-Silurian slates of the Citadel Hill, the first fossils of any importance that had been collected at that locality. He also went to the best *Eozoön* locality and made a collection of specimens for distribution. The following is an approximate estimate of the number of fossils collected by Mr. Weston during the year:—

From the Laramie and Cretaceous Formations of Alberta, N.W.T.

- 40 Portions of jaw bones.
- 49 Teeth.—Mammalian and reptilian.
- 46 Vertebrae.
- 216 Portions of limb-bones.
- 20 Rib and other bones.

60 Cretaceous mollusca from three miles north of Ross Coulée.

From the Cambro-Silurian Rocks of Manitoba.

394 Fossils from Stony Mountain.

56 " " East Selkirk.

84 " " Lower Fort Garry.

384 " " various localities on west coast of Lake Winnipeg, and on the islands near that coast.

918

From the Lévis and Hudson River Formations—Point Lévis and Quebec.

40 Graptolites from Point Lévis.

50 " " from the Cove Fields, Citadel Hill, Quebec.

Mr. Weston has also taken about forty photographs of geological sections, &c., in the North-West Territories.

Mr. H. M. Ami has been occupied chiefly in the re-classification and re-labelling of the fossils in the museum, under the supervision of Mr. Whiteaves. The whole of the species from the Hudson River formation, from the Cambro-Silurian rocks of Manitoba and Keewatin, from the Guelph formation, from the Oriskany of Western Ontario and the Lower Devonian of Campbellton and the Cascapedia, N.B., from the Hamilton formation, from the Upper Devonian of Quebec and New Brunswick, from the Neocomian of British Columbia and the Gault of the Queen Charlotte Islands; also the fossil plants of the Upper Cretaceous of the Nanaimo and Comox coal fields of Vancouver Island, and of Peace River, have been re-arranged, and in all cases re-labelled. A commencement has also been made of a systematic re-arrangements of the Laramie and Miocene plants and insects of the Souris, Nicola and Similkameen Rivers, N.W.T., and British Columbia, and of the Devonian fossils of the Corniferous formation of Western Ontario.

With a view to determining the exact geological horizon of the rocks in which they are found, the following collections of fossils have been examined by Mr. Ami, under Mr. Whiteaves' supervision. The species have been determined as far as possible, and lists of them have been prepared:—

A. R. C. Selwyn:—

Fossils from a Black River limestone outlier forming islands in Lake Nipissing.

R. W. Ells and Assistants:—

Fossils from various localities in the Devonian and Silurian rocks of the Gaspé peninsula.

L. W. Bailey and Assistants:—

Fossils from the Silurian and Cambro-Silurian of Carleton, Charlotte and Victoria counties, New Brunswick, with several collections previously made at those localities by C. Robb, G. F. Matthew and T. C. Weston; also fossils from the Eastern Townships and the neighborhood of the city of Quebec, collected by T. C. Weston.

Named collections of fossils also have been sent to educational institutions during the year, and a few small ones to private collectors, in exchange for other specimens. About twenty boxes of specimens in the basement have been opened and a number of types found that had been mislaid many years ago. The number of specimens and of species of fossils exhibited in the cases in the upper flat of the museum has been counted and there are found to be upwards of 11,000 specimens and about 3,000 species. Of these fully two-thirds, or about 2,000 species, have been re-arranged and re-labelled since 1882. Records of donations and additions to this branch of the museum have been regularly kept and the paleontological and zoological publications issued during the year have been distributed.

Mr. S. Herring was engaged as taxidermist to the Survey on the 1st of February last, and since that date he has mounted thirty-two specimens of mammals and seventy-eight birds for the museum, and has prepared skins of about forty birds.

The number of letters received during the year is nearly 250, to which about 180 answers have been returned.

In addition to the fossils already mentioned as having been collected by Mr. Weston, the following collections have been received during the year from members of the staff:—

G. M. Dawson:—

One hundred and fifty specimens of palæozoic fossils from the Rocky Mountains.

L. W. Bailey:—

Seventy species of Cambrian fossils from Stanford Brook, St. John county, New Brunswick, identified and named by G. F. Mathew, St. John, N.B.

R. G. McConnell:—

A number of Cretaceous invertebrates from the Wood Mountain region, district of Assiniboia.

J. B. Tyrrell:—

About 400 specimens of plants, invertebrates and vertebrates (including the skull of a dinosaur), from the Laramie and Cretaceous rocks of the Red Deer and Battle River districts.

A. C. Lawson:—

Thirty specimens of stone and copper implements, pottery, &c., from ancient mounds at the confluence of Little Lake and Rainy River.

R. Bell:—

An interesting series of marine invertebrates, insects, birds, mammals and fishes from Hudson's Bay. Seven mammals, twenty birds, two fishes and one fossil bone having been given him by P. W. Matthews, M.R.C.P., (Lond.), L.R.C.S., (Edin.)

The additions to this section of the museum, by presentation and purchase, are as follows:—

By Presentation:—

T. G. Coursolles, Ottawa.—One mounted specimen of the ruffed grouse (*Bonasa umbellus*); one do. of the passenger pigeon (*Ectopictes migratorius*); one ptarmigan (*Lagopus albus*); one black duck (*Anas obscura*); and one blue-winged teal (*Querquedula discors*).

H. Abbott, Montreal.—A fine specimen each of *Orthoceras rapax*, Billings, and *O. subfusiforme*, Hall, from Darch Island, Lake Huron.

The Ottawa Literary and Scientific Society.—Thirty-four specimens of Indian relics, mostly arrow and spear heads, adzes and other stone implements, from various localities near Ottawa.

John F. Flindall, Trenton, Ont.—Forty-two specimens of Indian arrow and spear heads, stone gouges, pipes, fragments of pottery, &c., from the neighborhood of Trenton, Ont.; also thirteen species of fossils and fifty-two copper coins.

Colonel C. C. Grant, Hamilton, Ont.—Fifty-six specimens of fossils from the Niagara group of Hamilton, Ont.

Prof. Kjerulf, Christiania, Norway.—Eight Cambro-Silurian fossils in mica schist, and seven specimens of graptolites from the *Phyllograptus* schists of Christiania.

D. Craig, Nepean, Ont.—Fine specimens of *Leperditia* from the Black River limestone, and a golden-winged woodpecker (*Colaptes auratus*.)

H. Kavanagh, Montreal.—Specimen of a trilobite, probably *Dalmanites pleuropteryx*, Green, collected by a fisherman on the Green Bank, opposite Mal Bay, and 12 miles from shore.

Robert McKenzie, Collegiate Institute, Ottawa.—Two fossils (*Prasopora oculata* and *Calymene senaria*) from Peterboro, Ont.

- L. J. Coursolles, Ottawa.—Specimen of a raven (*Corvus corax*, L.), from Petrie Island, near Ottawa.
- W. G. Kidd, Kingston, Ont.—Cast of *Murchisonia turritiformis*, Hall, from the Guelph formation of Ontario.
- Staff Commander J. G. Bolton, R. N.—Six specimens of fossils, including a very fine *Murchisonia*, from Cape Smyth, Lake Huron.
- T. Davidson F.R.S., Brighton, England—Ten species of recent brachiopoda.
- W. P. Lett, Ottawa.—Specimen of hawk owl (*Surnia ulula*, L.), from Ottawa.
- G. R. White, Ottawa.—Pair of pied-billed grebes, (*Podilymbus podiceps*): One male cedar bird (*Ampelis cedrorum*) and a female sharp-shinned hawk (*Accipiter fuscus*).
- E. B. White, Ottawa.—Male pectoral sandpiper (*Actodromas maculata*), and a chipmunk, (*Tamias striatus*, L.).
- D. A. St. Cyr, Quebec.—Fine specimen of *Tetragnaptus approximatus*, Nicholson, from Point Lévis.
- H. T. Strickland, Peterboro', Ont.—Fine specimen of *Licrophycus Ottawaensis*, from Peterboro'.
- S. White, Ottawa.—Female ruffed grouse (*Bonasa umbellus*).
- L. M. Lambe, Montreal.—Four specimens of trilobites from Tunnel City, Bow River Pass, Rocky Mountains.
- W. R. Billings, Ottawa.—Fourteen specimens of fossils from Point Lévis.
- From John Stewart, Madoc, Ont.—Deer horns found in ancient workings at Wallbridge hæmatite mines, Madoc; and three stone implements of Indian manufacture from various localities in Ontario.
- John Saunders, Smith's Falls, Ont.—One stone arrow-head.

By Purchase :—

- From C. A. Hirschfelder, Toronto.—A very fine and important collection of Huron Indian relics from Ontario, including copper, stone and bone implements, also charms, beads, wampum, fine specimens of pottery, clay and stone pipes, skulls, &c. The whole collection contains about 3,962 specimens.
- In British Columbia Dr. Tolmie has secured a small collection of crania, stone implements, arrow-heads, &c.
- David Boyle, Toronto.—Large and unusually perfect specimen of *Megalomus Canadensis* from the Guelph formation at Elora, with the test preserved on both valves.
- D. Herring, Toronto.—Skunk (*Mephitis mephitica*, Shaw). Female osprey, (*Pandion haliaetus*, Sav.). Red-shouldered buzzard (*Buteo lineatus* Gmel.); Red-tailed buzzard (*Buteo borealis*, Gmel.) Red variety of the mottled owl (*Scops asio*, L.).
- G. Warin, Toronto.—Trumpeter swan (*Cygnus buccinator*, Rich.): adult female, from St. Clair Flats, Ont.

BOTANICAL WORK.

This work is reported on, by Professor Macoun, as follows :—

On the 1st of December, 1883, my assistant, J. M. Macoun, commenced, in accordance with your instructions, to label, mount and arrange the Herbarium. This work, involving the writing of 6,500 labels, was completed, and the greater part of the polypetalæ registered before the 20th of May, when he left with Mr. Weston for the North-West. Since his return, 25th of September, he has mounted, ticketed and arranged in the Herbarium, 1,818 sheets of specimens, which are chiefly part of my own and his collections during the past summer. These, at commercial rates, are worth \$333.50. Specimens of 800 species have also been sent to various institutions and individuals. Besides necessary correspondence, I examined and named all the

collections made by the field parties in 1883, and also prepared the second part of the Catalogue of Canadian Plants—the Gamopetalæ. In the spring you expressed a wish that I should examine the country lying north of Lake Superior, and along the line of the Canada Pacific railway. I therefore visited the country west of Lake Nipissing in the end of May, and early in June proceeded to Lake Superior where the country from Port Arthur to Dog Lake, north of Michipicoten, was examined. The Nipigon River was ascended, and Lake Nipigon circumnavigated. These excursions have afforded data sufficient to show the character of the climate and the botanical features of the region. In August I returned to Ottawa, and after attending the meeting of the British Association in Montreal, the members of the Biological section, proceeding to the Rocky Mountains, asked permission for me to accompany them. Since my return, on the 21st of September, I have been engaged correcting the proof of the catalogue prepared last winter. It contains 202 pages, royal 8vo. The collections made during the past summer are now being examined and named. The examination of Dr. Bell's collection, from the shores of Labrador and Hudson's Strait and Bay, has been completed, and the list of species has been prepared to accompany his report.

Some time has been devoted during the year to collecting good specimens of Canadian woods, and these are now in the museum—280 sections, representing 115 species of our useful forest trees. An extended catalogue of the trees and shrubs of the North-West was made out and furnished, by request, to the Minister of Agriculture, Manitoba, for publication in the report of his Department.

As the subject of the collection and publication, by the Survey, of statistics of mines and mineral products has of late been much discussed in the Press and elsewhere, and much misconception appears to have arisen respecting it, I may be permitted to refer to my views and action in this connection—the first, expressed as follows in my summary report to the Minister, dated 2nd May, 1870, and the second, shown by the result as published in the Geological Report for 1871-72, pages 146 to 154.

EXTRACT FROM REPORT DATED MAY, 1870. (MINERAL STATISTICS.)

“In view of the importance and usefulness of mining records, and of complete and accurate statistics of mineral produce, it is thought desirable to endeavor, in future, to publish yearly, with the reports of the Geological Survey, a return of the mineral production of the Dominion. With this object in view, the annexed circular and blank form have been issued, and copies of it have been sent to all persons who, it has been ascertained, are actively engaged in mining, or in raising or manufacturing mineral products, and whose addresses were known. In circulating the printed form, either personal or written application has, in most cases, also been made to have the information asked for under the respective heads given in as complete a form as possible, and the object of the inquiry has, at the same time, been more fully explained. No great success can be expected at first; neither is it likely that the replies received will be of such a nature as to afford the requisite material for the compilation of as complete a statistical return as could be desired. The precise object of the enquiry will have to be familiarized, and its public utility more generally understood and appreciated. On the whole, however, the results already obtained are very encouraging, and I have no doubt that by degrees a large amount of valuable information relating to the mineral produce of the Dominion will be collected.”

Mr. Edward Hartley has issued ninety-seven circulars, with explanatory letters. Eleven only of these have been returned filled up, in most cases very satisfactorily. He has also received fifteen letters, acknowledging the circular, and promising to return the form filled in with the information asked for. Two hundred copies of the circulars have been sent to the Honorable Robert Robertson, Commissioner of Mines and Public Works in Nova Scotia, who has kindly promised his assistance in distributing them there, and undertakes to see that they are put in the hands of every person engaged in mining, connected with his department, who would be likely to make any use of them.

Professor R. Bell has sent 169 circulars to eighty-four persons in Ontario and Quebec, some of whom have undertaken to distribute the duplicates sent to them to mine-owners in their respective districts, whose addresses were not known at the Geological Survey office. Of these only fifteen have as yet been returned; they are filled up very satisfactorily. Twenty more have been acknowledged, and the information promised. Sectional drawings of two mines have been sent with the returns, showing the nature of the deposit and the extent of the working.

The scheme, so far, appears to meet with general approval, and no one to whom application has been made has declined to give the desired information.

(Signed)

ADFRED R. C. SELWYN,

Director of the Geological Survey.

EXTRACT FROM REPORT, 1871-72.

"The following tables, compiled by Mr. C. Robb, exhibit in a concise form the results of mining operations during the last three years throughout the Dominion of Canada and the British American Provinces. They have been compiled chiefly from information obtained by the officers of the Geological Survey, under the arrangement specified in Mr. SELWYN'S SUMMARY REPORT, addressed to the Legislature, and dated 2nd May, 1870, pp. 13 and 14; and partly from the reports of the Commissioner of Mines for Nova Scotia, supplemented by other authentic sources of information. In some cases, in order to render the tables more complete and uniform, it has been deemed necessary to fill up some of the items by estimating according to the compiler's best judgment. In such cases the figures are marked by an asterisk. It is to be regretted that the returns are so incomplete as to render such an expedient necessary; and it is hoped that, when the importance and value of such records are duly recognized, the parties more immediately interested will give their cordial co-operation. These tables comprise the records only of such mines as have been in operation during the whole or any part of the three years referred to; and in some instances, where it has been impossible to obtain any information, all notice has necessarily been omitted. In the column indicating the year, the brackets denote that the "aggregate" production, number of men, &c., for each year, of all the mines of the class referred to, is recorded."

It may naturally be asked why this work was not continued, and on this point I may say the reasons were numerous, chief among them, however, being, that after the third year but a few of the circulars issued were returned, while at the same time I was instructed to direct my own attention and that of the staff to the exploration of the North-West and British Columbia. That the development of mines and economic minerals in the Dominion generally, however, has not at any time been, as has been stated, "entirely neglected," or "received no attention whatever," is sufficiently proved by the following list of reports published by the Survey, and which relate exclusively to this subject:—

- SELWYN. Notes and Observations on the Gold Fields of Quebec and Nova Scotia.
- BROWNE. On the Phosphate of Lime and Mica found in North and South Burgess.
- RICHARDSON. On the Coal Fields of Vancouver Island.
- VENOR. On Geology of Leeds, Frontenac, &c., with notes on Gold of Marmora, &c.
- ROBB. Mining and Mineral Statistics.
- SELWYN. On the Acadia Iron Ore Deposits of Londonderry.
- RICHARDSON. On the Coal Fields of Vancouver and Queen Charlotte's Islands.
- VENOR. On Counties of Frontenac, Leeds, &c., with plan of Dalhousie Iron Mine.
- ELLS. Operations in Boring for Coal, New Brunswick.
- ROBB. On Coal Mines of Sydney, C.B.
- HARRINGTON. On Samples of Brick Clay from Manitoba.

- HARRINGTON (Appendix to Selwyn). On Western Coals.
 HOFFMANN (Appendix to Bell). On Lignites.
 VENNOR. On Frontenac, Leeds, &c. Notes on Plumbago, Apatite, &c.
 BARLOW. Springhill Coal Field.
 McOUAT. On a portion of the Cumberland Coal Field.
 HARRINGTON. On the Iron Ores of Canada, and their development.
 ELLS. Second Report on Borings for Coals in New Brunswick.
 ELLS. On Iron Ore Deposits of Carleton Co., New Brunswick.
 VENNOR. On Frontenac, Lanark, &c., with notes on some of the Economic Minerals of Ontario.
 ROBB. On Explorations, &c., with Table of Sections of Measures in Sydney Coal Field.
 SMITH. On History and Statistics of Canadian Salt.
 ELLS. On Boring Operations in the North-West
 BARLOW. On Progress of Survey of Coal Fields of Cumberland Co., Nova Scotia.
 DAWSON. Mines and Minerals of Economic Value in British Columbia.
 RICHARDSON. On Coal Fields of Nanaimo, Carvot, &c.
 HUNT. On Goderich Salt Region.
 VENNOR. On Renfrew, Pontiac, &c., with additional notes on Iron, Apatite, Plumbago, &c., of Ottawa County.
 BAILY AND ELLS. On L. Carboniferous Belt of Albert and Westmorland Counties including the Albert Shales.
 HOFFMANN. On Canadian Graphite.
 HARRINGTON. Report on Minerals of some of the Apatite-bearing Veins of Ottawa County.
 SELWYN. Report on Boring Operations in the Souris Valley.
 DAWSON (Appendix to Selwyn). On Lignite Tertiary Formation from the Souris River to the 108th Meridian.
 DAWSON. Preliminary Report on Bow and Belly River region, with special reference to the Coal Deposits.
 WILLIMOTT. Notes on some of the Mines of the Province of Quebec.

SPECIAL REPORTS (PUBLISHED SEPARATELY).

- Descriptive Catalogue of Economic Minerals of Canada, &c., Philadelphia Exhibition, 1876.
 Catalogue des Minéraux Économiques du Canada, Exposition Universelle, Paris, 1878.
 Preliminary Note on Geology of Bow and Belly Rivers District, with special reference to Coal Deposits (published separately), 1882.
 General Note on Mines and Minerals of Economic Value of British Columbia. (Published separately. Also first printed in Canadian Pacific Railway Report, 1877).

The above enumeration shows a total of thirty-seven reports (without counting two, which were also printed as special reports) making known in their titles their special bearing on mines, mineral deposits and statistics of mineral production.

Besides the above it will be found that in almost every report published in each of the twelve volumes issued during the past fourteen years, the closing pages are devoted specially to an enumeration and statement of all the economic minerals observed, or reported to occur, in the districts to which the report itself relates. This is precisely the same system as was adopted in this connection by my predecessor, Sir W. E. Logan.

Without, however, now further referring to the past, we may perhaps offer some suggestions for the prosecution of this work in the future, and I may say that after carefully considering the matter in all its aspects, I am led to the belief that the system I originally adopted, namely, that of issuing a circular, with questions to be answered on a form printed for this purpose, and when convenient or considered

necessary, to be accompanied by personal application on the ground, is that which is most likely to afford the desired result. There are two gentlemen, trained mining engineers, now employed on the Survey, to whom the work of issuing, collecting and compiling the returns might be entrusted, and who might also each year visit and critically examine and report on one or two mining districts. In this way every mining district in the country would be visited at intervals of one or two years, unless some special development called for more frequent examination.

At present the chief mining developments are in the provinces of Nova Scotia, Quebec and British Columbia, and in each of these provinces the Local Government employs a mining inspector or engineer, who collects statistics and reports on the mines of the province.

It would not, therefore, seem desirable or necessary that the work should also be done in these provinces by the Dominion Survey, but with the co-operation and consent of the provincial authorities the results obtained by their officers might be incorporated in the general statement issued annually by the Geological Bureau, and thus gain wider publicity.

So far as the examination of mining districts is concerned, a commencement was already made in 1883 and continued in 1884, the districts examined being:—In 1883, the Lake of the Woods gold region and the phosphate region in the townships of Wakefield and Templeton; and in 1884, the Marmora gold and iron bearing region, and the mining region around the north shore of Lake Superior; also some of the mines in the province of Quebec.

If the scheme now proposed is carried out, no further assistance would be required, but the two gentlemen named—Messrs. R. Coste and E. Ingall—should be appointed on the permanent staff, with the title of mining geologists, and salaries of \$1,500 each per annum.

LIBRARY.

The Librarian, Dr. Thorburn, reports that during the year 1884, from 1st January to 31st December, 5,471 copies of the Geological Survey publications were distributed. Of these 2,729 were distributed in Canada, the remainder—2,742—were sent to scientific and literary institutions, and individuals in America, Europe, India, Japan and Australia.

Three hundred and sixty-five French copies of the Report of Progress were distributed during the year.

A larger number of these would have been distributed had the printing not been delayed. English copies were, in consequence, sent to a number of individuals and societies who would otherwise have received French ones.

Six hundred and forty publications, including books, transactions, memoirs, periodicals, pamphlets and maps were received as exchanges.

Fifty volumes have been added to the Library by purchase and forty-three magazines and periodicals have been subscribed for during the year, a list of which will be given in the Annual Report.

Eight hundred and seventeen letters were written and sent out and 805 letters were received during the year.

Three hundred and ninety-three volumes have been bound, since the 31st of December, 1883.

There are now in the Library about 5,000 volumes.

The catalogue has been completed, but it is considered unnecessary to incur the cost of printing it. And for future reference in the Library, it is proposed to make a card catalogue, such as is now used in most well arranged libraries.

VISITORS.

The number of visitors to the Museum is continually on the increase, as shown by the following figures:—

1882.....	9,549
1883.....	11,993
1884.....	13,946

The periods in each year being from 1st of January to 31 December, inclusive.

STAFF APPROPRIATION, EXPENDITURE AND CORRESPONDENCE.

There have been no changes in the permanent staff during the year. It consists of twenty-five persons, including the Director.

The position of artist is vacant since the retirement of Mr. A. H. Foord, the drawing having since been done by Mr. L. M. Lambe, of Montreal, and Mr. J. W. H. Watts, R.C.A., of Ottawa.

The appropriations for the fiscal year ended 30th June, 1884, were:—

Civil list salaries.....	\$31,604.00
Contingencies	60,000.00

Total..... \$91,604.00

against which the expenditure for the Geological and Natural History Survey and the maintenance of the museum is charged.

The expenditure may be summarized under the divisions named, as follows:—

Pay-list salaries.....	\$30,504.00
Wages of temporary employees.....	13,280.70
Exploration and survey, including travelling charges, purchase of horses and equipment.....	25,218.40
Printing and lithography.....	10,381.60
Purchase of specimens.....	1,496.15
Purchase of books and instruments.....	1,367.43
Chemicals and laboratory apparatus.....	188.39
Stationery	663.04
Fuel	106.86
Incidental and other expenses, including museum and office fittings.....	3,685.80
	<u>\$86,892.37</u>

The correspondence of the branch shows 2,611 letters sent, and 3,432 received.

In concluding this report I must again refer to the wholly inadequate accommodation afforded in the present Museum building both for offices and for the proper arrangement, preservation and exhibition of the constantly augmenting collections.

I have the honour to be, Sir,

Your obedient servant,

ALFRED R. C. SELWYN,

Director.

The Honourable

Sir DAVID MACPHERSON,

Minister of the Interior, Ottawa.

PART IV.

GOVERNMENT OF THE NORTH-WEST TERRITORIES.

GOVERNMENT HOUSE, REGINA,
1st January, 1885.

SIR,—I have the honor to submit the following Report concerning the administration of the North-West Territories for the year 1884.

Erection of Electoral Districts.

Having satisfied myself that the population in the Districts of Calgary and Moose Mountain, had so far increased as to entitle them to representation in the Council, I was pleased to be able to exercise the authority conferred on me by Section 15 of "The North-West Territories Act, 1880," and to add these two Districts to the number of Electoral Districts already established. The proclamations for their erection were issued on the 29th day of May last, and an election for both at once ordered to be held, thereby permitting the members returned to take their seats at the session of Council called for the 3rd of July following.

Session of Council.

The Council of the North-West Territories, convened for the 3rd of July, was opened by me on the said day and closed on the 6th of August following.

The members composing this session of Council were :—

Lieut.-Col. Hugh Richardson, Lieut.-Col. James F. Macleod, C.M.G., Chas. B. Rouleau, Stipendiary Magistrates and *ex-officio* members of Council.

Lieut.-Col. A. G. Irvine, Pascal Bréland, Hayter Reed, nominated members.

Francis Oliver, member for the Electoral District of Edmonton.

Capt. D. H. MacDowall	do	Lorne.
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Claude C. Hamilton	do	Broadview.
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Thos. W. Jackson	do	Qu'Appelle.
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William White	do	Regina.
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James H. Ross	do	Moose Jaw.
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John G. Turriff	do	Moose Mountain.
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James D. Geddes	do	Calgary.
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Legislation.

The Ordinances passed at the above session of Council were both numerous and important, and intitled as follows :—

No. 1. An Ordinance to amend and consolidate, as amended, the registration of titles Ordinance of 1878 and the Ordinance amending it.

No. 2. Respecting the herding of animals.

No. 3. To amend and consolidate, as amended, the Ordinance respecting the administration of civil justice in the North-West Territories.

No. 4. Respecting municipalities.

No. 5. An Ordinance providing for the organization of schools in the North-West Territories.

No. 6. An Ordinance to establish liens in favor of mechanics, machinists and others.

No. 7. An Ordinance respecting controverted elections.

No. 8. An Ordinance to regulate the costs of distress for rent, extra judicial seizure.

No. 9. An Ordinance respecting distress for interest upon mortgages.

No. 10. An Ordinance to declare the law respecting real property held by two or more persons.

No. 11. An Ordinance to encourage the planting of forest trees

No. 12. An Ordinance respecting compensation to the families of persons killed by accidents.

No. 13. An Ordinance to amend Ordinance No. 12, of 1883, intituled "An Ordinance respecting auctioneers, hawkers and pedlars."

No. 14. An Ordinance to amend and consolidate, as amended, the several Ordinances respecting the marking of stock.

No. 15. An Ordinance to amend Ordinance No. 1, of 1883, respecting infectious diseases of domestic animals.

No. 16. An Ordinance for the protection of sheep and other animals.

No. 17. An Ordinance to amend Ordinance No. 5, of 1881, intituled "An Ordinance respecting mortgages and sales of personal property."

No. 18. An Ordinance to amend Ordinance No. 10 of 1879, intituled "An Ordinance respecting the Ordinances or the North-West Territories."

No. 19. An Ordinance to amend Ordinance No. 5, of 1879, intituled "An Ordinance respecting masters and servants."

No. 20. An Ordinance to amend and consolidate, as amended, Ordinance No. 7, of 1878, providing for the appointment of constables.

No. 21. An Ordinance to amend and consolidate, as amended, the several Ordinances respecting the licensing of billiard and other tables, and for the prevention of gambling.

No. 22. An Ordinance to authorize corporations and institutions incorporated outside the North-West Territories, to transact business therein.

No. 23. An Ordinance to amend Ordinance No. 11 of 1883, intituled "An Ordinance to enforce the destruction of the Canada thistle and other noxious weeds."

No. 24. An Ordinance relating to the duties of the Justices of the Peace in cases of appeals.

No. 25. An Ordinance respecting ferries.

No. 26. An Ordinance respecting property and civil rights.

No. 27. An Ordinance concerning receipt notes, hire notes and orders for chat-tels.

No. 28. An Ordinance exempting certain property from seizure and sale under execution.

No. 29. An Ordinance to amend and consolidate, as amended, the several Ordinances respecting fences.

No. 30. An Ordinance respecting choses in action.

No. 31. An Ordinance respecting preferential assignments.

No. 32. An Ordinance to amend Ordinance No. 14, of 1883, respecting the construction of chimneys.

No. 33. An Ordinance to amend Ordinance No. 8, of 1883, respecting the protection of game.

No. 34. An Ordinance respecting inn hotel and boarding-house keepers.

No. 35. An Ordinance respecting keepers of livery, boarding and sale stables.

No. 36. An Ordinance to amend Ordinance No. 9, of 1883, intituled "An Ordinance to regulate the disposal of found and stolen horses.

The most important of the above were the Municipal and School Ordinances. It was found that the Ordinance respecting municipalities, passed at the session of Council held in 1883, was defective in some particulars, and required some important amendments. A new one was therefore passed, which appears to better suit the wants of the Territories.

The School Ordinance, it is hoped, will be found adapted to the Territories. Great care and attention were given to it in its preparation, and it has been made as liberal, I believe, if not more so, than the School Acts in other portions of the Dominion. As far as I have been able to judge, all religious denominations in the Territories appear satisfied with its provisions.

Schools.

The establishment and maintenance of schools in a sparsely settled country like the North-West Territories must necessarily be attended with many difficulties. The subject, however, is one of paramount importance, for if a fair standard of education be not, by some means, at once, established throughout the Territories, our present young generation will be placed on a footing of inequality with the incoming settlers.

Great credit is due to the Clergy of all denominations, for their efforts to promote the interests of education and, specially, for the work performed by them prior to receiving Government aid. The Council, also, has done its duty, by passing the School Ordinance, under which an easy mode is provided for the erection of School Districts throughout the Territories, and power conferred upon such districts to levy taxes for school purposes, and as an incentive to the formation of these districts, provision is made for Government aid towards the maintenance of such schools as may be established therein. The people, I am pleased to remark, are taking a lively interest in the subject; and in almost every settlement they are moving with a view of organizing themselves under the provisions of the Ordinance. Over twelve petitions have already been received by me in that behalf.

The sum of \$7,000, for school purposes, was asked by me in my estimates for the current financial year, and granted by the Dominion Government. This sum, which I thought would be ample, is, I am sorry to say, insufficient for the number of schools in operation. Twenty-eight schools, seventeen Protestant and eleven Roman Catholic, are at present receiving aid, through me, out of the above appropriation, and several other applications are on file in my office. It will thus be seen that the vote for school purposes will be exceeded; but I am in hopes a decrease can be made in some of the other items of expenditure, and with this saving meet our school liabilities without exceeding the total vote for North-West Government.

Public Buildings.

At all the important points of settlement, such as Prince Albert, Battleford, Calgary and Edmonton, a want of court house and jail accommodation is much felt. At present our magistrates are obliged to rent buildings in which to hold their courts, these being, in many cases, inconvenient and unsuitable. The guard rooms of the North-West Mounted Police, with the rapid increase of settlement, have been found quite inadequate to accommodate the prisoners, who, in some instances, have been compelled to be confined side by side with raving lunatics. As tenders are being called for the erection, at Prince Albert, of a good court house and jail, that point will shortly be relieved from the inconvenience, and I would urge the necessity of others being built as soon as possible.

The buildings to be erected at the Capital will be a great boon to the Territories. Since the beginning of the year no less than four lunatics have been ordered to be sent to the Manitoba Penitentiary from the North-West Territories, and seven others have been held at police posts, suffering from temporary insanity; and although every care and attention is given them in the Manitoba Penitentiary, compatible with the crowded state of that institution, the necessity for an asylum where these unfortunates can be specially cared for in the Territories is urgently required.

I also find that the accommodation at our North-West Offices is insufficient and will require considerable additions for library, committee rooms and general offices. I drew the attention of the Honorable Minister of Public Works to this, during his recent visit to the Territories, and I feel sure he appreciated the necessity of these additions.

Roads and Bridges.

The amount I have at my disposal for roads and bridges only enables me to assist in repairing the most travelled highways and building bridges over gullies and

small streams. These improvements have been carried out conjointly with the settlers in the districts where the money is expended, they contributing a fair proportion in money and labor. On some of our most important roads, traffic is much interfered with by streams, which, at certain seasons of the year, are very dangerous to cross. At low water they are fordable, and consequently no one can be found willing to establish a ferry. They are liable to sudden changes, being affected by the weather in the mountains, and while one day you might cross with impunity, to do so the following day might be at the risk of your life. I refer more especially to the streams in Alberta, namely to Fish Creek, Pine Creek, High River, Old Man and the Bow. The two latter, which are the most important, would require very substantial structures and would be expensive; the other three, not so.

On the trail from Moosomin to Moose Mountain, a bridge on the Pipe Stone is required, but cannot be built, I fear, out of the North-West appropriation.

Before any of the above bridges are built, with the exception of, perhaps, the bridge over Fish Creek, an engineer of experience in the construction of bridges should be employed to prepare the necessary plans and specifications. The local revenue of the Territories, derived principally from marriage and other licenses, fines under North-West Ordinances, fees from notaries public and commissioners for taking affidavits, sales of stray horses, and fees on liquor permits, has increased, so as to enable a larger amount to be expended for public improvements, in the several districts, than last year. The sum of \$9,000 was voted for this purpose. The members for the districts, in conjunction with a committee of responsible settlers, see to the proper expenditure of the money, and this plan has worked very satisfactorily.

Municipal Corporations.

There are now in the North-West Territories three incorporated towns, under the provisions of the municipal Ordinance, namely:—

The town of Regina, erected the 1st December, 1883.

The town of Moose Jaw, erected the 19th January, 1884; and

The town of Calgary, erected the 7th November, 1884, and four municipalities, namely:—

The municipality of Qu'Appelle, established the 1st of May, 1884.

The municipality of South Qu'Appelle, established the 16th June, 1884.

The municipality of Wolseley, established the 18th August, 1884, and

The municipality of Indian Head, established the 22nd December, 1884.

Administration of Civil Justice.

By section 1 of the "The Administration of Civil Justice Ordinance, 1884," the North-West Territories are divided into three Judicial Districts, named respectively: Assiniboia, Alberta and Saskatchewan, and for the better administration of justice, I have thought it desirable, under the authority of the said Ordinance, to issue a proclamation, dated the 1st November, 1884, sub-dividing each of these Districts into Divisions as follows:—

The Assiniboia Judicial District, which comprises the whole of the Provisional District of Assiniboia, has two Divisions, namely:—

1. The Regina Division, composed of all that portion of the said Judicial District lying east of the 107th Meridian of west longitude; and

2. The Medicine Hat Division, composed of all the remaining portion of the said District.

The Alberta Judicial District, which comprises all of the Provisional District of Alberta, lying south of Township 41, has two Divisions, namely:—

The Calgary Division, composed of all that portion of the said Judicial District lying north of the line dividing Townships 16 and 17; and

2. The Fort Macleod Division, composed of all the remaining portion of the said District.

The Saskatchewan Judicial District, which comprises all of the Provisional District of Alberta lying north of Township 41, as also the Provisional Districts of Saskatchewan and Athabaska, has three Divisions, namely :—

1. The Edmonton Division, composed of all that portion of the said Judicial District lying west of the western boundary of the Provisional District of Saskatchewan.

2. The Battleford Division, composed of all that portion of the said Judicial District lying east of the Edmonton District, and west of the 107th Meridian of west longitude; and

3. The Prince Albert Division, composed of all the remaining portion of the said Judicial District.

Sittings of the court are proposed, by the magistrates, to be held twice a year in each of the above Divisions.

Although the three Stipendiary Magistrates have concurrent jurisdiction over the whole of the Territories, they have found it more satisfactory to themselves and the public, that each should take a separate district. For this purpose, Lieut.-Col. Richardson resides at Regina, and has charge of the Assiniboa Judicial District; Lieut.-Col. Macleod, the Alberta District, with residence at Fort Macleod; and Mr. Stipendiary Magistrate Rouleau resides at Battleford, and has charge of the Saskatchewan District.

APPOINTMENTS.

The following is a continuation of the list of territorial appointments transmitted with my report of last year :—

Justices of the Peace.

Names.	Addresses.
Matthias Holtby	Long Lake
Chs. Marshallsay	Whitewood
Neil F. M. Scobie	Pincher Creek
John Garnett	Old Man's River
John Turner	Edmonton
Geo. A. Simpson	do
Jacob W. Hosteller	Laramie
William McArthur	do
Samuel Cruthers	Fort Qu'Appelle
Richard S. Garratt	Pheasant Plains
George Ness	Batoche
Joseph Nolin	Carlton
William F. Meyers	Carrot River
James Muirhead	Fort Macleod
Robert L. Alexander	Moose Jaw
Richard F. Holterman	Pheasant Forks
Thomas S. Burns	Calgary
Archibald Dewar	Silver City
Peter Ballendyne	Battleford
James Clinkskill	do
Benjamin Fisher	Landsdowne
Christian Troyer	Alameda
Louis Couture	Touchwood Hills
Hugh C. Gilmour	Moose Jaw
John O'Flynn	do
Leslie Gordon	Qu'Appelle Station
Chs. E. Phipps	Summerbury
John Mann	Wolf Creek
Levi Thompson	do
Thomas Lyle Bray	do
James Biden	do

Edward Carss	Carsdale
Anthony Neville	Regina
Matthew Henderson	Wascana
Edwin F. T. Brokowski	Moosomin
Samuel Whitlock	Glen Adelaide
William W. Watson	Dalesboro'
Jacob W. Brookfield	Pasqua
Thomas D. Watson	Moose Jaw
Andrew Spence	Red Deer Hill, Prince Albert
George R. Davis	Fort Macleod
Lieut.-Col. Francis. A Hutchins	do
James Sharp	Yorkton
William Porklington	Fort Macleod
Thomas A. McLean	Calgary
James Ansdell Macrae	Carlton
Alexander Aitkinson	Green Valley
James Hayes Dickie	Carlyle
Roderick Ross	Ile à la Crosse
John W. Powers	Saskatoon
John F. Clark	South Saskatchewan
John J. McHugh	Carlyle
John M. Campbell	Medicine Hat
John Burn Doig	Longlaketon
William John French	York Colony
John C. McArthur	Welwyn
Henry Fisher	Regina
John Buchanan	Whitewood
Robert Russell Smith	Fort Qu'Appelle
William Anderton	Medicine Hat
William T. Finlay	do
George Murdoch	Calgary
Albert E. Boake	Wallace

Notaries Public.

Names.	Addresses.
Capt. John Cotton	Fort Macleod
Herbert Norman Morphy	Moose Jaw
Colin Nicol Campbell	Calgary
H. Campbell Oswald	do
Oliver Neff	Moosomin
James G. Fitzgerald	Calgary
Capt. William D. Antrobus	do
Frederick Marigold	Battleford
Paul Kingston	Silver City
John Malony	Fort Qu'Appelle
James P. Mitchell	Medicine Hat
George Louis Lecomte	Silver City
William J. Scott	Battleford
Hugh A. J. Macdougall	Fort Qu'Appelle
Alexander L. Lunan	Regina
Edwin F. T. Brokowski	Moosomin
Frederick Wm. A. G. Haultain	Fort Macleod
Daniel Maloney	St. Albert
George T. Marsh	Regina
F. B. Warren	Menota
Stephen Brewster	Prince Albert

Coroners.

Names.	Addresses.
Lt.-Col. Wm. M. Herchmer	Calgary
Capt. John Cotton	Fort Macleod
Robert B. Cotton, M.D.	Regina
Henry Dodd, M.D.	Broadview
Supt. J. M. McIllree	Maple Creek
John E. Ross	Moose Jaw
Patrick G. Laurie	Battleford
Hillyard Mitchell	Duck Lake
Hugh A. G. Macdougall	Fort Qu'Appelle
William Anderson	Edmonton
Louis Couture	Touchwood Hills
Samuel Macdonald	Indian Head
P. Arthur Shee, M. D.	Medicine Hat

Commissioners for taking Affidavits outside the North-West Territories.

Names.	Addresses.
Samuel C. Fatt	Montreal, Que.
William Pugsley, jun.	St. John, N. B.
Acton Burrows	Winnipeg, Man.
Louis William Coutlee	do
Eugene D. Carey	do
Frederick William Howbach	do
Henry James Morgan	Ottawa, Ont.

Issuers of Marriage Licenses.

Names.	Addresses.
Dr. Henry Dodd	Broadview
Capt. John Cotton	Fort Macleod
Hugh Hassard	West End Moose Mountain
Rev. Chas. Simpson Willis	Pheasant Forks
Joseph C. Irvine	Regina
William Johnston	Moosomin
Rev. John A. Mackay	The Pas
Samuel Macdonald	Indian Head
Rev. W. Halstead	Saskatoon
William Fred. Myers	Carrot River
Rev. William S. Moore	Yorkton

Game Guardians.

Names.	Addresses.
Hon. Walter A. H. à Court	Moose Jaw
William Naple	Prince Albert
Thomas T. Brown	Pheasant Plains
John Cook	do
Richard F. Holterman	do
Henry Wheeldon	do
Thomas Pallister	do
Isaac Jones	do
William J. C. Hortwell	do
Charles Marshallsay	Whitewood
Major Gen. T. B. Strange	Namaka
John Barter	Sheep Creek

James Kidd	Oswald
David Macdougall	Morleyville
Joseph Bannerman	Red Deer Crossing
Fred. S. Stimson	High River
C. W. Frend	Grenfell
J. G. Brown	Kootenai Lakes
W. S. Lee	Fort Macleod
Louis Couture	Touchwood Hills
Henry Parker	Battleford
Peter Ballendyne	do
Adelard P. Forget	do
J. E. Stewart	do
George M. Harpur	do
Robert Wyld	do
L. Taylor	do
William S. Urton	Moose Jaw
Charles Bingerfield	Long Lake
Matthew Holtby	Loon Creek
Linton Purdy	Regina
Oliver T. Stone	Long Lake

Issuers of Billiard Licenses.

Names.	Addresses.
Capt. John Cotton	Fort Macleod
Insp. Arthur H. Griesbach	Fort Saskatchewan
Samuel Macdonald	Indian Head
A. E. Forget	Regina

Veterinary surgeon for the provisional district of Assiniboia, John Y. Ormsby, of Regina.

During the year the Territories have received a large share of western immigration, and the improvements in farm buildings and the increased area under cultivation have been very great. My annual visit to distant parts of the Territories, on Indian business, has enabled me to judge of the growth of districts far away from the line of railway, and although the increase to the population has not been so great in the north as in the south, the improvements have been extensive, giving the districts about Prince Albert, St. Laurent, Battleford and Edmonton the appearance of old settled countries.

The unusually dry spring kept back the early growth of crops in one or two districts, so much so, that a large portion of them did not mature in time to escape the fall frost.

On my visit to Edmonton, after the harvest, I was shown some excellent grain of all kinds raised in Edmonton and the St. Albert districts, and all the crops that were put in early turned out very well.

Along the line of the railway a much larger percentage of good wheat has been raised than heretofore, and from information that has reached me, I estimate that the new land broken this summer will increase the area of cultivation three-fold next year.

Agricultural societies have been formed in almost all the settled districts, and the exhibits were of the most gratifying character. Grain of all kinds, especially red Fife hard wheat, was shown at all points along the line of railway, where exhibitions were held, and the root crops were exceptionally fine. Thoroughbred stock of all kinds were exhibited, as well as a great variety of poultry. Breeders have already imported into the Territories as fine blooded stock as there is in the Dominion.

Attached to this report you will find a return of liquor permits issued by me during the year, as required by sub-section 2 of section 90 of "The North-West Territories Act, 1880."

It will be seen that there is a slight increase on last year, accounted for by the rapid settlement of the country.

A strong desire has been expressed in almost all parts of the Territories for the establishment of breweries. Personally, I am in favor of it, as I believe where people are able to obtain beer much less quantity of strong liquor is consumed, and it would be the means of stopping the illicit traffic in spirits which is now being carried on on a large scale.

I have the honour to be, Sir,

Your obedient servant,

E. DEWDNEY,

Lieutenant-Governor of the North-West Territories.

STATEMENT showing total quantity of wines, liquors, &c., &c., imported into the North-West Territories, under permits issued during the year 1884, by His Honor the Lieutenant-Governor.

Description.	Gallons.
Whiskey	3,744
Brandy	1,249 $\frac{3}{4}$
Beer	3,565
Wine	938
Gin	86
Rum	138
Alcohol	187 $\frac{1}{2}$
Total gallons.....	<u>9,908</u>

RETURN of Special Permissions for the Importation of Intoxicating Liquors into the North-West Territories, during the Year 1884, as required by 43 Vic., Chap. 25, Section 90, sub-Section 2.

No. of Permits.	Quantity in each kind of Permit.							Total Quantities.							Remarks.	
	Whiskey.	Brandy.	Beer.	Wine.	Gin.	Rum.	Alcohol.	Whiskey.	Brandy.	Beer.	Wine.	Gin.	Rum.	Alcohol.		
1,148	2							2,296								
44	1							44								
32	3							96								
40	4							160								
48	5							240								
13	6							65								
3	8							24								
15	10							150								
1	4	1		2	1			4	1		2	1				
1	2	2	18					4		36						
1	2		10	2				2		10	2					
1	1					1		1					1			
1	1				1			1				1				
1	5	3	18	2				5	3	18	2					Pharmaceutical purposes.
1	2	2	10					2	2	10						
2	4			2				8			4					
1	2	1		1				2	1		1					
1	5	5						5	5							
1	6		40	4				6		40	4					
1	2			1				2			1					
1	2				2			2				2				
1	6		30					6		30						
1	10	5		4	2		5	10	5		4	2		5		do
1	3			1				3								
1	2	1	8					2	1	8						
1	5		15					5		15						
2	2	2		2				4	4		4					
1	4				1			4				1				
1	4			1				4			1					
1	2		7					2		7						
1	8			2				8			2					
1	5		12					5		12						
8	3			2				24			16					
1	3			2	2			3			2	2				
1	1															
1	2		8					2		8						
2	2		15					4		30						
2	10	2						20	4							
2	3	2						6	4							
1	6		16					6		16						
1	2				1			2				1				
1	2					1		2					1			
1	4	2		2				4	2		2					
2	2	2				2		4	4					4		
1	5	2	15		2			5	2	15		2				
1	15		8					15		8						
1	15	8						15	8							
1	1							1								
1	2		30					2		30						
1	1		12					1		12						
1	10			2				10			2					
1	2	1		2				2	1		2					
4	3		10					12		40						
21	2			2				42			42					
1	2		10	3				2		10	3					
1	1						2	1						2		
1	1							1								

RETURN of Special Permissions for the Importation of Intoxicating Liquors, &c.—*Con.*

No. of Permits.	Quantity in each kind of Permit.							Total Quantities.							Remarks.
	Whiskey.	Brandy.	Beer.	Wine.	Gin.	Rum.	Alcohol.	Whiskey.	Brandy.	Beer.	Wine.	Gin.	Rum.	Alcohol.	
1	5	2	2	6	5	2	2	6	Pharmaceutical purposes.
1	5	.....	.....	5	.....	.....	.....	5	.....	.....	5	.....	.....	.....
2	5	2	.....	1	.....	.....	.....	5	2	.....	1	.....	.....	.....
2	3	1	.....	1	.....	.....	.....	6	2	.....	2	.....	.....	.....
2	1	.....	.....	.....	1	.....	.....	2	.....	.....	.....	2	.....	.....
1	2	.....	4	.....	.....	.....	.....	2	.....	.....	4	.....	.....	.....
1	4	.....	10	.....	.....	.....	.....	4	.....	.....	10	.....	.....	.....
1	6	2	.....	2	.....	.....	.....	6	2	.....	2	.....	.....	.....
4	2	.....	5	.....	.....	.....	.....	8	.....	.....	20	.....	.....	.....
1	3	.....	15	.....	.....	.....	.....	3	.....	.....	15	.....	.....	.....
2	2	.....	.....	.....	.....	.....	5	2	.....	.....	.....	.....	.....	5
2	2	.....	25	.....	.....	.....	.....	4	.....	.....	56	.....	.....	.....
2	2	1	.....	1	.....	.....	.....	4	2	.....	2	.....	.....	.....
18	2	2	.....	.....	.....	.....	.....	36	36	.....	.....	.....	.....	.....
1	1	.....	5	.....	.....	.....	.....	1	.....	.....	5	.....	.....	.....
1	10	.....	15	.....	.....	.....	.....	10	.....	.....	15	.....	.....	.....
1	1	2	.....	2	.....	.....	.....	1	2	.....	.....	.....	.....	.....
10	1	.....	.....	1	.....	.....	.....	10	.....	.....	.....	.....	.....	.....
5	2	2	.....	2	.....	.....	.....	10	10	.....	10	.....	.....	.....
1	2	2	.....	1	.....	.....	.....	2	2	.....	.....	.....	.....	.....
18	2	.....	10	.....	.....	.....	.....	36	.....	.....	180	.....	.....	.....
17	1	1	.....	.....	.....	.....	.....	17	17	.....	.....	.....	.....	.....
2	1	.....	.....	2	.....	.....	.....	2	.....	.....	.....	.....	.....	.....
1	5	.....	10	.....	.....	.....	.....	5	.....	.....	10	.....	.....	.....
3	2	1	.....	.....	.....	.....	.....	6	3	.....	.....	.....	.....	.....
5	2	.....	.....	1	.....	.....	.....	10	.....	.....	5	.....	.....	.....
1	10	.....	15	.....	.....	2	.....	10	.....	.....	15	.....	2	.....
1	12	4	.....	4	.....	.....	.....	12	4	.....	4	.....	.....	.....
2	5	.....	.....	2	.....	.....	.....	10	.....	.....	4	.....	.....	.....
1	5	.....	.....	2	.....	.....	5	5	.....	.....	2	.....	.....	5
2	10	.....	.....	25	.....	.....	.....	20	.....	.....	50	.....	.....	.....
2	5	.....	.....	10	.....	.....	.....	10	.....	.....	20	.....	.....	.....
1	4	.....	30	.....	.....	.....	.....	4	.....	.....	30	.....	.....	.....
1	3	.....	.....	3	.....	.....	.....	3	.....	.....	3	.....	.....	.....
1	2	.....	32	.....	.....	.....	.....	2	.....	.....	32	.....	.....	.....
1	10	.....	.....	4	.....	.....	.....	10	.....	.....	4	.....	.....	.....
1	6	.....	20	.....	.....	.....	.....	6	.....	.....	20	.....	.....	.....
2	2	.....	.....	.....	.....	2	.....	4	.....	.....	.....	.....	4	.....
2	2	.....	20	.....	.....	.....	.....	4	.....	.....	40	.....	.....	.....
1	10	.....	.....	12	.....	.....	.....	10	.....	.....	12	.....	.....	.....
1	3	.....	.....	4	.....	.....	.....	3	.....	.....	4	.....	.....	.....
1	4	.....	.....	2	.....	.....	.....	4	.....	.....	2	.....	.....	.....
1	4	.....	27	.....	.....	.....	.....	4	.....	.....	27	.....	.....	.....
1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
2	5	1	.....	2	.....	.....	.....	10	2	.....	4	.....	.....	.....
1	2	.....	13	.....	.....	.....	.....	2	.....	.....	13	.....	.....	.....
2	4	.....	.....	3	.....	.....	.....	8	.....	.....	6	.....	.....	.....
1	5	5	.....	10	.....	.....	10	5	5	.....	10	.....	.....	10
1	2	.....	.....	.....	.....	.....	1	2	.....	.....	.....	.....	.....	1
1	1	.....	.....	2	.....	.....	.....	1	.....	.....	2	.....	.....	.....
2	2	.....	.....	9	.....	.....	.....	4	.....	.....	18	.....	.....	.....
2	1	5	.....	20	.....	.....	.....	5	.....	.....	20	.....	.....	.....
38	.....	1	.....	.....	.....	.....	.....	.....	38	.....	.....	.....	.....	.....
335	.....	2	.....	.....	.....	.....	.....	.....	670	.....	.....	.....	.....	.....
12	.....	3	.....	.....	.....	.....	.....	.....	38	.....	.....	.....	.....	.....
17	.....	4	.....	.....	.....	.....	.....	.....	68	.....	.....	.....	.....	.....
8	.....	5	.....	.....	.....	.....	.....	.....	40	.....	.....	.....	.....	.....
1	.....	10	.....	.....	.....	.....	.....	.....	10	.....	.....	.....	.....	.....
1	.....	20	.....	.....	.....	.....	.....	.....	20	.....	.....	.....	.....	.....
3	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....

RETURN of Special Permissions for the Importation of Intoxicating Liquors, &c.—*Con.*

No. of Permits.	Quantity in each kind of Permit.						Total Quantities.						Remarks.		
	Whiskey.	Brandy.	Beer.	Wine.	Gin.	Rum.	Alcohol.	Whiskey.	Brandy.	Beer.	Wine.	Gin.		Rum.	Alcohol.
1		2½							2½						
39		2½		2					78		78				
3		2½					2		6					6	
1		3		1			3		3		1			5	Pharmaceutical purposes.
2		1			1				2			2			
1		1	10	2					1	10	2				
1		2			2				2			2			
8		2	10						16	80					
1		2		4					2		4				
1		2	15						2	15					
1		1½					½		1½					½	
1		2	15	1					2	15	1				
1		1				1			1				1		
1		2	5						2	5					
1		4	14						4	14					
1		2	15	2					2	15	2				
7		3		2					21		14				
1		½		½					½		½				
1		1					4		1					4	
19		1		1					19		19				
2		4		2					8		4				
1		1		3					1		3				
2		2				2			4				4		
2		1		2					2		4				
1		3					5		3					5	
2		2		3					4		6				
1		3		3					3		3				
1		2	8						2	8					
1		2		1					2		1				
1		3				3			3				3		
1		2	10	2					2	10	2				
1		½					½		½					½	
1		2					1		2					1	
19			4							4					
13			15							285					
1			5							65					
1			6							6					
1			8							8					
50			10							500					
2			9							18					
3			14							42					
2			16							32					
13			20							260					
9			25							225					
6			32							192					
1			35							35					
2			36							72					
15			30							450					
2			64							128					
38				2							72				
8				1							8				
7				5							35				
4				3							12				
5				4							20				
2				8							16				
2				10							20				
1				½							½				
1				4½							4½				
2				1			2				2			4	

RETURN of Special Permissions for the Importation of Intoxicating Liquors, &c.—*Con.*

No. of Permit.	Quantities in each kind of Permit.							Total Quantities.							Remarks.
	Whiskey.	Brandy.	Beer.	Wine.	Gin.	Rum.	Alcohol.	Whiskey.	Brandy.	Beer.	Wine.	Gin.	Rum.	Alcohol.	
2				5			5				5			5	
4					1							4			
23					2							46			
2					5							10			
1					1½							1½			
45						2							90		
1						3							3		
1						4							4		
2						5							10		
1						1							1		
14						1							1		
1						1							1		
3						5							15		
1						3							3		
17						2							34		
5						10							50		
1			10	2	2					10	2	2			
1			20	2						20	2				
1			10			10				10			10		
1			25	6						25	6				
1			15	4						15	4				
1			30		2					30		2			
1			25	2						25	2				
1			15	3						15	3				
1	1	2		1				1	2		3				
1	2	2		5				2	2		5				
1	2			3				2			3				
1	10			10				10			10				
1	3	2					5	3	2					5	Pharmaceutical purposes.
1	5	1						5	1						
1	2		30	2				2		30	2				
1	2				1			2				1			
1	2	2	30					2	2	30					
1	2		18					2		18					
1		3			1				3			1			
1		5			2				5			2			
1		4			4				4			4			
9					2						18				Sacramental purposes.
2				100							200				do
2				4							8				do
1				11							11				do
1				3							3				do
1				1							1				do
2,457								3,744	1,249½	3,565	938	86	138	187½	

PART V.

FORRESTRY COMMISSION.

SUMMARY OF PRELIMINARY REPORT OF MR. J. H. MORGAN,

PREPARED by direction of the Minister of the Interior, for the information of His Excellency the Governor General in Council, upon the subject of the protection of the present forests of the Dominion, and the planting of forest trees upon an extensive scale.

Mr. Morgan prefaces his report by stating that he is deeply convinced of the necessity for a more specific and general investigation into the question involved; that the increasing and reckless waste of our forests, brought about as much by the destructive carelessness of individuals as by accidental fires, has not received that attention from the Governments of the Dominion and the several Provinces which the future will show to have been necessary. The inevitable consequences of future neglect in this matter, he predicts will be, among other climatic changes, drought, varied by sudden and destructive floods, and a deterioration in the quality of the soil; and he suggests that a joint commission should be appointed by the Governments of the Dominion and the several Provinces, to deal with the whole question.

As a most appropriate and ominously prophetic introduction to the subject of his report, Mr. Morgan quotes the following lines, which appeared in the *New York Sun* some months ago:—

“ A TREELESS COUNTRY.”

- “ I had a dream which was not all a dream !
 A great State was a desert, and the land
 Lay bare and lifeless under sun and storm,
 Treeless and shelterless. Spring came and went,
 And came, but brought no joys; but in its stead,
 The desolation of the ravening floods
 That leaped like wolves or wild cats from the hills,
 And spread destruction over fruitful farms,
 Devouring as they went the works of man,
 And sweeping seaward Nature's kindly soil
 To choke the water-courses, worse than waste.
- “ The forest trees that in the olden time —
 The people's glory and the poet's pride —
 Tempered the air and guarded well the earth,
 And under-spreading boughs for ages kept
 Great reservoirs to hold the snow and rain,
 From which the moisture through the teeming year
 Flowed equably and freely,—all were gone :
 Their priceless boles exchanged for petty cash,
 The cash that melted and had left no sign.
 The logger and the lumberman were dead ;
 The axe had rusted out for want of use ;
 But all the endless evil they had done
 Was manifested on the desert waste.
- “ Dead springs no longer sparkled in the sun ;
 Lost and forgotten brooks no longer laughed ;
 Deserted mills mourned all their moveless wheels ;
 The snow no longer covered, as with wool,
 Mountain and plain, but buried starving flocks
 In arctic drifts ; in rivers and canals
 The vessels rotted idly in the mud
 Until the spring floods buried all their bones.
 Great cities that had thriven wondrously,
 Before their source of thrift was swept away,
 Faded and perished as a plant will die
 With water banished from its roots and leaves ;
 And men sat starving in the treeless waste,
 Beside their treeless farms and empty marts,
 And wondered at the ways of Providence ! ”

Mr. Morgan points out that the absence of the data to aid in forming an estimate of the extent, condition and availability of our forests, surrounds the subject of their protection with no little difficulty.

The reckless and distinctive waste of the great forests of Canada and of the adjoining States, by fire and by the axeman, has long been looked upon with much alarm by the more thoughtful of both countries, and the rapidity with which the vast pine and spruce forests of Ontario and Quebec are being exhausted, has attracted public attention to the question in those Provinces, while commissioners from the United States, and from many of the individual States, have been sent to Europe to enquire into and report upon the protection, conservance and management of the forests in those countries which have the most matured systems.

In the United States the danger threatened by the destruction of the forests is so great that the attention of Congress was recently called to the matter in the Presidential Message, while the Secretary of the Interior says the rapidity with which that country is being stripped of its forests must alarm every thinking man, it being estimated, on good authority, that at the present rate of cutting, the supply of timber will, in less than twenty years, fall considerably short of the country's necessities.

In his address before the American Forestry Congress, at St. Paul, Minn., in August last, the Honourable George B. Loring, United States Commissioner of Agriculture, said the destruction of the pine and spruce timber supply was going on so rapidly that it would be necessary to allow the exhausted region to recuperate while the comparatively uncut sections were resorted to to meet the demands of the market. Recent investigations showed that the supply of pine in New Hampshire and Vermont was exhausted; that the supply of spruce in the former State would last but four years, and in the latter seven; in Maine pine would last four years, spruce fifteen years; in South Carolina, pine would last fifty years; in California, 150; Georgia, eighty; Louisiana, 100; North Carolina, fifty; Mississippi, 150; Alabama, ninety; Florida, thirty; Texas, 250; Wisconsin, twenty; Minnesota, ten; Michigan, ten; Arkansas, fifty years. Mr. Loring says there is no doubt that the exhausted forests in these States can be restored in time, and every means of cultivation and protection should be applied by the people and by the Governments, both State and Federal, each in accordance with its own jurisdiction.

Commenting on the above, Mr. Morgan points out that no allowance is made for destruction of forests by fire, nor is any reference made to the fact that lumbering in the Southern States has recently received an impetus which will add largely to the denudation of the land; that some of our Canadian lumbermen have been investing largely in timber lands in Arkansas and Louisiana, and are now actively engaged there in making and rafting timber, and that so soon as the railroads penetrate these hitherto untouched forests, the work of destruction there, similar to that which exhausted the supply in the older States, will, unless checked by wise legislation, very soon give cause for alarm. Many railroads are now being built expressly to get out the timber that could not otherwise be marketed, the direct effect of which is to hasten the destruction already going on too fast. While this extensive cutting will keep up the supply at the mills so long as there are forests from which the supply can be obtained, it is every day hastening the ruin that must inevitably follow, unless prompt and adequate measures are taken to meet future wants by judicious and extensive planting, and by effectual measures for protecting and economizing the remaining supply.

Should the effort now being made by the people of the Western States to have the import duties taken off lumber, prove successful, the rapid increase in the demand would cause an exhaustion in the Canadian supplies, which would, Mr. Morgan says, be fearful to contemplate.

Respecting the probable duration of the timber supply in Canada, under the present high pressure of cutting, Mr. Morgan does not attempt to fix any term in the absence of data to enable him to form an opinion. Alarmists place it at a very short period, while many think there is no apparent danger of scarcity of the

necessary supply. Mr. Phipps, quoting Mr. Little and other authorities, puts the duration of our supply, at the present rate of consumption, at ten years, and after alluding to statistics regarding Canadian forest fires, says: "We may well doubt whether we have five years' supply." This much, however, Mr. Morgan affirms: that while there is no immediate danger of wood becoming so scarce in the Dominion that we shall have to send abroad for any, yet at the rate at which our commerce and our industries are growing—the building and repairing of railroads, telegraph and telephone posts, all causing heavy drafts on our supply—we may well be alarmed about providing for our future wants.

In the past our forests have been our greatest source of wealth, the exports of lumber, since Confederation, amounting to the enormous sum of \$330,520,000, while the Provincial Governments, during the same period, have collected about \$11,000,000 in revenue on the product of the forests. This rich harvest cannot much longer be reaped, unless prompt measures are taken for the economic use, conservance and reproduction of our woods, which can only be accomplished by careful and competent supervision, by persons of reliable integrity, and thoroughly competent to perform this important duty.

With rigorous laws, vigilantly and fearlessly enforced, against trespass, waste, careless or wilful destruction, with a judicious management and proper and economic use, our present forests would last a long time, the young trees would mature, and the danger that seems so imminent be, to a great extent, provided against. It is a duty we owe to nature, to ourselves and to posterity, to remedy, as far as possible, the evils which reckless wastefulness has caused.

Fourteen years ago Dr. James Brown, the eminent forester, said:—"Were those vast forests properly dealt with, they could not fail to be a source of great revenue to the country, and contribute annually, for an unlimited time, as much timber as they do now; but unfortunately we find indiscriminate felling going on everywhere, and in time this must lead to the exhaustion of the best timber, and render these yet valuable forests comparatively of little consequence."

The timber interests of the Dominion being closely identified with those of the United States, Mr. Morgan cites authorities in support of the estimate of the probable duration of the supply in the great lumber-producing States on our border, as their supply will always exercise a marked influence on our lumber market; and when these competing markets are removed, and the price of lumber thereby greatly enhanced, the temptation to further denude our remaining forest lands will be greatly augmented.

Mr. Morgan next proceeds to point out that beyond the question of the loss of our timber supplies, the consequent reduction in the revenue, the inconvenience and expense of importing lumber from abroad for domestic use, there are other important interests involved in this matter, such as climatic changes, public health, agricultural prosperity, exposure to floods and torrents—in fact, our very existence as a great people—and quotes many instances in ancient, medieval and modern times, of the unfortunate results of the wholesale removal of entire forests, without any steps being taken for their reproduction, which has made of a territory larger than all Europe, the abundance of which once sustained a population scarcely inferior to that of the whole Christian world at the present day, a realm of desolation, withdrawn from human use, or at least only inhabited by tribes too few, poor and uncultivated to contribute anything to the general, moral or material interests of mankind.

In Canada we have many bleak and rugged hills that once were covered with valuable and beautiful trees. The early navigators of our rivers and lakes were charmed and surprised at the extent of the luxuriant forests that stretched without limit far away from the banks and shores, while to-day no forest remains to check the chilling sweep of the north-east gale as it travels up the valley of the great St. Lawrence, from its home among the icebergs.

The Honorable H. G. Joly, speaking of the Province of Quebec, says the old settlements there are painfully bare of trees, and that "there is a large district of good agricultural land, south of Montreal, where the scarcity of firewood, which is a

matter of life and death in a climate like ours, has compelled many a farmer to sacrifice a fine farm and leave the country."

This is, unfortunately, applicable to all the other Provinces. The scarcity and high price of fuel, the difficulty of obtaining fencing material to replace the worn out fences, together with short crops, often caused by absence of tree shelter in winter and of moisture in the summer, have caused the discouraged farmer to abandon what he unwittingly has impoverished.

Mr. Morgan then proceeds to describe the process by which the removal of the forests in many of the countries of the eastern hemisphere has brought desolation and disaster upon them. These lands, like the western part of this continent, were subject to periodical droughts—had their dry and wets seasons. The forests with which the hills and mountains were covered acted as reservoirs to hold, retain and economize the waters which the rainy season showered upon them. The soil in the forest is loose and spongy. The roots and rootlets are as so many pipes penetrating the earth, leading the water into the deeper soil; the heaps of leaves, the layers of brambles, the beds of moss, all combining to hold and retain the water, while the shade afforded by the foliage protects the ground from the parching rays of the sun, and prevents too sudden evaporation. The water thus retained percolates slowly through the ground to feed the numberless springs, creeks and rivers. Remove the forest; what follows? The plants that flourished 'neath its grateful shade all die, the moss withers, the parched leaves are blown away by the winds. Then comes the rainy season. Rain falls in torrents and washes down the sides of hill and mountain, carrying off the rich mould, the deposit of ages, the life of the land; overflowing the valleys, obstructing river channels, often destroying life and property.

We in Canada have had but a foretaste of danger, while our neighbours in the United States have suffered severely, the floods that desolated the Ohio valley, last spring, and caused such terrible destruction of life and property, being a forcible example of the evil results of stripping the hills and mountains of their leafy covering.

Is it not probable, Mr. Morgan warningly asks, that the causes which led to the disasters on the Ohio are now in action about the head waters of the Ottawa, and may not it be time to enquire, whether it is possible to avert the danger threatened by the overflowing of the Thames, Richelieu and other of our rivers?

Many parts of Europe, notably France, Hungary, Northern Italy, and some of the German states, suffer more than in former years from floods.

In a paper read before the Geographical Society of Vienna, in 1875, Herr Gustave Wex, Director of Government Works for the regulation of the flow of the Danube, affirms that in the last fifty years the decrease in the average level of the Rhine has been 24 inches, in the Vistula 26 inches, and in the Danube, at Orsova, 55 inches, and many manufactories have been compelled to substitute steam for their diminished water supply. The changes in the water level of these rivers is ascribed to the clearing away of the forests, especially in the mountainous districts, where inundations more frequently occur.

A commission appointed by the Royal Academy of Science of Vienna, the Imperial Academy of St. Petersburg, and other societies, to report on Herr Wex's statement, substantially confirmed it. The Commissioners say:—

"Forests exercise a beneficial influence, which cannot be estimated too highly, in an increased humidity of the air, a reduction of the extremes of temperature, a diminution of evaporation, and a more regular distribution of the rainfall; while in their destruction is seen the injurious effects of an alternation of periods of drought at one time and of destructive floods at another."

Referring to the climatic influence of forests, Mr. Morgan says experience will not sustain the claim of many theorists that they cause rainfall; on the contrary, they retain it, economize it and distribute it more regularly, causing a more equable temperature and more humid atmosphere. In corroboration of this, Mr. Morgan quotes Dr. Brandis, Superintendent-General of Forests in India, and Dr. J. C. Brown,

perhaps the most reliable of writers on the subject of forestry. The latter, in his work on "Forests and Moisture," says:—

"From what has been advanced, it appears to be established as a fact that there are cases in which an extensive destruction of forests has been followed by a marked desiccation of soil and aridity of climate, and some cases wherein the replanting of trees has been followed by a more complete restoration of humidity; or the planting of trees, where there were none, has been followed by a degree of humidity greatly in excess of what had been observed; that there are cases in which the rainfall within forests, or in their immediate vicinity, has been perceptibly greater than in the open country beyond, but that there are also cases in which it is alleged that the desiccation of some lands once clothed with forests, and fertile, now treeless and barren and dry, may be attributable, in part if not in whole, to other causes besides the destruction of the forests, and cases in which the extensive destruction of forests does not appear to have extensively affected the quantity of the rainfall over a wide expanse of country. * * * * * The effects of forests in retarding the flow of the rainfall after its precipitation has been established, I consider, beyond all question, and not less so their effect in maintaining a general humidity of atmosphere and soil."

Sir Richard Temple, Bart., in his work on "India in 1880," says that if forest tracts were distributed over the plains, there would be cool surfaces to attract the clouds, and arrest them on their way to the mountains, where they are condensed, and filling the torrents' beds with rain water, ultimately return to the plains in the shape of inundations.

Mr. Morgan combats the soundness of Sir Richard Temple's theory, so far as this continent is concerned. Abundant rain, he says, if the soil is good, will bring rich vegetation, but rich vegetation will not bring rain. The Mormons in Utah have succeeded in covering their hills and valleys with the richest kind of vegetation, but have not succeeded in increasing the rainfall. Last summer (1883) the people of Manitoba complained of long drought, but he never saw anything to surpass the richness of the vegetation in their wheat fields and meadows, when he visited them in the month of August, although rain had not fallen for over two months.

Professor Arnold Guyot, in a paper read before the National Academy of Science, says:—"Throughout the world those regions which possess rich vegetation receive abundant rain, while those that are denuded of vegetation are rainless. It is remarked, too, that those regions in India which ordinarily receive rain, but which have been parched by a long drought, are plagued afterwards with immoderate rain."

From his researches among the works of writers upon the subject, Mr. Morgan comes to the conclusion that the denudation of a country by stripping it of its woods, may bring upon it irreparable calamity; but that fire has been a greater foe, even than man, to the forests. Persia and other eastern and southern countries, now treeless and desolate, were subject to the same long periods of drouth from which every State on the west side of this continent, from Oregon to Chili, suffers, and at the close of a protracted dry season, vast tracts of timber would be swept away by forest fires, and with them the fortunes of the people of a whole Province.

The enormous losses entailed by the disastrous fires which have swept away many of the finest forests of America, have compelled careful attention to the subject, and necessitated the enactment of laws for the prevention of, and protection against, forest fires.

In Canada, up to the present time, fire has been the greatest enemy our forests have had to contend with. The Hon. H. G. Joly, in his "Report on the Forests of Canada," says:—"It is estimated by those who are competent to form an opinion on the subject, that more pine timber has been destroyed by fire than has been taken out and destroyed by the lumbermen. Not only is the ripe timber destroyed by fire, but all the young trees, too, upon whose growth we must depend for the re-stocking of our forests. It is not practicable, in our Canadian woods, to plant trees to take the place of those that are cut down."

"The difficulty of guarding against fire in such immense and distant forests as ours is enormous; and as for extinguishing it when once fairly started, the power of man cannot succeed. It will sweep onward as long as it can find food, leaping at one bound over such rivers as the great Ottawa and the Miramichi, and will only stop when brought to bay by large lakes, or when it reaches rocky or barren ground, with nothing to burn; it will riot for weeks, until starved for want of food or drowned under torrents of rain. * * * In France and Germany, where the science of forestry is brought to a high state of perfection; where the forests are much smaller than ours; divided and isolated one from another; kept as much as possible free from rubbish and dead timber and the light stuff that carries on the flames so rapidly; protected by stringent laws, strictly enforced for generations; watched over by large staffs of foresters; even there, disastrous fires are of frequent occurrence, and they call for such an effort to suppress them as is totally beyond our powers." Then follows a description of the methods employed in France to prevent the spread of fire, the most usual one being the *contre feu*—a method not unlike that practiced by hunters when overtaken by fires on our western prairies—started at one of the *coupe feus*, or safety strips, upon which no trees or shrubs are allowed to grow. The immensity of our forests, and their great distance from settlement, renders any such measures impracticable in Canada. There remains, then, but one hope for us, and that is in *prevention*.

Fires are started by settlers clearing their lands; by lumbermen, while driving their timber down the stream; by hunters and fishermen; by sparks from locomotives; by lightning; sometimes even by the violent rubbing of dead branches, one against another, in gales of wind; while a frequent cause of disastrous fires in the woods is the mode of clearing land now generally adopted by settlers.

Considerable diversity of opinion exists as to the quantity and value of timber annually destroyed by fire, but it is generally admitted that fire is a greater source of consumption than all others combined. Mr. Thistle, a surveyor and lumberman of long experience, puts the quantity destroyed by fire at ten times that used in the manufacture of lumber. Mr. Stewart Thayne, in his evidence before a Committee of the House of Commons, places the annual loss in the Ottawa Valley alone at \$5,000,000. In view of such testimony as to the enormous loss the country sustains through forest fires, Mr. Morgan wonders that steps have not been taken before now to organize a forest corps, whose duty it would be to prepare our nearest forests with fire-strips, regardless of the cost, which in no case could reach a fifth of the estimated annual loss.

In 1880, Dr. Franklin B. Hough, for several years chief of the Forestry Branch of the Agricultural Department at Washington, issued circulars to correspondents in the several States and Territories, with a view to ascertaining the extent of injuries caused by forest fires, the causes, and the methods employed for preventing and arresting fires, and inviting suggestions respecting means for preventing the recurrence of these calamities. One correspondent's suggestion is as follows:—"Open the eyes of the people to the danger, the immense destruction of property, the rapidly shrinking streams, the increase and duration of drought, the blighting of landscape, and the general climatic effect. This can be done by national publications fitted for the common people, not by documentary reports. Force these upon the attention of all, by tracts or placards, in the places of summer resort, in lumbering camps, in all centres of population adjacent to the forests." Another says:—"By stringent National and State laws, fastening responsibility upon careless guides and tourists, and also upon those who are clearing land. When a man wishes to burn a fallow piece, he should girdle it with a swathe. Responsible men who would not think of endangering their neighbours' houses with a bonfire in their gardens, think nothing of letting loose their fallow fires into adjoining timber." A detailed summary of the causes of fires, shows that about 70 per cent. are attributable to carelessness, the greater part being avoidable, if not in the starting of the fires, to a great degree in the provision that might be made for their suppression. Respecting the estimate of damage from forest fires, Dr. Hough considers any attempt through any existing agency to obtain a

numerical summary of the annual destruction, would be liable to great error; but his compilation of facts goes to show how general, all through the States and Territories, is the destruction of the remaining wood lands of the whole country which is still going on.

Mr. Morgan now proceeds to deal with the question of the organization of a system of forest management, the immediate necessity of which, he says, cannot be doubted; and he gives a very interesting account of what has been done, and is now being done, by other countries in this direction.

Germany, France, Austria and Italy, all have very mature systems. They long ago realized their danger, and adopted systems of forest management, and have never ceased in the efforts to improve them. They enacted codes and statutes for the protection of their wood lands, and established schools and colleges for teaching practical and scientific forestry. France, appreciating the great benefits resulting to herself from the improved system, extended it to her African colonies.

Russia, although 42½ per cent. of her land is covered with trees, has, nevertheless, established schools for teaching forestry in all its branches, and exacted laws for the protection of her enormous forest domain. In Russia there are 762 large Government forestry stations, under the general charge of an equal number of educated directors, most of whom are college graduates who have taken lessons in the forestry schools. The forests contain 300,000,000 acres, and are divided into 21,502 named forests, which are under the 762 directors. A part of these Government forests, in the north, are of native growth, but all of the central and southern provinces have immense plantations of trees, in some places almost exclusively of Scotch pine, in others, of oak, birch, basswood, elm, &c. In the steppes the planting has been done with the main idea of modifying the climate, and new stations are now being organized in portions where the present rainfall is only 6 inches per annum, while even drifting sands are being planted with Caspian willow, to be followed, so soon as the surface is covered, with Riga pine.

The history of Schools of Forestry in Germany goes back more than a century, and the nine establishments at present in operation there are the best endowed and, in some respects, the best managed to be found.

In all the principal countries of continental Europe the wood lands belonging to the Government, to local municipalities and public institutions, are under the care of a special branch of administration, which not only looks after their management, to prevent injury or waste, but has for its special duty the restoration of forests when cut at maturity or at appointed times. This management necessitates a well organized staff of properly qualified agents. These agents have all been educated at the Forestry Schools, and entering the Forestry service in a subordinate grade, may rise to the more important positions. Many foreign students, mostly English, attend these schools.

One of the oldest and best Schools of Forestry in Europe is at Nancy, in France. Free instruction is given to those preparing for the State Forest service, the importance of which may be inferred from the fact that the State forests cover about 3,000,000 acres of land, while the gross revenue derived from them is about \$7,000,000, or, deducting expenditure, a net annual revenue of about \$5,000,000.

In Spain, Portugal, Denmark and Norway, the Forestry Schools are mostly carried on in connection with Schools of Agriculture. In Sweden, although over 40 per cent. of the country is covered with valuable forests, a system of forest education has been established on a very liberal scale.

In India steps are being taken to organize a system of Forest Schools. Owing to the dense population, who from time immemorial enjoyed rights of usage in cultivation and pasturage wholly inconsistent with successful forest culture, whose ancient prejudices had to be respected, abuses conciliated and overcome, the Government at the outset was surrounded with difficulties apparently insurmountable. These difficulties have been overcome, and the improvident destruction which has been going on for ages at length arrested. A Forestry Department has been established, and the Government has sent students at the expense of the State, to France and Ger-

many, to perfect themselves in the most approved systems of Forestry. There are now 60,000,000 acres of forest land under the supervision and control of the Department, with a net annual revenue of over \$1,250,000, which will be greatly increased so soon as outlays for surveys and plantations, essential in the first stages of the work, are lessened.

In South Australia, for many years, the woods and forests had been under the control of a board of supervisors, but recently their management has been transferred to a department under the Commissioner of Crown Lands. At the end of last year there were nineteen forest reserves in a most satisfactory and prosperous condition, comprising an aggregate area of 239,336 acres. In fact, remarks Mr. Morgan, in the matter of forest conservancy, South Australia displays the most systematic and rapid progress of any portion of Her Majesty's dominions. Farmers and land-owners in that colony, encouraged by the excellent example of the Government, are giving much attention to tree culture, which, it is believed, they will find a profitable investment. The other Australian colonies are also turning their attention to the conservancy and protection of their forests.

The physical history of every country proves that a reasonable extent of forest promotes, in a high degree, both its agricultural and its manufacturing interests, as well as the productive resources of the country at large; and the beneficial influence of the forests in a physical, economical and healthful aspect, is now receiving more of that attention which its importance deserves. The question as to what proportion of the country should be occupied by trees is then treated very exhaustively, statistics being given of the estimated forest area in a number of countries, and extracts from a lecture by Professor Tyndall, upon the result of experiments made by that gentleman on the subject of radiation in connection with the temperature of the earth.

Referring to the vast area of prairie lands in our North-West, whereon there is little or no timber, Mr. Morgan says:—"The climate of this vast territory is one of the healthiest in the world, but it is very dry, and ought, therefore, to have a large proportion of its area in woods. Woods would have a most beneficial and ameliorating effect on the climate. They would temper the cold winds of the spring and retard the autumnal frosts. It is a well established fact that the atmosphere of the woods in summer is much cooler, as well as moister, during the day, than in open field, and that the reverse is the case during the night. So soon as the sun's rays leave the surface of the earth it chills very rapidly, and often, in a dry climate, while the air at, say 5 feet from the ground, is moderately warm, the temperature of the earth is chilled by radiation, and often goes below the freezing point, while the air, at an elevation of 5 or 6 feet, is several degrees warmer. The presence of woods would often avert these early frosts, more especially if the woods occupied the higher grounds. The moist, warm air from the woods would spread out over the fields after the sun had gone down, and act as a protecting mantle to the unripe crops, and become the means of averting what otherwise would be an almost certain danger. The drier the atmosphere the more liable are we to refrigeration of the earth's surface; consequently, the greater and the more imperative the necessity for planting forest trees in our North-West."

Of the great necessity of tree planting on our prairies there can be no practical doubt, fuel and shelter being among the first wants of the settlers.

In respect to the contention of some scientists, that the character of the soil of some of the high plains is such that trees will not grow thereon, he cites, in refutation, the experience of the pioneers of the adjoining Territories and States, which affords promise of unquestionable success.

From the Geological Survey Report for 1875, Mr. Morgan quotes Dr. Bell's remarks on the relations of the different classes of soils to the wooded and open areas of the country, to show that the timber is found in those parts where the soil has a capacity for receiving and retaining moisture, while those parts which are dry and the soil sandy and gravelly, are, as a rule, bare of timber.

One of the greatest barriers to the success of arboriculture on our prairies is want of moisture. So soon, however, as the land becomes broken up, the rains will

penetrate and remain in the soil to a much greater extent than at present. In Nebraska and Dakota millions of trees have been planted, and there are now to be seen magnificent groves of trees where, ten years ago, there was nothing but dreary waste. In Minnesota there is a Mennonite settlement where, in seven years from the turning of the first sod, the settlers were enjoying the shade of large groves of trees which they had planted. Similar instances are also found in Iowa.

Ex-Governor Furness, of Nebraska, in a report to the United States Commissioner of Agriculture, in 1882, gives an interesting account of what has been done in that State in the direction of forest protection and tree planting, and in converting a naturally timberless portion of country into a timber-growing region. Reliable official statistics, covering a period of twenty-eight years, show there have been planted within the State of Nebraska no less than 244,356 acres of forest trees, while it is estimated that since precautions have been taken against fire, the spontaneous indigenous growth is equal to one-half that area. Governor Furness says too much importance cannot be attached to spontaneous timber growing; that nature is, in this respect, both accommodating and bounteous, the only care required from man being to guard against fire.

Railroad companies in the neighbouring States are so alive to the importance of this question that they place belts of trees along their roads for the purpose of shelter from snowdrifts, as well as to provide for future supplies of cross-ties and sleepers for repairs and extensions of their tracks, the Northern Pacific Railway alone having, in 1882, expended over \$70,000 in tree planting.

Reports of F. P. Baker and Professor F. B. Hough are quoted in support of the theory that, at no very remote period, these high plains were covered with forests, their disappearance having been caused by the destructive summer fires.

Mr. J. F. Mott writes in the Iowa Horticultural Report of 1872 on the subject of blizzards:—"More people have been frozen to death within the last year in North-west Iowa and West Minnesota than ever were murdered by Indians in those counties since their settlement. * * * The people are now petitioning their Legislature for some kind of protection from these storms, asking that fences and storm houses be built along the travelled roads—asking them to do something for their safety. I see nothing that would do but tree planting. It alone would do to stop these terrible winds, modify the climate, and furnish landmarks to the traveller."

Mr. Stewart Thayne, previously quoted, says there is only one method,—and that, tree planting—to ameliorate a climate presenting such sudden contrasts of temperature as are experienced in our North-West; and, that on the solution of this question, depends whether that region will realize the sanguine expectations entertained of its being able to support an immense population, or whether, after many sore disappointments, it will deserve the name of the "Lone Land."

The work to be done is one of great magnitude, in which the Government, the railroads, the land companies and the people must all take a share. The Government should, however, take the initiative, the first and most essential step being the establishment of experimental forestry stations at several points in Manitoba and the North-West Territories. The aim of these stations would be to furnish a scientific as well as practical foundation for a rational management of the forests, to examine the advantages which one method may have over another, and to establish an economical and profitable system of forest administration. Mr. Morgan thinks immediate steps should be taken towards the establishment of these experimental stations, which would be of great benefit to us, and solve many of the problems that otherwise might lead to failure. From these stations could be learned what trees could be grown; their adaptability to the soil; a study could be made of the animal and vegetable foes of trees, and of the means to combat them; while reliable tables of increase could be acquired, as well as practical methods for valuing forests. They could also be used as nurseries for raising and supplying young trees to settlers, and as meteorological stations. Various suggestions are then given as to the selection of sites for these stations, the preparation of land for the planting of shelter belts around

them, the preparation of the soil for the planting of the young trees, and for directing the progress of the work at the different stations when in operation.

Germany, where the system of experimental stations originated, expends upon them annually about \$80,000, while Austria, Switzerland, Spain and Russia are all following the example of Germany in this matter.

Professor Lene, Secretary of the Ohio Forestry Association, says the great need of forestal experimental stations in the United States and the Dominion and Provinces of Canada has long been felt. Our climate, the nature of our forest trees, the want of State forests and of trained foresters, render the adoption of the German plan inexpedient, and demand a plan adapted to our peculiar circumstances. Such a plan was laid before the American Forestry Congress, at its last meeting, at St. Paul, Minn., and was heartily endorsed by the Congress, and a committee appointed to recommend its adoption to the several States of the Union, and to the Dominion and Provinces of Canada.

Professor J. L. Budd, of the Iowa State University, Horticultural Chair, reports of a recent visit to Russia, that he found there, in latitudes and climates similar to the great American North-West, a state of horticulture and arboriculture that was very remarkable, and calculated to inspire us with the hope of seeing the "Great Lone Land" transformed not only into wheat fields, but into a land of groves, woods and orchards.

Having shown that the denuding of the country of its trees causes an abnormal condition of the rivers and streams, Mr. Morgan proceeds to enquire whether the re-foresting of a fair proportion of the plains would not cause a change in the level of the waters of the Red River, the Saskatchewan, Assiniboine and other rivers now subject to extremes of high and low water, and thinks it may reasonably be presumed that if their banks and the neighboring hills were clad with trees, whose foliage would protect the earth from the sun's rays and from the hot winds, the mosses and porous earth would hold and store the water till it found its way gradually to the rivers, preventing floods, causing a more regular water level, prolonging the season of navigation, and contributing largely to the prosperity of the country.

The work of desiccation is still advancing. Dr. Selwyn, in the Geological Survey Report of 1873-74, says:—"The lakes and lake basins are abundant. They appear to be gradually diminishing in size and drying up." On the other hand, in Utah, the Great Salt Lake, under the influence of the groves, orchards and other plantations set out by the Mormons, and which now throw a grateful shade on the surrounding hills, has increased in magnitude, while many of the minor lakes and some of the rivers have increased their volume of water and are not now so subject to extremes of high and low level.

Before the American Forestry Congress, in 1882, Mr. Emile Roth gave an interesting address on the influence of the absence of trees on the rivers of the prairies, illustrating his remarks by statements as to the present condition of the Upper Mississippi and its tributaries, their loss of water supply, decreased water power, frequent inundations, uncertain navigation, causing abrupt changes of temperature at all seasons of the year, and late frosts in the spring. Speaking of Arizona, Mr. Roth says:—"The hills and slopes were once stocked with timber, which was wasted by the inhabitants, whereafter the same deterioration of the country gradually took place which we notice in Palestine, Greece and Sicily, and finally the people had to emigrate to avoid starvation."

In concluding his report, Mr. Morgan says it is not too late to repair much of the damage that has been done by the destruction of our forests. Regulations for the use of the timber might be made without injury to the legitimate lumber trade, and the replanting and establishment of artificial forests may undoubtedly be made profitable for private as well as public enterprise. The forests of Manitoba and the North-West, now being slashed and wasted with great recklessness, should be kept as permanent reserves, to supply the wants of settlers, the mature trees only being cut down. Millions of fine young trees are now being cut down, and their branches left to litter the ground, acting as conductors for the prairie fires. All our present forest

land should be carefully surveyed, laid out in districts and charted, and the character and profile of the land described. Timber experts or competent wood rangers should be sent to examine, appraise and report on their value and availability. Enough has been shown, Mr. Morgan believes, to make it evident that it is the duty of the Government to adopt immediate measures to arrest the further destruction of our remaining forests, except under some very improved system of supervision; to replant, where practicable, the high lands formerly covered with forest trees, and to adopt some system of forest plantation for the great prairie region in our North-West. Of the great necessity for this there is no doubt; of the probability of success there can be none. The chief forester of the Northern Pacific Railway says:—"The fact that within the last ten years hundreds of groves, containing millions of healthy, vigorous young trees, are now growing far out in the treeless region, where science had preordained and deemed the work an impossibility, must be acknowledged. The fact that young groves of forest trees are now being successfully grown on the line of the Northern Pacific Railway, away out and beyond the 100th Meridian, has also got to be admitted, science and its votaries to the contrary notwithstanding."

In most of the States the failure of laws (whether for protection of forests or encouragement of arboriculture) to attain the desired result has been not so much the fault of the laws as the absence of persons to see that they were properly enforced.

In any system that may be adopted by Canada, special care should be taken to make provision for the fullest enforcement of the laws. By this means only can we expect to see our remaining forests protected from utter destruction, new ones produced, and our prairie country beautified with groves and plantations. Almost all the civilized nations of the old world long ago realized the danger that their improvidence and carelessness had caused, and have taken the most thorough and systematic steps towards the protection and reproduction of the forests, and in this have shown a striking contrast to the wastefulness and neglect that have characterized the conduct of those who have had control of the great forests of America. If we would keep up with the march of progress and civilization of our time, if we would do our duty to the noble heritage with which God has endowed us, we must no longer defer a work which is of such paramount importance and so absolutely essential to our prosperity as a people.

The Government of the Dominion should, without loss of time, appoint a Forest Commission to co-operate with a similar commission from every Province in the Dominion, to deal with this all-important question of the protection of the old and the reproduction of new forests.

Appended to the report are the various Acts passed in the United States and in the Provinces of Ontario, Quebec and New Brunswick, for the protection and growing of timber and brief summaries of the principal forest fires of which there are records.

PART VI.

REPORT OF THE DEPUTY HEAD UPON HIS VISIT TO THE
NORTH-WEST.

SIR,—I have the honour to submit the following observations upon the visit which I paid, in accordance with your instructions, to the Province of Manitoba and the North-West Territories during last summer.

OTTAWA TO WINNIPEG.

I left Ottawa on the 3rd June, taking the Canadian Pacific route *via* Collingwood and Port Arthur. Much has been said and written of the line of steamers placed upon the lakes last season by the Canadian Pacific Railway Company, and of the comforts and conveniences of travelling by the line of communication of which they form a part. It is, however, as a means of conveying intending settlers that the establishment of this route is of greatest importance. The disadvantage to this country of being compelled to send immigrants, intending to settle on the public lands in the North-West, through the United States, has for years been evident.

Those people had of necessity to pass for a considerable proportion of their journey through those sections of the Northern and North-Western States which have been competing most keenly with Canada for European immigration. They were continually and too often successfully beset by the agents of the very railway companies over whose lines they were passing, and not only had presented to them the alleged superior attractions of the United States as a field for settlement, but were given the most doleful accounts of the sufferings and privations which they might expect to have to undergo if they persisted in their intention to settle on the Canadian side of the 49th parallel. It is scarcely necessary to say that the evidences of prosperity to be witnessed in many places, from the time they crossed the Canadian frontier on the east, until they reached it again at Emerson, did much to give an appearance of truth to at least part of these representations. Canada and the United States cannot be on a footing of perfect equality in regard even to immigration promoted by our own agents, until that part of the Canadian Pacific Railway north of Lake Superior has been completed, and the journey to Winnipeg can be made at all times of the year through Canadian territory. The Lake Route will always continue to be a favourite during the summer months, especially so long as the standard is maintained in regard to meals, berths and the general cleanliness and ventilation of the apartments, which I witnessed on the Canadian Pacific system.

I cannot speak too highly of the attention and kindness shown by the officials of the Canadian Pacific Railway to passengers of all classes, particularly to those who were strangers to the country, and were, therefore, most in need of assistance and guidance. The journey from the seaboard to the prairies of the West is a long, and, at best, a somewhat exhausting one; but with the clean and comfortable sleeping cars furnished by the railway company at Port Arthur and, I believe, elsewhere over their lines, and the facilities afforded for cooking, it is difficult to conceive that an equal distance could be travelled anywhere else in the world with more comfort and at such small cost. I say also for the Government Officials in the North-West, and for the people in that section generally, that they are unremitting in their attentions to the incoming settler, and spare neither time nor trouble in assisting him to select a suitable farm for himself, or, if he be not a farmer, then such available employment as he may be in quest of. The plan of engaging guides, to conduct strangers to where they are likely to find the best lands, has worked admirably, although it has occasionally been abused.

The appearance of the country from Port Arthur, through what had become popularly known as the "disputed territory," is not very inviting. This section is chiefly valuable from the proximity of its timber (which is of a poor class, and of comparatively limited area) to the Winnipeg market. Along the line of the railway much damage has been done, and the prospect rendered very much more dreary by

extensive bush fires. If the effect of this upon the mind of the traveller be a little depressing for the time being, he must certainly experience a powerful reaction when he reaches the Valley of the Red River, where he is surrounded upon every hand by evidences of the fertility of the soil. Unfortunately, this effect is somewhat marred by the fact that much of the land within sight of the railway has fallen into the hands of people who have not, so far, brought it under cultivation; and its agricultural capacities can, therefore, only be judged by the richness of the soil and the luxuriance of the native grasses. It is to be feared that private owners are holding their properties at excessively high prices. Otherwise, it is not to be supposed that so extensive an area, along the line east of Winnipeg, and in the immediate vicinity of that city itself, would still be lying waste instead of yielding the abundant crops which such wonderful soil is capable of producing. The consequence is that Winnipeg, with a population variously estimated at from 20,000 to 30,000, and the centre of one of the richest agricultural districts in the world, is poorly supplied with the products of the farm, which ought to be purchaseable in great abundance and at low prices, but are, as a matter of fact, both scarce and dear. If the properties in question were to be acquired at reasonable prices, they would be taken up by experienced agriculturists, dairy farmers and market gardeners, possessed of some capital, to whom the immediate neighbourhood of a profitable local and export market would prove a greater attraction than even the liberal conditions upon which free homestead grants are to be obtained from the Government further west. I believe a strong effort was made during last summer, by a number of the proprietors, to dispose of their lands in this way, but with what success I am not aware. I am afraid that the selfishness of a few who decline to enter into any general arrangement, hoping that by holding out they would eventually profit by the sacrifices of their neighbours, retarded seriously the completion of the scheme.

THE CITY OF WINNIPEG.

So much information has been published respecting the progress of Winnipeg in the last few years, its handsome stores and residences, its elegant churches, its streets lighted by electricity, its street car and railway accommodation, that anything more than a mere passing notice is unnecessary in a report of this description: There is little in the appearance of Winnipeg to suggest, what is the fact, that it is but the growth of a few years, except the state of the streets and the comparatively inefficient sewerage. These defects are not the result of want of interest or energy or enterprise on the part of the citizens, but arise solely from the natural conditions appertaining to the site. Good streets and effective sewerage can only be produced at very great cost, and no doubt both will be provided as soon as consistent with the revenues of the corporation. So far as business is concerned, I should judge that it is as active as is compatible with commercial healthiness and the extent of country and the population for which it is a distributing point. Some of the more expensive residences erected during the days of inflation do not readily find tenants, but there is still a demand for good houses in Winnipeg fully in excess of the supply, and rentals are accordingly high.

The dwellings of the artizan and labouring population would appear to be well constructed, convenient and comfortable. If regard be had to the hurry with which most of them were erected, it is surprising that they are so good. As to the people themselves, they have every appearance of being in good circumstances and contented.

There is but one question relating to lands under the jurisdiction of the Minister of the Interior, in the Winnipeg district, which has not been settled—the disposal of the claims of certain persons to have patented to them, in equal shares, a lot known as St. Boniface Common. The validity of those claims has been admitted in principle for several years; but the difficulty which at first presented itself, as to the whereabouts of some of the claimants, has not yet been overcome, and it has not therefore been possible to issue the patents. Upon this subject, and in accordance with your

instructions, I had a conference with His Grace the Archbishop of St. Boniface, who has taken a great deal of interest in the case, and it is to be hoped that with his assistance an early solution of the difficulty at present existing may be found.

THE PRICE OF FUEL.

Through the encouragement offered by the Government to those having the necessary capital and experience, the coal areas of the North-West are being rapidly developed, and the price of fuel in the Winnipeg market, already reduced by an enormous percentage, will, in the course of a very short time, be as low as in almost any city in the Dominion of Canada. The Saskatchewan Coal Company, which operates the mine in the vicinity of Medicine Hat, continues to produce what proves to be excellent domestic coal, the output for the four months ending the 15th ultimo—all of which has been sold—being 6,000 tons.

The North-Western Coal and Navigation Company commenced work on the coal seam on Belly River in the autumn of 1882. They had previously tested the seams both at Blackfoot Crossing (Crowfoot), and at Grassy Island, on the Bow River, and at points on the Belly River, and finally selected the Lethbridge location, from the superior quality of the coal. The company built a steam saw mill on the Porcupine Hills in 1882, and the same winter constructed the hull of a steamboat at the mines, and a number of barges. In the summer of 1883 the steamboat was floated down to Medicine Hat and her machinery put in. A small quantity of coal was also floated down by barge, but the season was too far advanced for any extensive work. In the winter of 1883-84, the company built two additional steamboats at Medicine Hat, and prepared a fleet of barges with a carrying capacity of upwards of 3,000 tons. But the navigation failed on the 28th June, and the total quantity delivered by water was about 3,000 tons—which was taken by the Canadian Pacific Railway—and reported on as excellent in every respect. The total output at the mines last summer was from 8,000 to 9,000 tons, of which 3,000 was sold to the Canadian Pacific Railway, 1,000 consumed by the company's steamboats, and the remainder is being supplied to the Government Stations at Calgary, and MacLeod, as well as to the resident population. The coal has been analysed by the School of Mines in London, with the following results:—

Carbon.....	64.30	per cent.
Hydrogen.....	4.21	"
Nitrogen }	17.25	"
Oxygen }	0.69	"
Sulphur.....	6.20	"
Ash.....	7.35	"
Water.....		
	100.00	

"The proportion of water," says the analyst, Mr. Richard Smith, "would indicate that the coal approximates to the lignite class of coal, and by some would be classified under that head. In its physical characters it corresponds to some varieties of bituminous coals; and in this country (England) would probably be called a non-caking bituminous coal, similar to those which occur in Staffordshire."

The daily output of the mine, up to its close for the season, was 175 tons per day. The workings have been so arranged that the output can at once be raised to 250 tons per diem, with an indefinite increase, as the demand may require. In consequence of the unreliability of the navigation of the South Saskatchewan for such a heavy class of freight, the company are now constructing a narrow gauge railway from the Lethbridge colliery to Dunmore, on the Canadian Pacific Railway, a distance of 107 miles. The work is under contract, the rails and rolling stock already purchased, and the grading commenced.

There can be no doubt, therefore, that not only in Winnipeg, but in all the important towns along the Canadian Pacific Railway, the question of a plentiful and cheap supply of fuel, the absence of which was at one time thought to be a great drawback to the successful settlement of the North-West, has been finally placed beyond the region of speculation and calculation, and has been settled in the most satisfactory and practical fashion. But a comparatively short time ago the coal market at Winnipeg and the whole Province of Manitoba was controlled by one firm of Pennsylvania coal owners, and for years the price was enormously high. The competition from the West is now becoming serious, with the prospect that next year it will be much more so, and this has had an appreciable effect upon the actual cost of the fuel of almost every householder in the Province.

No progress would appear to have been made in the development of the semi-anthracite discovered last year on the Devil's Head Creek, in the Rocky Mountains. This is but a question of time, and meanwhile the necessities of the population are sufficiently provided for from the high grade lignite (some of it equal to the best Pennsylvania bituminous coal) discovered further east.

STATE OF THE DEPARTMENTAL OUTSIDE SERVICE.

I devoted a week to making a thorough examination of the office of the Commissioner and Land Board, and found the business in a very satisfactory condition. A great deal of Mr. Walsh's time is devoted to interviews with settlers and intending settlers, whom I found disposed to acknowledge his uniform patience and courtesy in dealing with them. It follows, as a natural consequence, that a large proportion of the actual office work of the Board has to be performed in extra official hours, and the duties of the Commissioner and the Land Board continue to be very laborious. When I was in Winnipeg Mr. William Pearce, who, until then, had been Inspector of Dominion Lands Agencies, assumed his new office of Superintendent of Mines, continuing a member of the Land Board; and Mr. H. H. Smith, Mr. Pearce's successor as Inspector of Agencies, also entered upon the duties of his office, which he has since discharged with marked efficiency. The Dominion Lands service in Manitoba and the North-West is now upon a thoroughly efficient footing. The business of each of the Agencies is promptly disposed of, and the officials, so far as I was able to learn, are all capable and courteous, doing their best in every instance to assist those who may visit their several districts with a view to settlement on the public lands.

I had the pleasure, while in Winnipeg and elsewhere in the North-West, to meet a large number of people, and I am glad to be able to report that, with the amendments made to the Dominion Lands Act last Session, the Land Laws are now admitted to be as good as laws of the kind can well be.

The dissatisfaction which at one time existed concerning the reservation of the One-Mile Belt, has completely disappeared. The majority of the original squatters within the belt were the paid servants of town site speculators. The object of these speculators was defeated, to a very large extent, by the policy of the Government in reserving the belt; but in any case they would probably have defeated themselves, for it has been found, as a matter of experience, that the hiring of squatters at from \$40 to \$60 a month and rations, even if they acted according to agreement and divided the spoils with their employers, is not a paying investment. The opening of the belt upon conditions of actual settlement and cultivation has had the effect of securing, in the immediate vicinity of the railway, a very good class of settlers, and the lands have been in considerable demand during the past season.

THE ROCKY MOUNTAIN REGION—TIMBER RESOURCES.

After spending a week in Winnipeg, I started for the Rocky Mountains, accompanied by Mr. Walsh, the Commissioner, and Mr. Pearce, the Superintendent of Mines. We went together as far as the end of the railway track, where we spent the

greater part of two days examining, as far as it was possible to do so, the timber resources of the country adjacent to the line on the British Columbia side. I was so much impressed with the importance of these that, with your authority, I took immediate steps to secure the services of a competent and experienced lumberman, who has since been engaged in exploring and reporting upon timber within the railway belt, between the summit of the Rocky Mountains and the summit of the Golden Range. This work is in progress at the present time, but the reports received from the explorer indicate a greater quantity and a better class of timber than had been anticipated. Indeed, until the opening up, by the construction of the Canadian Pacific Railway, of this part of the Province of British Columbia, it was practically unknown land. That it will be valuable almost solely on account of its timber and minerals is now almost certain.

THE PRECIOUS METALS IN THE RAILWAY BELT.

Shortly after my arrival at the summit, I found that some time previously the Provincial Gold Commissioner of the Kootenay District had given public intimation that the Government of British Columbia claimed all the timber and minerals within the railway belt, and contended that only for agricultural purposes did the public lands in this belt become the property of the Dominion Government under the Act of Settlement. The claim of the Provincial authorities to the timber had been abandoned before my visit; but the official before alluded to had received specific instructions from his Government that they owned the minerals, and he had actually accepted, from a large number of miners, applications for mining locations, with the requisite fee, and granted them certificates, which he represented gave them the privileges of free miners, without which they could neither mine nor prospect in the belt. I thought this matter of such public importance that I took the earliest opportunity of telegraphing the facts to the Acting Minister; and in the meantime informed all whom it might concern that the Government of Canada had acquired the lands embraced within an area of twenty miles on each side of the Canadian Pacific Railway, from the Government of British Columbia, absolutely, and without the reservation of timber, minerals or any other rights or privileges whatever. It is important, in my opinion, that this conflict of jurisdiction should be settled at the earliest possible moment; otherwise great confusion will result, to the damage of the mining interest of the Rocky Mountain region.

THE MINING REGULATIONS.

On my way westward I had arranged for meetings, on the the return journey, with the miners at Silver City and Calgary. In the course of the interviews which followed, I learned from them that there were some provisions of the mining regulations to which they took exception, and all the points involved were fully discussed between us. They submitted, in the first place, that the two years provided for by clauses five and eight, within which the regulations require that a miner should purchase and pay for his mining location, would be insufficient to enable a discoverer to dispose of his location in the best market. It was shown that the prospecting season in the Rocky Mountains is practically confined to the months of June, July, August and September. Very little is yet known of the mineral deposits of the Mountains, but it seems, beyond doubt, that within the region adjacent to the railway, on this side of the summit, and within the greater portion of the mineral country beyond, which will fall within the jurisdiction of the Dominion Government, there will be comparatively few placer mines. Should the mineral resources of these regions prove to be valuable, the expenditure of large sums for labour and machinery will be necessary to their development. The value of a placer mine may be ascertained and its resources worked at comparatively little expense, and, therefore, not much time need be spent in preliminary arrangements. It is quite otherwise with quartz mining. After discovery specimens of the ore have to be obtained and assayed. If,

on being assayed, these specimens prove productive, the first business of the discoverer is to procure the interest and co operation of persons or companies, usually to be found in the great financial centres, who may be looking for investments in such enterprises. These people are naturally not content with satisfying themselves as to the value of the specimens; they send their own experts to the place where these specimens are said to have been discovered, for in this way only can investors secure themselves against the risk of fraud. These various proceedings take time; and in view of all the facts, I regard the objection to this feature of the regulations as well taken, and have recommended to your favourable consideration that the period be extended to five years. This would entirely meet the views of the miners, who admit that their own interests, as well as the interests of the public, demand that some definite period should be fixed within which they should be required either to purchase their claims or abandon them. Of course it would be necessary, in the interval between the date of the record of discovery in the Local Land office and the date of actual purchase, that they should annually renew their location receipts, paying therefor the regulation fee of \$5.

The second exception taken by the miners was to the provision that the boundary lines of mining claims should be due north and south, and east and west. They contended, especially if the Government insisted upon the principle that the boundaries of a claim beneath the surface shall be the planes of the surface boundaries, produced vertically, that to have the survey lines due north and south, and east and west, might, in certain circumstances, be attended with hardship. Their fears, I am convinced, would not prove well founded, unless in very exceptional cases; but as the principle involved is not one of much importance, and the sole purpose of this clause of the regulations was to secure the uniformity of mining claims with the rectangular system of survey, there would appear to be no very strong reason against the adoption of the amendment asked for, and I have recommended the request to your favourable consideration.

Thirdly, it was submitted that in consequence of the shortness of the prospecting season, it would be difficult, and in some instances impossible, for a miner to put \$500 worth of actual labour upon his claim in each year previous to purchase, and a material reduction of the amount was very strongly pressed for. Permit me to remind you that, when this feature of the regulations was under consideration, it was found somewhat difficult to arrive at a satisfactory conclusion. The object of the provision, of course, is to secure the development of a mining location in good faith, between the period of discovery and the issue of the Crown Patent, and to prevent its being held for purely speculative purposes.

The United States law requires that not less than \$100 in labour be expended annually, previous to purchase; and when our regulations were being framed, the minimum annual expenditure required by the law of British Columbia was \$1,000. During the fall of last year, when Mr. O'Reilly, Indian Reserve Commissioner, was on his way to British Columbia from England, the opportunity was seized to benefit by his long experience as a Gold Commissioner on the Pacific Slope, and to consult him regarding various questions, in regard to which his practical knowledge would be of assistance. I drew Mr. O'Reilly's attention particularly to this matter, and he expressed the opinion that \$100 was too small a sum, and \$1,000 much too large. It was, therefore, thought that \$500, being the mean between the two extremes, would probably be about the correct amount. At the last Session of the Legislature of British Columbia the Provincial mining law was so amended as to reduce the minimum annual expenditure in labour upon a mining claim to \$200. There would be no objection, I think, to the reduction of the sum to be expended annually upon a mining claim in our territory to the same amount.

The British Columbia law demands that not less than \$1,000 be spent in this way upon a claim before it can be purchased, and although this provision might tend to confine the sale of mining lands exclusively to actual explorers and working miners, it would, I think, operate as a considerable obstacle in the way to immediate sales, and also to prevent investments by men of capital in enterprises of this class.

The fourth and most important feature in the regulations discussed with the miners was that which has reference to the character of the claim. Nearly all those I met, and I think probably nearly all who either are now or were at any time prospecting in the Rocky Mountains, are United States citizens, with strong predilections in favour of the order of things to which they have been accustomed in the past, and therefore of what is known as the Californian or "ledge" claim, under which a miner has the doubtful privilege, when he owns a location containing a lode or vein of mineral-bearing quartz, to follow that lode or vein from its outcrop on the surface to its lowermost workings, even if, in its downward course, it should so dip from the perpendicular as to pass beyond the side lines of the claim produced vertically, and in this way out of the ground of the locator and under the surface-ground of his neighbour. I need scarcely say that, in the clause of our regulations which has reference to this point, is to be found the one radical difference between our system and that prevailing in the mining regions of the United States west of the Missouri; and that difference was not created without the most minute inquiry and the gravest consideration on your own part. The history of the mining industries of the Western States sufficiently accounts for the peculiar property in a mineral discovery which is acquired under the "ledge" system. Up to 1866, there was no law of the United States governing the mode of laying out and disposing of public lands known to contain gold and silver—copper, lead, tin, and other base metals, being the only minerals for the mining of which previous legislation had provided. By an ordinance of the 20th May, 1785, all gold and silver had been reserved. As a matter of law, therefore, every prospector and miner operating on the public lands for gold or silver was a trespasser; but as a matter of fact, the legitimacy of their possessory titles came, in time, to be recognized. With the discovery of gold by John W. Marshall, at Coloma, California, on the 19th January, 1848, the history of mining for the precious metals in the Western States began. There were then no legal tribunals of justice in California; but the miners took this matter in hand themselves. Their custom was, when a discovery had been made in any region, to meet in public assembly—two being a quorum—organize a mining camp or town, and pass such resolutions and regulations as they might think fit. In enacting these resolutions they assumed both civil and criminal jurisdiction, and this mode of administering justice continued until the organization of State and County Courts. Afterwards, in regard to the size and conditions of working mining claims, and until abrogated or amended by the authority which enacted them, these local regulations were recognized by the Courts, and had all the force of law. Almost every mining district had a different set of regulations. About 1860, when the taxes resulting from the Civil War pressed very heavily upon the industrial and commercial classes of the American Republic, the people of the Eastern and Central States began to demand that the public lands in the west, out of which so many men were making a living, and quite a few enormous fortunes, should be made to contribute their fair share of the public burdens. When the legislators came to consider how best to give effect to the public desire in this respect, they found themselves confronted by very great difficulties, arising out of the different local customs and regulations under which vested rights had already been created. The Act, therefore, which finally found its way into the Statute Book, was not such a measure as those who were responsible for it would have framed had they commenced with a fair field, but was simply an attempt to give the existing state of things formal legal recognition, and to make the mineral property of the General Government to some extent tributary to the general revenue. The size and shape of a mining claim under local regulations depended greatly, if not indeed entirely, upon the number of prospectors among whom the mining lands in a particular district had to be divided. When the claimants were few the claims were large. When the claimants were numerous the claims were small. It is, therefore, not to be wondered at that, in this primitive state of things, the actual discoverer of a mineral outcrop on the surface should desire to be protected as far as possible in his discovery; and as he had no intention of becoming a permanent resident upon his claim, he cared nothing

for the land itself, except as an easement connected with his mine. All he looked for was a possessory title to the lode or vein, and this he insisted upon being permitted to follow underneath the surface wherever it might go. This principle the Government of the United States found itself under all the circumstances compelled to embody in the law, and it continues to be recognized up to the present time. In 1880, however, a commission appointed by the President, in accordance with a resolution of Congress, submitted a report upon the whole of the laws affecting the public lands, including mining lands, with two large volumes of the evidence they had collected, and upon which the opinions expressed in the report were based. This report I took with me to the North-West, and read to the miners extracts from it, and from the evidence bearing upon this point which I had already selected and marked. I need not here reproduce those extracts, but I may say that, in effect, those to whom they were read, pronounced the most severe and scathing condemnation upon the operation of the California principle, which they declared to be the cause of fully one-half the litigation which has characterized mining wherever the "ledge" claim prevails. If quartz claims consisted entirely, or even mainly, of well defined fissure veins of regular course and dip, the mineral material and walls of which clearly define them from the inclosing rocks, and the unity of the whole formation were shown by its smooth, unbroken continuity from a visible apex upon the surface down to its lowermost workings, the commissioners were of opinion that not much harm might result. "With such a defined fissure vein," they say, "by spending many thousands of dollars, and provided his cloud of expert witnesses are not tripped up by clever cross-examination, and the judge is impartial, and the jury are not corruptly influenced against him, after many months and perhaps years, during which his enterprise has been handcuffed with injunctions, and himself reduced to poverty, the owner might derive whatever hollow comfort he could from a victory which left him ruined." It has proved in practice, however, and in law, that a lode or ledge is an absolutely indefinite thing. Two classes of cases will serve to illustrate how mischievously the "ledge" principle works. The deposit may consist of a main central body of ore, with several dependent bodies. One discoverer may locate his claim on the outcrop of the main body, and another on the outcrop of a dependent body. In working downward both find their lodes or veins converge into a single ore chamber. Or again, the deposit may be so broad on the surface that two or more parallel claims, each having an apex, may be located side by side across the outcrop. In this case also, the miners, in working downward, find themselves on one lode. In both the instances referred to, there has been, so far as the miners are concerned, a *bona fide* independent discovery of mineral bearing quartz upon what, even to the eye of the expert, appear to be independent outcrops of separate and distinct lodes or veins. When development reveals the actual facts, need it be said, quoting the words of the report, that: "murder sometimes, litigation always, follows."

However reasonable, therefore, it might appear in theory, that a miner should be permitted to follow, so far as it goes, in a downward direction, the vein or lode which he has discovered, experience shows that, far from conferring upon him any advantage, the permission to do so has been found to be productive of costly and vexatious litigation, of bad blood between man and man; and has been a real bar to the investment of capital, and to the progress of the mineral industries of the country.

Mr. J. J. Valentine, Vice-President and General Superintendent of Wells, Fargo & Company, furnished to Mr. Williams, Compiler of the Report of the United States Geological Survey of 1883, upon the condition of the mining industries, an estimate of the products of gold and silver west of the Missouri, from 1870 to 1882, inclusive, from which it appears that the total has increased from \$51,000,070 in the former year to \$77,144,337 in the latter. Of this, the celebrated Comstock lode, produced in 1882, \$1,333,018—a very large proportion, certainly, and yet almost half a million short of its contribution for 1881. I mention the Comstock principally, because the Report of the United States Land Commission directs attention to the fact that, in consequence of a dispute arising out of the "ledge" system, it cost \$3,000,000 in

litigation, and \$15,000,000 in underground development, to establish which of two contending parties was entitled to the location.

I respectfully submit that, commencing, as the Government of Canada does, with a clear field in the mining country under its jurisdiction on both sides of the Rocky Mountains, and unembarrassed by local legislations or vested interests of any kind, it would be unwise to depart from the sound common law practice of granting to a man under Crown Patent, for mining purposes, all that may be within the exterior boundaries of his property or piece of land produced vertically, and no more.

As to the probable ultimate success of mining enterprise in the region of the Rocky Mountains traversed by the Canadian Pacific Railway, my visit to the country put me in possession of no information which would enable me to arrive at any conclusion. Some specimens discovered have assayed poorly, others have assayed well, and now that the railway has been completed and is actually operated beyond the summit, there need be no reason why any mine that is fairly productive should not be worked to advantage.

CALGARY DISTRICT.

In consequence of an accident which befel me on my return from the Rocky Mountains, my stay in the neighborhood of Calgary, which I did not expect would exceed four or five days, was prolonged to very nearly three weeks. In this way I had the opportunity to meet with a much larger number of the people of that section than I otherwise would. I found some of them disposed to grumble (although the land on which they squatted had been surveyed) on the ground that the previous year the local agent was not yet in a position to record their entries. I pointed out to them that during the summer and autumn of 1883 the surveyors of the Department had sub-divided and set out for settlement no less than 27,000,000 of acres; that this enormous area was divided amongst a large number of surveyors, who performed their work under contract; that in order to secure that reasonable approach to accuracy, without which sub-division surveys are practically useless, and are indeed a waste of public money, it was necessary that the survey of each contractor should be examined on the ground by the application of the usual tests; and subsequently that the plans and field notes should be carefully gone over in the office of the Surveyor-General at Ottawa, by experts specially trained for that work; that so to examine, and in some cases to correct the surveys of so many of the townships, and to produce the lithographed copies of the plans, which the law requires shall be in the hands of the local agents before either sales or entries can be made, must take up a good deal of time; and that it would be unreasonable to expect at Calgary, situated at the extreme western end of the region within which these surveys had been made, and the operations of surveyors being necessarily conducted from the several meridians westward, that any very large number of the townships in that vicinity should be opened for entry within so short a period. I also reminded them that *bond fide* residence upon and cultivation of land open for homesteading, in advance of survey, counts to the settler just the same as if made after the entry is recorded.

With this explanation I found they were satisfied; and, indeed, there never would have been any uneasiness but for the insinuations of ignorant and mischievous people, and the impressions created by loose statements in the press, that the Government, in some undefined way, and in regard to people whose names have never yet been mentioned, disallowed the legitimate claims of actual settlers. I may say that any want of confidence existing amongst the settlers elsewhere in the North West, at any time, arose from similar causes. I may here observe, that, in regard to the grandeur of its scenery and the advantages of its site, the town of Calgary is not surpassed, in my judgment, by any other in Canada. With such facilities for drainage and water supply, surrounded by an atmosphere so clear and invigorating, and blessed with such an equable climate, it bids fair to become the great inland-sanitarium of Canada.

SETTLERS AND GRAZING LEASEHOLDERS.

A strong effort is being made in some quarters, with what object it is very difficult to conceive, to create the impression that there is a conflict of interest between the ordinary agricultural settler and the grazing-leaseholder. There is no necessary or natural conflict of interest between these two classes. On the contrary, their interests are identical.

I discussed the subject with a large number of the range managers during the time I was at Calgary, and, with one or two exceptions, I found them strongly of opinion that the location of actual settlers upon the ordinary homestead and pre-emption holdings within their respective ranches, would be of mutual benefit to the agriculturist and the stock-owner. The advantages to be expected from this might be illustrated by reference to the case of the Cochrane herd during the winter of 1881. If from fifty to one hundred settlers engaged in mixed farming, had been located along the banks of the Bow River, west of Calgary, at that time, the decayed and decaying carcasses of so many of Mr. Cochrane's cattle would not, to-day, have been presented to the sensitive eye of the land hunter.

Arriving in the country, weak and footsore, after a long and exhausting journey, these animals were almost immediately compelled to struggle with a heavy snow-storm, accompanied by severe frost. The result was unfortunate for Mr. Cochrane, although it involved no reflection upon the adaptability of the country for cattle raising. The winter was, in fact, an exceptionally severe one, the like of which had not been known for years before, and has not been experienced since; but if any feed had been procurable within a reasonable distance, and at almost any price, Mr. Cochrane would have purchased it, and thus would have been able to save a large proportion of his herd. It will not be profitable for stock men, in view of the infrequency of severe winters, to make specific provision against them each year; but in order to escape occasional disaster they will be compelled either to do so or to encourage the settlement in their ranches of agriculturists, from whom they could purchase the necessary supplies in case the necessity arose. There are numerous other ways in which the actual settler would be a desirable adjunct of the cattle range' and the fact that from this class the stock raiser could rely upon obtaining, at reasonable cost, the assistance which, at certain periods of the year, is necessary for the proper conducting of his business, would render it unnecessary for him to keep in permanent employment a larger number of men than he has constant need for. Settlers naturally select their homesteads either on the river fronts or in the vicinity of the towns and railways. To those localities the range cattle will not, under ordinary circumstances, resort; their haunts being the higher and more remote lands, where they are not likely to be disturbed by the presence either of men or steam engines.

The alleged antagonism between settlers and stock men is purely theoretical, and has no existence in fact. There are instances in which small speculators force themselves upon ranches for the purpose of engaging in the business of stock raising, and entering into competition with the individual or corporation leasing the land from the Government. They invariably take up choicest locations on the invaded ranche, and they insist upon using the best of the public lands without paying for them. These lands are the property of the whole people of Canada, and there is no reason, so long as they continue to be so, why those who use them should not pay the reasonable value of the privilege. This the leaseholders are compelled to do, and those who trespass upon their ranches, either with the object already stated, or to extort some consideration for departing quietly, have surely little claim to popular sympathy.

SHEEP RANCHING.

Sheep raising is likely to become a valuable industry along the base of the Rocky Mountains within a very short time. The difficulties and disputes which have

arisen in the United States in consequence of sheep and cattle grazing upon the same ranges, are not likely to be repeated on our side of the International Boundary; for a recent Order in Council provides for the exclusion of sheep from the territory bounded on the east by the Bow River and the 4th Meridian, and on the north by the northern branch of the High River, which is *par excellence* the cattle range of the North-West. There is much land within this territory which is well suited for sheep, and much outside of it equally well suited for cattle; but the dividing line, in addition to being a distinct and well defined natural boundary for the largest half of its length, is probably the best that could have been devised; and the conflict it was intended to obviate, one which the public interest demands should be prevented at all hazards.

REGINA AND MOOSE JAW RESERVES.

On my way eastward I spent two days at Regina, and had interviews with a large number of the settlers in that vicinity. The reserve at that point had previously been visited by Mr. Commissioner Walsh and Messrs. Pearce and Smith, and the Land Board had submitted to you a proposition for the opening, for agricultural settlement, of the even sections not required for town purposes, which I was authorized to discuss with those concerned. Some suggestions were made which appeared to me to deserve favourable consideration. They were adopted by the Board, and thereupon the reserve was thrown open upon terms entirely acceptable to the settlers. Since then the reserve around the town site at Moose Jaw has been made available for settlement upon similar conditions. I take this opportunity of acknowledging the valuable services rendered me by Mr. N. F. Davin, barrister, Regina, through whose courtesy I was enabled to meet so many of the settlers, and to ascertain so clearly and fully their views upon the questions then pending.

TIMBER FOR SETTLERS.

While at Regina I had the pleasure of meeting several members of the North-West Council, which was then in session, and amongst others, Mr. Sheriff, the representative of the Moose Mountain district, who placed in my hands a petition addressed to you, asking for an increase in the quantity of timber which settlers are permitted to cut for building purposes under free permit.

It is a somewhat difficult task to convince the ordinary settler of the wisdom of the efforts of the Department to conserve the timber on the public domain; and measures, the sole object of which is to prevent the abuse but permit the economical use of our comparatively limited supplies, are apt to be resented as unnecessary and oppressive. It may be well to state here that if the quantity of timber on any quarter of an even-numbered section, which would otherwise be open to homestead entry, exceeds twenty-five acres, the law requires that it be reserved for the benefit of those whose homesteads contain no timber; otherwise, the homesteader is entitled to use all the timber on his land for his own purposes, until the issue of patent, after which it becomes his personal property. In any event, the homesteader who has no timber on his own, is entitled to obtain a free permit from the nearest Crown Timber Agent to cut upon Crown Lands a quantity estimated as sufficient for the construction of a fair-sized dwelling house.

THE BELL FARM.

I spent a day at Indian Head, and succeeded in effecting reference of the difficulty between the proprietors of the Bell Farm and the squatters to arbitration. The squatters choose Mr. George Taylor, M.P., Gananoque, to represent them, and the company appointed Mr. John F. Wood, M.P., Brockville. These gentlemen visited the ground as soon as possible after my return to Ottawa, and agreed that the actual value of the the squatters' improvements should be paid by the company;

that the squatters should select homesteads upon the public lands open to settlement; and that the Government would be asked to favourably consider their claim to have the period of actual residence and cultivation of the lands they occupied within the company's tract credited in regard to the lands selected. To this settlement the Government and the company agreed, and it has been accepted by all the squatters but one. I made a thorough inspection of the tract sold to the company, and found the crops in a forward and promising condition, and must add my testimony to that offered by all who have seen the farm, as to the illustration it affords of the wonderful grain-producing capacity of that section of the North-West. My objects were facilitated in every possible way by the manager, Major Bell.

INTERVIEW WITH MESSRS. FLEMING AND SIFTON, AT BRANDON.

I also stayed over for a day at Brandon, during which time, in addition to seeing and conversing with many of the people, I had a meeting, previously arranged for, with representatives of the Manitoba and North-West Farmers' Union, who submitted a memorandum, of which the following is a copy:—

“ BRANDON, 15th July, 1884.

“ DEAR SIR,—Being instructed to wait upon you by the Executive Council of the Manitoba and North-West Farmers' Union, in reference to the various questions presented by the laws relating to the Dominion Lands, we beg to call your attention to the following points as worthy of consideration :

“ The numerous changes in the land laws of this Province have produced a want of confidence, a feeling of suspicion and discontent in the minds of the people who are anxious, as far as possible, to conform to all needful restrictions. By the confusion and uncertainty thereby created, the settlers are deprived of the advantage which would result from a definite system, thoroughly understood by them; and they are thus left subject, to a large extent, to the discretionary power of individuals, a power which we have reason to believe is too often abused.

“ The delay in obtaining homestead entries, the uncertainty in the minds of the people as to the actual provisions of the law, and the conflicting construction placed upon the law by the various agents throughout the Province, and the Land Board at Winnipeg, have, to our certain knowledge, had a most disastrous effect in deterring persons who would have been desirable settlers from taking up land in accordance with their desires. There is no doubt that in the manner thus briefly indicated an enormous amount of harm has been done to the country at large, and it has become the conviction of many intending settlers that it is impossible to procure eligible homesteads.

“ Having exceptional facilities for knowing the feeling of the people, we, on behalf of the farmers' organization, would suggest that, with a view to remedying the above evils, the following recommendation be made to the Minister of the Interior :

“ That no change be made in the law relating to Dominion Lands, except by Acts of Parliament, and that the entire law be embodied therein.

“ That the advice of persons resident in this Province, and known to be practically acquainted with the working of the land regulations, be heard before any changes are carried into effect.

“ That the relative rights and the discretionary power of the Land Board and of local agents, respectively, be strictly limited and defined.

“ If the above recommendations were accepted and acted upon, we are convinced that in a very short time the present dissatisfaction would wholly cease; the recent changes in the law having, we believe, been of great benefit, and if the same were defined and confirmed by legislation, would be still more advantageous. At the present time the dissatisfaction is principally caused by lack of information as to

what the law is, conflicting constructions of the same by different officials, and the apparently arbitrary exercise of discretionary authority.

“ We have the honour to be, Sir,

“ Yours &c.,

(Signed) “ ALEXANDER FLEMING,

do “ CLIFFORD SIFTON,

“ For the Manitoba and North-West Farmers' Union.

“ To A. M. BURGESS, Esq., Deputy Minister of the Interior.”

In handing me the memorandum, Dr. Fleming took occasion to say that it must not conflict with any action that might subsequently be taken by the executive of the Farmers' Union. This I took to mean that the memorandum had not been submitted to or authorized by the executive, and that Messrs. Fleming and Sifton were individually responsible for its contents. This Dr. Fleming admitted to be a correct interpretation. There was, of course, no special object in receiving representations of this description from two professional gentlemen living in Brandon and following agriculture as a sort of secondary pursuit. Indeed, I supposed, until the last moment, that I was being presented with the authorized views of the Union; but, as my instructions from you before leaving required me to obtain all possible information respecting the working of the land laws, I was quite ready to receive it from any and every source. I need not here record the particulars of what occurred at the interview, which took place in the presence of the Mayor and leading citizens of Brandon, and was reported in the press of the Province at the time. I may simply state that I could obtain from Dr. Fleming and Mr. Sifton no account of a single specific case to which the remarks contained in their memorandum would apply; and as to the vague allegations of suspicion, discontent and want of confidence in the minds of the people, I found, on the contrary, that all with whom I met (although many of them complained bitterly of their misfortunes during the previous season, with which the land law or the manner of its administration had nothing whatever to do) were quite satisfied with that law in its existing form, and full of hope and confidence at the prospect of an abundant harvest which has since been so happily realized.

MIXED FARMING—CARE OF IMPLIMENTS.

The partial failure of the crop last year was, undoubtedly, a very great calamity, and was the principal cause, combined with the exaggerations indulged in at some public meetings in the Province, and by a number of organs of public opinion in Manitoba and elsewhere in Canada, of reducing very materially the settlement made upon public lands this season. But the people have learned some valuable lessons from their misfortune, one of which is that, however profitable the growing of wheat may be in a country so well adapted as the North-West for the production, at very small cost, of enormous crops, it is better that the bulk of the population should not be entirely dependent upon that one industry. What makes exclusive wheat growing very enticing to a certain class of settlers is, that it leaves at their disposal a considerable portion of the year, during which they may give their attention to other pursuits. But it is with farming as it is with every other calling in life, to be successful, a man must, as a rule, give to it his whole time and energy. Except in cases like the Bell and other similar large farms, where the raising of grain is made a specialty, and not only is the land selected for that purpose, but the most improved methods are resorted to, and the best procurable machinery obtained, I am convinced that mixed farming would, in the end, prove the most profitable to the settler, and most advantageous to the country. The recurrence of the disaster of last year would in this way be avoided, and a homestead would become much more the actual home of the farmer than it is at present; thus promoting the *bonâ fide* settlement of the land,

the establishment in rural districts of schools, churches, and social organizations, and the greater comfort of the majority of the people. The average homesteader has, in too many cases, neither cows, sheep, pigs nor poultry; and the consequence is that almost everywhere throughout the Province the products of these animals are scarce and dear. That the farmer should be a customer of the country storekeeper for such articles as butter, eggs and bacon, is almost beyond belief, but it seems to be the fact nevertheless. Of the advantages of mixed farming the people themselves are rapidly becoming convinced, and it is shown by the statistics collected with so much care, and published, from time to time, by the Department of Agriculture of the Province of Manitoba, that great advances in the direction of this change have been made in the course of the past two or three years. Another respect in which there is great room for improvement, is the care of implements. I regretted to see, on every hand, valuable ploughs, harrows and harvesters lying in the open air, exposed to sun, wind and rain—a condition in which, I am informed, they frequently remain throughout the whole season, except when they are in actual use. Many of these articles have been purchased on long credit—and, it is not necessary to add, at long prices, too—and it is greatly to be feared that, in many cases, they will be worn out through exposure to the weather before they are actually paid for.

I have the honour to be, Sir,

Your obedient servant,

A. M. BURGESS,

Deputy Minister of the Interior.

The Hon. Minister of the Interior,
Ottawa.

I want to add, at the point where I mentioned the arrangement made with regard to the exclusion of sheep from the cattle country, that the cattle industry has grown to be one of great importance to the North-West; that there are millions of acres outside of the territory now occupied for that purpose—as there will continue to be for many a year to come—the quality of which is far better suited for ordinary agriculture; and that, in my opinion, it would be a great public misfortune if the Government should pursue any course calculated to interfere with the successful pursuit of cattle raising, and the investment of a still larger amount of capital in what is proved to be so important an adjunct to the opening up of the country.